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Understanding Agriculture's Transition into the 21st Century

Challenges, Opportunities, Consequences And Alternatives

David M. Saxowsky, Associate Professor
Dr. Marvin R. Duncan, Professor

NDSU
Department of Agricultural Economics
P.O. Box 5636
North Dakota State University
Fargo, ND 58105-5636

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Abstract

Advances in production, communication and transportation technologies as well as expectations of consumers, taxpayers, business people and rural residents continue to cause changes in agriculture and rural areas. These changes pose challenges, such as increased competition, as well as offer opportunities to produce specialized products and reach new markets. The opportunities for production agriculture appear to be 1) low-cost, large-scale commodity production, 2) medium- or small-scale commodity production combined with non-farm sources of income, or 3) production and marketing of specialized products. Emerging opportunities for rural businesses appear to be in serving production agriculture and agribusinesses by meeting their unique needs. These firms also can use advancing communication technologies to reach distant markets. Many business managers are adopting strategies that will shift their firm away from perfect competition. Opportunities for rural communities lie in using technology to efficiently provide services to rural residents. The size and composition of rural communities also will be redefined by advances in communication and transportation technologies. The decision of how to pursue these opportunities require a thorough understanding of what is occurring and thoughtful deliberations.

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An educational effort initiated in 1995 focused on the ongoing challenges and opportunities faced by rural residents as a consequence of changes occurring in agriculture. One part of the effort was a regional conference on the *Industrialization of Heartland Agriculture* held at Minneapolis, Minnesota in July 1995. Like that conference, support for the development of these educational materials was provided in part by

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Introduction

Many rural residents, farmers and those who reside in small towns across rural America are sensing that changes are underway which will affect their careers and personal lives in important ways. Some are concerned that many of the things about farming and rural living which they value could be lost.

In such an environment, it is important to remember the need to think and talk about change, understand it, and look for ways to influence both the direction and pace of change.

Periods of change also are periods of opportunity. By thoughtfully assessing individual and community strengths and weaknesses, as well as understanding the impact of current changes, individuals and communities can prepare to identify opportunities and action plans that will achieve their goals.

This educational material is intended to help farmers and residents of rural communities better understand the nature of the current changes and to empower them to shape the changes in ways that bring opportunity and promise to rural America.

We hope you will read this material and actively discuss the meanings these changes hold for your future and for your community.

Overview

Concerns are being raised, and discussions and debates are being held about changes that are occurring in agriculture and rural communities. A major concern is that as farms continue to grow larger, the number of farms continues to diminish, and rural communities lose population, businesses, local services, and a way of life. A related concern is that the standard of living in rural areas has historically been lower than in urban areas.

A second concern is that expanding farm operations reduce the number of workers in the community and that some individuals are employees, rather than business owners. A loss of individuality and independence is related to this concern. A third concern is that local decisions are being removed from the control of persons living in the community. A final concern is whether the local environment will be adversely impacted by these distant decisions.

But at the same time, improved communication, transportation, and production technologies are creating new opportunities for farmers, rural businesses and rural communities. The disadvantage of distance is diminishing for persons and firms willing to take advantage of these technological advances. Likewise, producers of agricultural commodities are overcoming the disadvantage of not directly interacting with the final

"Whether you consider (industrialization) good or bad, or a mixed blessing, depends on your attitude and understanding of agriculture."

Neil D. Hamilton, Drake University, excerpt from *Industrialization of Heartland Agriculture*

consumer of their product by establishing ongoing relationships with processing and retail firms, and positioning their businesses to meet consumer demand. As a result, these individuals have been able to improve their standard of living without relocating. Whether the current situation raises more concerns or offers more opportunities usually depends on the perspective of the individual who is making the assessment.

For some time, the trend in agriculture and rural areas has been referred to as the industrialization of agriculture. Although the term is frequently used, its definition varies. Some say industrialization is a continuation of a process of adopting technology, expanding farm size, and decreasing farm numbers that has been ongoing for most of the 20th century. Others describe industrialization as agriculture creating opportunities by adopting business strategies that have been practiced by other industries for some time. A third description of industrialization is that it is the last straw; it is the economic pressure that will cause the demise of many farms, rural businesses, and rural communities.

As explained in a subsequent section, industrialization, for the purpose of this material, is defined as adopting business strategies to shift farm businesses away from perfect competition. This is typically accomplished through a variety of business arrangements, including linkages or alliances that join together, under the same management control, a combination of input supply, production, processing, distribution, and marketing in the agricultural sector.

Regardless of the definition of industrialization, it is generally accepted that agriculture is under considerable pressure to change and that these changes have serious implications for rural communities which depend on agriculture. The goal of this educational program is to help individuals make personal decisions about how they will respond to current challenges and opportunities, and to help communities make collective decisions about policy matters. To reach this goal, participants need to 1) understand the trend, its underlying causes, and its implications, 2) identify opportunities, and assess their consequences, and 3) become an active participant in the decision making process.

"I believe we can be the architects of our own destinies."

Sarah Vogel, former North Dakota Commissioner of Agriculture, excerpt from *Industrialization of Heartland Agriculture*

The purpose of this educational material is to facilitate discussions among farmers, rural business people, and rural residents about the current trend. The following issues will be considered:

- What **changes** are occurring in agriculture and rural areas?
- What **causes** underlie the current trend?
- What **impacts** will these changes have on farms, rural businesses, and rural communities?
- What **opportunities** are available as a result of the current trend?

The material is intended to encourage participants to consider a range of issues arising from the industrialization of agriculture. It is organized into sections based on the questions listed above. Each section includes a brief explanation of the issue, some background information, and questions to stimulate discussion. Some issues focus on policy questions that may require a decision by a public group, whereas other topics relate to management strategies of private firms.

These materials are not intended to draw conclusions or to provide answers, for several reasons. First, no one has a better understanding of available alternatives than the persons involved in the situation. Each person must decide how they will proceed, rather than having a decision presented to them. Second, each person has different values and goals for themselves and their community. These differences often reflect the individual's situation — factors such as employment status, age, family responsibilities, health, skills, and experiences. Thus each person's perspective is different, and perceived alternatives and their relative merits will vary. People will disagree as to what should be the future of rural areas.

From these differences, ideas and opportunities will be identified, but each person, group, and community must actively participate in determining their individual and collective responses.

What Changes Are Occurring In Agriculture And Rural Areas?

The decade of the 1990s is not the first time agriculture and rural areas have experienced changes. For example, the number of farms and the population in many rural areas have been declining in the United States since the 1930s. The past 60 years often are described as a time characterized by

- wide-spread adoption of production technology by farmers, specialization in commodity production, and consolidation of farms into larger units in an effort to gain economies and increase profit;
- new technology which allows capital to replace agricultural labor, improve the standard of living for farmers, and provide resources to enhance opportunities for those who will no longer be involved in farming;
- displaced farmers moving from rural areas or being employed on larger neighboring farms;
- apprehensions that large farms controlled by outside interests overlook local concerns in an effort to maximize profit for owners;
- declining rural population as individuals pursue opportunities in urban areas;
- rural businesses serving fewer customers due to smaller population, declining number of farms, and larger farms relying on non-local suppliers;
- loss of rural businesses and further decline of rural population and economic activity; and
- rural communities no longer able to provide necessary services, leading to the eventual demise of the community.

Much of this trend has been driven by the desire of farmers and other rural residents to improve their standard of living. That basic driving force is not likely to change; but the opportunities to improve the standard of living in rural areas are changing. The remainder of this section considers what is changing for farmers and other rural residents.

Changes in Farming

Changes in farming this past century could perhaps be described as a series of eras or major events. The precise time of the events or eras is not critical, but they reveal a pattern that helps explain current events.

1. ending of the frontier (circa 1900),
2. mechanization of agriculture (circa 1910s),
3. emergence of scientific agriculture (e.g., plant and animal breeding, petroleum-based fertilizers and chemicals, circa 1930s),
4. development of an ongoing world market for agricultural commodities (circa 1970s),
5. emergence of a system-based food production process (1980s), and
6. emergence of an information-intensive food production system (1990s).

The first four of these events are probably quite clearly understood (primarily due to the passing of time), but the more recent emergence of an information-intensive food system may be less clear.

Some sectors of the agriculture industry, such as poultry and pork have evolved into a **food production system**. A primary characteristic of a production system is that the relationships among input suppliers, producers/farmers, commodity buyers, food processors, and food distributors have grown closer. The firms which comprise the various stages of the production process no longer limit their interaction to commodity marketplace transactions. Instead, these businesses are establishing longer term relationships wherein the seller becomes familiar with the unique needs of the buyer's business. The seller then modifies its product and service to better meet those needs. At the same time, buyers develop a reliance on identified sellers with hopes of buying more consistent inputs with which to produce more consistent products. In some situations, firms are selecting who they will conduct business with by placing more emphasis on non-price considerations than on price. *What is unclear at this time is the extent to which other sectors of agriculture also will evolve into production systems.*

The closer relationships among businesses in the food production systems have taken several forms. In some cases, one firm operates all stages of the production process; thereby controlling a production system that extends from acquiring raw inputs and commodity production, to processing, distributing and marketing to consumers. A single firm that owns and controls an entire production process is described as being **vertically integrated**.

"An increasing amount of the food dollar is collected beyond the farm gate. As a result, we are seeing renewed interest by farmers in investing in value-added activities."

National Council of Farmer Cooperatives, 1995 Annual Report

In other situations, several independently-owned firms enter into long-term agreements to buy and sell their products with the understanding that the seller (firm 2) will modify the type and quantity of the product as well as the time of production to meet the buyer's (firm 1) needs. These contracts often cover several production and delivery periods, and are entered into before production occurs. This strategy also envisions that the firm (firm 3) which supplies the seller (firm 2) also will modify its product to meet the needs of the seller (firm 2) and indirectly the needs of the buyer (firm 1). Thus, there is a coordinated relationship among independently-owned businesses throughout the production process. This strategy is referred to as **vertical coordination**, and relies on **strategic alliances**. Buyers and sellers view each other more as partners, and less as adversaries. Again, price is not the only consideration (and may not be the primary consideration) in establishing these linkages.

In some situations, these relationships have characteristics of both vertical integration and vertical coordination. For example, one firm may supply inputs to a farmer as well as buy the farmer's produce. A firm that supplies feeder pigs and feed to a farmer who then raises the animals and sells them back to the same firm for slaughter illustrates such an arrangement. A variation of this strategy has the supply firm retaining ownership of the animals, providing all the inputs needed to raise the animal, and paying the farmer a fee for housing and caring for them. These relationships are often described as **integrator contracts**.

Coordinated production processes also open an opportunity for farmers to **further specialize**. For example, a hog farmer may no longer be involved in raising the pigs from farrowing to slaughter, but instead, focus on just one stage of production and rely on other farmers to complete the other stages of production. Again, a coordinated approach is critical to the success of each operator.

Another strategy being pursued by farmers is to **add value** to their commodities. In some cases, farmers are feeding their grain to livestock and selling animals rather than feed grains. Alternatively, farmers are developing firms to process their commodities into food or fiber products. But due to the costs and risk associated with developing and operating a processing firm, farmers are forming co-owned processing firms with an understanding (contract) that the farmer/owners will sell their commodities to the newly-developed firm. Some of the **farmer-owned processing** firms are being organized as cooperatives wherein the farmer must be an investing member in order to sell to the processing firm (a closed or contract cooperative). In other cases, the farmer-owned processing firm buys from non-

investors as well. Like some of the strategies already described, these arrangements have characteristics of both vertical integration (some common ownership) and vertical coordination (contractual relationships).

Why Are Farmers Making These Changes?

To understand this trend in agriculture, it is necessary to consider the reasons farmers are adopting these strategies. Why are they no longer exclusively relying on new production technology to lower costs? Why are they no longer simply looking to expand their operation to capture available economies of scale? There may be several reasons.

- Farmers understand that the advantage of new technology exists only until other producers adopt it, and that as more technology becomes available, the period of time during which new technology offers an advantage grows shorter; that is, the product life cycle is shorter. However for the foreseeable future, there will be farmers whose primary strategy will be to continue adopting technology and expanding their operation in an effort to be the low-cost producer.
- Farmers believe other sectors of the agriculture industry offer new opportunities to earn additional profit, so they attempt to become involved in them without discontinuing their farm business. Often these opportunities arise from expanding markets and changing consumer demand.

But perhaps a review of some basic economic theory may offer additional explanation for the current strategies.

Some Economic Theory

Businesses in market economies, such as the U.S., find that they face different levels of competition based on the characteristics of the industry. Farming often is used as an example of **perfect competition**. The characteristics of a perfectly competitive industry are

- many buyers and sellers,
- mobile resources (inputs such as labor, capital, and land can be shifted from producing one product to producing another product if it enhances profit to do so; this is the characteristic of perfect competition that farming lacks because 1) it often is difficult to find an economical alternative use for agricultural land, and 2) the reluctance of some producers to change their career because they do not want to give up the farming way of life even though they may be earning a low return for their labor),
- homogenous product (competing firms produce nearly identical products so they readily substitute for one another),
- equal access to production technology (farmers are not prohibited from buying the newest seed variety, using the latest herbicide, or purchasing the most advance equipment) and market information (such as provided by the futures market and other public markets), and
- ease of entry and exit (it is easy for a firm to acquire or dispose of the resources needed to produce farm commodities; this is characteristic of farming even though it is often stated that "it is difficult to start farming today").

The result of perfect competition is limited opportunity to earn more than a minimal return or profit. If a firm in a perfectly competitive market is earning extra profit, another firm will begin producing a similar product and compete for a share of the market.

By comparison, an industry with **imperfect competition** lacks one or more of the characteristics of perfect competition. Firms facing imperfect competition often enjoy opportunities to earn higher rates of return because potential competitors are in some manner blocked from entering the market. Basically, the strategy some farmers are adopting is to move their firm from one of perfect competition to one of imperfect competition, with the hope of enhancing their profits.
Several examples illustrate this principle.

- By adopting technology, farmers are no longer using identical information about production practices. However (as mentioned above) if the technology is available to all farmers, it is only a matter time before others also adopt it and thus return the industry to the point where most producers are using similar information. As a result, widely-available technology offers only a temporary advantage to the early adopters.

- Contractual arrangements which provide farmers with production technology that is available to only a limited number of producers eliminates equal access to information and offers an advantage to those who possess and control it (for example, proprietary genetics in the swine industry). If access to information or the technology is effectively controlled, the duration of the technological advantage can be extended.
- Contractual arrangements also can result in unequal access to market information and market opportunities; again, those with access to the information will have an advantage over those without access.
- Value-added processing eliminates the characteristic of homogenous products; farmers involved in processing their commodities are no longer limited to selling their commodities in a market filled with ready substitutes; instead, they are more likely competing with a smaller number of other processing firms. Processing also offers an opportunity for the farmers to convert their commodities into a product with unique characteristics, and thus reduce the level of competition if there are fewer substitutes available in the market. However, value-added processing does not eliminate competition from other firms which produce a product that can be readily substituted for yours.

These examples illustrate that many of the strategies farmers are pursuing at this time can be described as efforts to enhance profit opportunities by eliminating one or more characteristics of perfect competition. That is the definition of **industrialization** for the purpose of these materials:

adopting business strategies to shift the farm business away from perfect competition

Industrialization of agriculture is people pursuing business strategies that allow them to sell into a market with imperfect competition.

This definition also suggests a fundamental question for farmers to ask themselves — *what opportunities do I have and am I willing to pursue to shift my farm away from perfect competition*.

Changing from Commodity to Product

Implementing a strategy of vertical coordination in an effort to remove the farm from perfect competition has a substantial impact on the farm's marketing practices. Rather than selling the produce on the commodity market where substitutes are generally available, and where production, consumption, and price information is widely known, the product will be increasingly sold in a market where the information is more closely-held.

> "In the new food market, traditional division among the market segments are becoming less distinct. As the traditional market division blur, the old pricing scheme linking the market segments are being replaced by other devices, such as contracting and vertical integration. In brief, the new food market relies less on prices set in the trading pits of major commodity exchanges and more on private contract negotiations behind closed doors to divide risks and profits among farmers, food processors and retailers. Thus, the transition in the food system raises the question of how the risks and profits of the new market system will be shared among the players from the traditional markets."
>
> Barkema, A. "New Roles and Alliances in the U.S. Food System." in Schertz, L.P. and L.M. Daft, eds. (1994). *Food and Agricultural Markets — The Quiet Revolution*, Economic Research Service, USDA, and Food and Agriculture Committee, National Planning Association, Report No. 270, pp. 111-112.

Likewise, vertical coordination impacts production practices. Farmers who are interested in developing a strategic alliance with a processor no longer focus on "producing what they can and then selling it." Instead, these farmers emphasize determining what processors need in order to respond to consumer demand and then altering their production practices as necessary to produce that product.

These strategies require producers to continuously assess how well their product currently meets consumer demand, and to possess a willingness and ability to revise their product or service to meet new demands. Likewise, producers who pursue these strategies need to be willing to discontinue producing a product for which there is no longer a demand.

Information-Intensive Agriculture

Another characteristic of industrialization is the extensive reliance on information; often privately-held information. Examples include unique production technology, unique market opportunities, and coordinated efforts based on rapid communication among firms. Agriculture, like many other segments of modern society, is embarking on an era dependent on information. Critical skills during this era will be collecting data from numerous sources, analyzing it, and using the information. Collection will involve routinely making observations to complement reliable private and public data sources. The computer will facilitate collecting and analyzing data, but it will be the people who know how to analyze data, interpret results, and make decisions based on the analysis who will succeed in an information-intensive era.

Many of the strategies being pursued in the industrialization of agriculture are shifting farmers from producing and selling a commodity in an open market to one of producing and selling a product where price and other information is not as readily available. Different production and marketing information and skills will be required. The challenge will be for individuals and firms to continuously assemble, apply, and control meaningful information.

Are These Changes Really New?

For much of this century, farmers have not limited themselves to producing only agricultural commodities. They frequently have formed cooperatively-owned businesses to supply inputs, or to market commodities they produced. Some of these farmer-owned cooperatives even expanded to where they manufactured the inputs that were sold to the farmers (for example, petroleum products), or processed the commodities into products to be sold to consumers (for example, dairy, fruits, nuts and vegetables). The question that then arises is "how are the industrialization strategies of recent years different from these previous efforts."

There are several critical differences. First, the strategy is being used for a wide range of agricultural commodities, including grain. Second, today's farmers are not limiting themselves to vertical integration, wherein they have an ownership interest in the agribusiness firm that purchases and processes their commodity. Instead, they are entering into contracts (vertical coordination) with firms they do not have an ownership interest in. In addition, if the producer has an ownership interest in the agribusiness firm today, it often is accompanied by an obligation to deliver a specified commodity. This leads to a second major difference between past practices and today's strategies of industrialization.

It will be the people who know how to analyze data, interpret results, and make decisions based on the analysis who will succeed in an information-intensive era.

The second difference is that the legal relationship between today's farmer and the agribusiness firm is more demanding, whether or not the farmer has an ownership interest in the agribusiness firm. For example, the contracts farmers are entering into increasingly specify the quantity, quality, and time for delivery. Such obligations are no longer limited to having the farmer deliver what was produced (regardless of quantity or quality), if and when the farmer wants to deliver. Instead, farmers now have the risk of having to deliver irrespective of what quantity or quality the farmer is able to produce. And if the farmer does not have the commodity necessary to fulfill the contract, the farmer will be expected to acquire the specified commodity so it can be delivered to the buyer, regardless of the cost to the farmer. Such legal commitments and **the resulting risk exposures are considerably different** from the arrangements farmers entered into in the past. But it is these differences that can shift a producer from perfect competition to imperfect competition.

Changes for Rural Businesses

Farmers and farm businesses are not the only rural businesses impacted by the industrialization of agriculture. Rural businesses which serve the agriculture industry and rural residents also are affected by the current trend. The trend of diminishing population and a declining number of farm businesses is not new. The more dramatic impact is that farms that have industrialized are less dependent on traditional rural businesses. Industrialized farms are no longer acquiring their inputs from local supply firms, but instead rely on integrators or vertically coordinated relationships to provide inputs. Likewise, they no longer rely on local markets to sell their commodities but again, rely on integrators, vertical coordination, or even vertical integration to move their production into the processing sector of the food system.

"I would assert that the quality of life in rural communities is much more related to what people want it to be and whether they are willing to work together to achieve their vision for the good community than it is on the particulars of resource use and ownership."

Dr. Ronald C. Powers, University of Missouri, excerpt from *Industrialization of Heartland Agriculture*.

Farmers diminished reliance on local businesses is due to 1) the farmers having reached a business size where they can directly transact business with wholesale suppliers and processors, and 2) the farmers' need for information, inputs and market opportunities that rural businesses traditionally have not offered. Thus, traditional rural agribusinesses are finding that their role is declining in an industrialized agriculture. The opportunities, instead, lie in being able to provide inputs that meet the unique needs of individual producers, or being able to preserve the identity of producers' product as they are moved to processing.

Changes in Communities

Rural communities also are impacted by the trend of industrialization in agriculture. Some communities will experience economic growth if a processing facility is located in their area. Other communities will find that continued expanding farm size and declining agribusinesses will lead to further decline of population and economic activity. However, if industrialization offers opportunity for farms and agribusinesses that are not dependent on large acreage, the trend could offer a chance for increased economic activity and rebounding population. Could the future offer a combination of small-acreage farms and agribusinesses interspersed among large scale commodity producers? Could these small-acreage operations generate as much economic activity and employment as the large acreage operations? What type of employment opportunities are offered by firms in an industrialized agriculture? What impacts would these firms have on the community and the natural environment? These and other questions are explored in subsequent sections. But a discussion of the causes of industrialization is needed before considering its implications and opportunities.

Summary

Farmers generally produce commodities which, by their nature, can be easily substituted for with commodities produced by other farmers. Thus the level of competition is high and the level of profit is low among commodity producers. In the past, the primary strategy was to increase profit by decreasing production costs through improved production technology. Industrialization is a trend in agriculture wherein the firms are seeking to complement strategies of improved technology by also adopting strategies to differentiate their product from those of other firms. The most common differentiations are predictable quality and timing of delivery; that is, individual firms cooperating to develop a production system. Strategies of vertical integration and vertical coordination accomplished through strategic alliances and contractual arrangements are only some of the tools being used to shift the farm from a perfectly competitive industry to one of imperfect competition, and hopefully enhanced profits.

Discussion Questions

What changes have occurred in farming in the past 10 years?

What changes do you expect will occur in farming in the next 10 years?

What changes have occurred in rural businesses in the past 10 years?

What changes do you expect will occur in rural businesses in the next 10 years?

What changes have you observed in your community during the past 5 years?

How are these changes different than what you observed during the preceding 20 years?

What changes do you anticipate for your community in the next 10 years?

How do you feel about these changes?

Which of these changes do you consider desirable? Why?

Which of these changes do you consider undesirable? Why?

What Causes Underlie The Current Trend?

Although some of the changes occurring in agriculture and rural areas at this time are similar to those that have been ongoing for most of this century, other changes are relatively new. This section explores reasons for the newer changes that characterize industrialization.

Technology

One major cause of the current changes in agriculture and rural areas is technology. Although development of technology has been ongoing for centuries, current technological developments are thrusting considerable changes upon agriculture. As in the past, advances in **production technology** lead to greater output which, in turn, exerts downward pressure on commodity prices. But in addition, expanded **communication** and **transportation technology** allows producers to almost immediately learn about and quickly respond to market opportunities in other areas or regions. For example, a shortage in one region no longer assures that producers in the area will receive a higher price. As a result of technology, the movement of information and product is more rapid than any time in history. Consequently, the level of competition also is reaching new heights.

"Although numerous forces and drivers are contributing to the structural changes that are occurring in agriculture, information and knowledge play a significant role."

Dr. Michael Boehlje, Purdue University, excerpt from *Industrialization of Heartland Agriculture*

Increased use of technology by farmers affects profitability in more than one way. As already suggested, advances in technology (especially production technology) increase supply which leads to lower prices. However, increased use of production technology also reduces the portion of inputs contributed by the farmer. That is, purchasing technology decreases the amount of their own assets farmers invest in producing the commodity. Their labor and risk exposure, for example, decline when additional production inputs (technology) are purchased and used. It is someone else's ingenuity (whoever developed and is selling the technology) that is producing an ever greater portion of the commodity. If the portion of inputs being provided by the farmer decreases, the share of the return that the farmer can expect to retain also decreases. Thus technology replaces the farmers' input and diminishes their share of the earnings.

A consequence of immediate information and rapid transportation is that the world's producers and consumers are being brought closer together. As explained in a subsequent section, there is a growing demand for world-wide reduction in trade barriers. This trend often is referred to as **globalization**; that many of the world's economies and much of the world's population are increasingly interdependent and functioning as a single economy. Advancing technology and globalization lead to **greater competition** among producers of goods and services.

Added competition among sellers, although often beneficial for consumers, generally has an adverse impact on prices and profits. Thus, businesses increasingly seek ways to become more efficient as well as distinguish their product from those of other producers. Obviously, these are the two basic strategies being pursued in agriculture (as described in the preceding section). The former (expand the size of the farm operation by adopting readily-accessible production technology) has been ongoing for decades, whereas the latter has arisen more recently; that is, efforts to break out of perfect competition.

Equally important is the **pace of technological developments**; it is rapid and not likely to slow. As a result, the level of competition will continue to increase. Even early adopters will find that the advantage of technology may be shorter-lived than in the past. Business people, especially agribusiness people, are increasingly attempting to control access to technology in order to extend the period of time that a technological development will generate additional profit. Basically, the strategy is to eliminate equal access to information, and to shift the firm with the technology away from perfect competition.

Such practices raise the question of who will develop and control technology in the future. Much of agriculture's production technology has been developed with public support in the past; *will a greater portion of agriculture's new production technology be privately developed and controlled in the future?* Likewise, much of agriculture's commodity market information has been public in the past; *will there be less public market information in the future*? *Will private control of information lead to increases in food costs that consumers will find unacceptable?* These are only a few of the policy questions that surround the current trend of industrialization in agriculture.

Of course, technology also opens new opportunities; businesses will find opportunities to produce products, provide services, and reach markets that were not possible in the past. Similarly, firms willing and able to export generally view globalization as a positive development. And firms that develop or control technology will enjoy greater advantages than even early adopters of readily-accessible technology.

An additional impact of communication and transportation technology is that **workers are increasing mobile**. Laborers are better able to learn about employment opportunities, move to the job site (either temporarily or permanently), yet remain in contact with family and friends at their former home. Thus, the technologies of communication and transportation are raising the level of competition among workers. Although this lowers the cost for some business, it also means reduced wages for some workers. For other businesses, it means higher costs as a result of having to offer better wages and benefits to attract and retain employees (to the benefit of the worker). Likewise, workers compete with one another even without relocating if their products or services can be transported or transmitted to a common market. Restated, these technologies are impacting workers as much as, or more than, they are impacting businesses.

"What is clear is that food processors must change their employment practices if they wish to continue to staff their plants with the desired number of employees possessing the required skills."

James R. Jensen, Michigan Food Processors Association, excerpt from *Industrialization of Heartland Agriculture*

Expectations

A second major force causing changes in agriculture and rural areas is the **expectations** of various groups of people. These groups include consumers, taxpayers, rural residents, farmers, agribusiness people, and rural business people.

Consumer Expectations

One expectation of today's **consumers** is that food should be

- low-cost (abundant supply),
- nutritious (keep consumers healthy),
- safe (will not make consumers ill nor contain unacceptable levels of chemical residue from production and processing),
- good tasting,
- convenient (easy to prepare), and
- consistent (similar, if not identical, quality each time the item is purchased and consumed/used).

This expectation is, in part, a result of consumer education and information.

Perhaps more critical from the perspective of producers and processor is that consumers believe desirable foods are available; if not in the consumer's immediate community, then somewhere in the world. This belief among consumers reflects their confidence in modern production, communication, and transportation technologies. Restated, many consumers apparently believe that if a food product does not meet their expectations, they can find substitutes, even if it means changing brands, changing product, or importing from other countries (a reflection of globalization). Thus food producers and processors realize that if their product is considered unacceptable, consumer are likely to search for a substitute. Consequently, consumers' expectations of food and globalization combine to create a highly competitive business environment for much of the agriculture/food industry.

"Especially in the United States, consumers have learned to expect not just good, but continually improving, performance in the marketplace."

Dr. Steven T. Sonka, University of Illinois, excerpt from *Industrialization of Heartland Agriculture*

Consumers also expect that the food production and processing industry should impose only a minimal adverse impact on the **natural environment**. An expanding portion of the population embraces this goal even though they live some distance from where their food is produced. Consumers' feelings about the environment probably arise from their concern about 1) the immediate impact of environmental degradation 2) the future impact including capacity to produce food, and 3) their food containing residues of the contaminants. In addition to reaction in the marketplace, some of these concerns are manifested as public policy, legislation and regulations.

The change in consumers can be summarized as "expecting what they want, rather than accepting what is available." This change requires that industries and firms also change if they are to be successful. For example, agriculture not only needs to be efficient, but also able to monitor and respond to changes in consumer non-price preferences, such as nutrition, safety, and convenience. Farmers and agribusinesses can no longer focus primarily on increasing output without considering product consistency or consumer desires. The need to respond to consumers is forcing the food industry to develop methods that transmit and respond to information about consumer preferences. As a result, agribusiness firms are adopting strategies that culminate in coordinated food systems.

Consumer expectations raise at least two additional policy issues:

- to what extent will consumers' desire for access to a full range of food products influence **trade policy**, and
- who will have **access to information about consumers** (for example, how will consumer information gathered by retail establishments be shared with other agricultural firms).

Taxpayer Expectations

A second group to consider are **taxpayers**; their expectations also impact the agriculture industry. For much of this century, the United States, as well as numerous other countries, have had policies to support the price of farm commodities or the income of farmers. These policies probably had two objectives: 1) improve the standard of living for farmers, and 2) provide stable food production for the benefit of consumers.

The recent farm bill (Federal Agricultural Improvement and Reform Act of 1996) clearly demonstrates that the past farm policies will be significantly altered or discontinued. It may not be clear whether the change was due to a recognition that

- farm family incomes have grown to equal those of non-farm families (and therefore no longer warrant public subsidy), or
- taxpayers perceive there has been a dramatic decline in the risk of unacceptable food price increases in the absence of subsidies.

Most likely the reason for the farm policy change is a combination of the two suggestions, but the second reason deserves additional comment. A diminished risk of unacceptable food price increases suggests that taxpayers believe consumers in a globalized economy will be able to acquire enough food at reasonable prices even without subsidizing domestic production. Again, the technologies (production, communication and transportation) that lead to globalization, arguably, also are influencing public perceptions and policies.

A consequence of changing farm policy is that farmers will face additional risk exposure. The government intends to play a diminished role in countering production loses or declining commodity prices. Likewise, a global food industry with rapid transportation of commodities or food indicates that regional production losses will not lead to offsetting price increases. As a result, farmers suffering production losses will experience reduced incomes. To counter these risks, farmers will be adopting alternative management strategies, including those imbedded in the strategies of industrialization.

Rural Resident Expectations

A third group to consider is **rural residents,** including farmers. Increasingly, persons living in rural areas expect a **lifestyle similar to that of urban residents**. Although living in a rural area still has value for those who choose to live there, its value relative to income seems to be declining. Restated, today's rural residents expect income levels more comparable to those of urban residents than rural residents expected in the past. Similarly, it appears that rural residents expect their time commitments to their careers will be comparable to those of urban residents; that is, there will be regular periods of time away from career obligations.

Rural residents also are concerned about the impact agriculture has on the **natural environment**, because this is where they live. Their interest in the environment of rural areas is probably more pragmatic than that of urban consumers. The primary concern for rural residents is not that food may cost more in the future, but that their health and lifestyle may be adversely impacted immediately or in the near future. In addition, rural residents appear to be interested in **retaining their independence**; that they own their businesses, rather than work as an employee; that they retain control over local policies and perpetuate their social values. The question becomes *what product or service can they produce that will generate the desired level of income without imposing unacceptable costs on their environment or way of life.*

Business Owners Expectations

A fourth group to consider are the **business persons** who own and operate farms, agribusinesses, and rural businesses. Their expectations and goals influence how they will operate their firms and whether they will pursue strategies of industrialization.

"A central issue facing many farmers today is the public's increasing demand for greater environmental protections from agriculture."

Neil D. Hamilton, Drake University, excerpt from Industrialization of Heartland Agriculture

Although a primary goal may be to maximize their business' profit, business owners likely have a second goal of earning a profit or rate of return that reflects the firm's risk exposure. Consequently, many crop farmers will seek ways to increase their returns to offset the added risk exposure resulting from recent changes in the federal government farm program. But some farmers and rural business owners appear willing to accept a lower rate of return, perhaps because they

- are willing to accept non-monetary returns such as rural living, business ownership, or creating employment opportunities in their community,
- feel they do not have or are not aware of opportunities which offer a better rate of return for the level of risk, or
- are less risk adverse than other business owners.

However, a desire to increase their rate of return to offset new risk exposures will cause some farmers to consider different business strategies, such as vertical coordination.

Another sentiment being expressed by some farmers is that if "I need to coordinate my business with my suppliers and buyers, I might as well have an ownership interest in and some control over those businesses." Such statements suggest that farmers expect the trend toward industrialization to continue, and that they have a goal of being involved in the businesses that are likely to have a dramatic impact on their farm operations. This attitude also may reflect their belief that anything smaller than large-scale commodity production is not likely to generate the desired rate of return.

In addition, business persons expect their suppliers to provide the inputs necessary to produce a consistent product, as demanded by their customers. The expectation is that the inputs, therefore, also must be consistent in quality (to assure a consistent product as well as reduce the cost of having to accommodate differences in inputs), quantity (so buyers can plan their activities), and availability (so the inputs are available **when** they are needed). A consistent predictable supply reduces inventory costs as well as the cost of accommodating inputs of varying qualities. Suppliers, in turn, expect their sources of product to be ready to deliver on short notice. A strategy of close coordination between purchasers and suppliers will be essential to assure such consistency.

These expectations of consistency are moving backward through the food system to production agriculture. But farmers who want to participate in such a coordinated production system face the uncertainty of how to guarantee delivery of a biological product (such as a crop) that is produced only once a year and under conditions where quality is beyond the producer's control (as a result of factors such as weather). For this reason, the livestock industry with controlled production units has adopted strategies of industrialization more rapidly than grain producers. However, a question is *how can grain producers also participate in an industry that desires predictable supplies*.

Summary

Advancing technologies and higher expectations are the primary forces causing farmers to implement strategies that shift them from producing commodities for a perfectly competitive market to producing a differentiated product for a market with imperfect competition. Improving production, communication and transportation technology not only increases competition among producers but also opens opportunities for firms that are willing and able to change. Likewise, different and higher expectations among consumers, taxpayers, rural residents, farmers and rural business owners are forcing the agriculture industry to more closely monitor and respond to shifting demands.

Discussion Questions

What changes do you expect in technology during the next 10 years?

How do you expect changes in technology to impact your consumption habits?

How do you expect this technology to affect your business/employment?

How do you expect this technology to impact your community?

What technological changes do you consider desirable? Why?

What technological changes do you consider undesirable? Why?

What are your expectations about your future standard of living?

Will your level of income have to change in order for you to have that standard of living?

What changes are you willing to make in your business, location of residence, or lifestyle in order to achieve your income expectations?

What features do you expect from your food products?

What do you do when food prices are “too high”?

Do you consider your food to be safe?

How might your perspective of food differ from that of consumers in more urban areas?

What changes in rural policies (e.g., farm program, transportation subsidies, environmental regulation, business regulation) do you expect during the next 10 years?

What policies changes do you consider desirable? Why?

What policies changes do you consider undesirable? Why?

For what reasons may taxpayers living in an urban area decide to subsidize production agriculture, rural businesses, or rural communities?

Linkages To the Rest of the World

It is not only within the United States or Western Hemisphere where substantive changes in agricultural production and agribusiness are occurring. These changes are world-wide in scope. Because of the importance of the United States in world agriculture and agribusiness, what is happening here is shaping trends in the rest of the world. Moreover, the large number of international market transactions and political interactions bring to the United States and its agricultural and food sectors the impacts of what is happening in the rest of the world.

Factors driving change abroad are not fundamentally different than those driving change here at home. The development and adoption of new technology is a pervasive force. New varieties of crops have dramatically spurred rice production in Asia, for example. Even though many express concern over the lack of further dramatic genetic breakthroughs, it is generally agreed that most of East and Southeast Asian countries have substantial opportunities to increase per hectare crop yields by better fertilization programs, improved control of pre- and post-harvest losses from pests and diseases, and by other cultural programs. Indeed Vietnam, Cambodia, and Burma hold promise to become part of the 'Asian rice bowl' as more market oriented policies are adopted that increase economic performance and improve the agricultural sectors of the countries. Indonesia, one of the world's most populous countries is pursuing an aggressive 'new lands' policy to provide agricultural opportunities to citizens moved from Java, one of the most densely populated islands in the world, to other less populated areas of Indonesia. These 'new lands' policies are pushing the frontiers of civilization and agriculture well into one of the world's last locations of stone age people on Indonesia's more remote, but resource rich, islands.

International agricultural research centers around the world have been aggressively pursuing development of next generation technology and cultural practices. Several examples are noted.

- European countries have taken a leadership position in the development and manufacturing of food processing and packaging equipment; and U.S. food firms are increasingly dependent upon imported equipment and technology for their own success.
- Most of the proprietary genetics so important today in U.S. swine production was developed and is owned by European firms, and licensed to U.S. producers.
- A new sugar beet variety with resistance to herbicides for control of grassy weeds has been developed in Europe; access to this variety may become essential to maintaining competitiveness of the U.S. beet sugar production
- European cultural practices utilizing pesticides to control plant diseases in field crops have been an important component of their competitiveness in world crop production and markets.

Two or three decades ago, the United States was heavily involved in the support and leadership of these research centers. But some would argue that leadership now has shifted to other parts of the world because the United States has reduced its focus on, and funding for, agricultural research and development. This is in part the result of an intentional effort by public policy makers to shift the burden of such development to private sector firms. Consequently, there has been a decrease in inflation-adjusted levels of public support for agricultural research.

Some agriculturalists believe this decision was a miscalculation, and are concerned that

- there is a slower pace of new breakthroughs in basic research available to private sector firms;
- the United States is at risk of losing world leadership in agriculture and food research and development;
- our producers and agribusiness firms are increasingly on the outside of new research findings and development strategies that may have important future impacts on our competitiveness in world markets;
- research firms can no longer readily tap into a rich array of relevant university and federal government basic research as was possible a decade ago; and
- we are creating an agricultural technology gap at a time when technology generation and transfer play an ever greater role in world-wide agricultural production and agribusiness competitiveness at home and abroad.

Another major change in international competitiveness is occurring as countries around the world abandon socialism and communism for market oriented policies and private sector ownership and/or control of the factors of production. Arguably, China's stunningly successful economic growth in recent years is linked to its willingness to use market signals in guiding much of its economy. India has now developed a middle class as large in numbers as that of the United States, importantly due to increasing reliance on market signals and private ownership of resources. Latin America is beginning to recover from two or three lost decades of economic progress while countries there embraced socialism and dictatorships. The growth of democracy and private sector initiatives across most of Latin America are followed by a return to improved economic performance. How well the benefits of improved performance are shared across socio-economic classes remains a difficult problem.

These efforts have both been nurtured by and have resulted in, growing demand for a world-wide reduction in trade barriers. Here, the United States has consistently carried a leadership role, in creation of the General Agreement On Tariffs and Trade (GATT) shortly after the end of WWII, and in subsequent rounds of trade negotiations.

"Agriculture in the U.S. Heartland is obviously part of the total global food economy. As the influences of these global forces increase and are more clearly understood, producers, processors, and distributors alike will need to respond quickly to remain competitive."

James R. Jensen, Michigan Food Processors Association, excerpt from *Industrialization of Heartland Agriculture*

The most recent trade round, the Uruguay Round, broke multi-lateral new ground by placing agricultural subsidies and other implicit trade barriers on the negotiation table. The agreement reached has established a long-term trajectory toward much freer markets, including agricultural, around the world. No longer can countries continue to protect inefficient agricultural sectors behind trade barriers. Parenthetically, neither can countries continue to successfully manage domestic supplies to support producer prices well above those of competitor countries. Despite the progress in reducing trade barriers, there remain concerns that the new agreements contain provisions which grant an advantage to one country and a disadvantage to another country.

Preparing to participate in a world with fewer trade restrictions was part of the rationale behind the recent farm bill in the United States (Federal Agricultural Improvement and Reform Act of 1996). This legislation decoupled farm support from government supply management activities, substituting instead a finite

amount of transition payments to farmers over a seven-year period. That means, of course, significantly more risk to be borne by U.S. farmers, rather than being underwritten by the government.

Countries around the world are seeking to exploit their respective comparative advantages in the production and sales of all kinds of goods and services, including agricultural commodities and food products. The competitive mark is being set ever higher on the 'barn door' as a result. Neither agricultural producers nor agribusiness firms in the United States have the luxury of not joining this world-wide drive for competitiveness. We must be competitive to sell into emerging markets. Additionally, if we are not competitive, we also cannot protect our domestic markets in a free trade world!

In order to sell more agricultural products into the world market, we must be prepared to purchase what other countries have to sell. In many cases that is specialized agricultural products, such as processed meat and dairy products, beverages, fruits, and vegetables. Even in rural America, it is no longer surprising to find fruits and fresh vegetables on supermarket shelves from a wide range of countries in the Western Hemisphere, and sometime from the Middle East and Asia.

Finally, consumers in both the developed countries and developing countries of the world are becoming more discriminating in the choices of goods and services they wish to purchase. Increased education and improved communications are creating greater consumer awareness everywhere. That certainly works to the advantage of U.S. producers, as much of the developing world seeks to emulate the cultural mores of the United States. Their diets, as well, are becoming more like ours—more meat, processed foods, and high fat diets—as their real income levels continue to rise. However, we should not conclude that all dietary habits will mimic ours. Indeed, our own dietary habits are under transition toward a more Mediterranean style diet with less meat and other high fat foods, and more fruits, vegetables, and cereal products.

Moreover, consumers around the world are constantly on the look-out for more value, just as in the United States. To capture growing markets with these more affluent and informed consumers, U.S. farmers and agribusinesses must stay competitive in world markets. The good news, of course, is that U.S. agriculture has been successful in doing so. That has required many changes in technology and structure of U.S. agriculture and agribusiness. More change is likely in the future. Not everyone is happy about those changes. The adjustment burden of the change has not fallen evenly on all persons engaged in U.S. agriculture and agribusiness.

As farmers and rural Americans seek to understand the changes they are experiencing, it is important to understand what is happening elsewhere in the world, how that is feeding back to us to constrain the future direction of farming and rural communities in some instances, and in still other instances to open up new opportunities for farmers and the communities that serve them. As Dr. John Lee asserted when he addressed the *Industrialization of Heartland Agriculture* conference in Minneapolis in July of 1995, "it is often a great deal more productive to devise means that permit us to constructively adapt to change than simply to fight against it."

What Lee said about changes in U.S. agriculture is likely to be even more valid regarding changes in world agriculture. There are opportunities for which our farmer and agribusiness support networks are well positioned to pursue. We should shift our focus away from fighting against change and toward seeking how we can shape constructive change to our liking, while compensating those who will be hurt most by that change.

Discussion Questions

What are the implications of expanded world trade?

Which of those implications are positive and which are negative? Why?

Should the cost of developing agricultural technology in the future be borne by the public sector or private firms?

What are the implications of public versus private research efforts?

What level of cooperation between public and private research efforts would be desirable?

What Are The Impacts Of Industrialization?

Industrialization impacts farmers, agribusiness firms, and rural residents. Some individuals are concerned about adverse consequences, while others argue that industrialization will offer new opportunities. The topic of this section is to identify and discuss the most likely impacts. The discussion does not attempt to evaluate whether the impact is desirable or undesirable. However as with any type of change, some persons and communities will benefit from industrialization while others will be adversely affected. It is perfectly reasonable to ask what the impacts of industrialization might be. It is just as important to consider who might gain from this process and who might lose, and why that is the case.

Industrialization Offers Opportunities

Farmers will not be limited to large-scale commodity production to maximize their return. Instead, industrialization offers farmers an opportunity to be part of a system that focuses on developing differentiated products and, thus, creates an opportunity to be paid for the additional value. A farmer in this system will not have to settle for a commodity price. The uniqueness of the product may increasingly be based on privately-held and controlled market information and production technology. In this way, market power is created. Industrialization is, in part, the result of persons seeking an alternative way to remain involved in agriculture without having to be a large-scale commodity producer. The strategy can be described as attempting to increase earnings through a higher-valued differentiated product, rather than focusing only on lowering production costs.

Industrialization will not Eliminate the Need for Agricultural Commodities

Basic agricultural commodities will still be produced in massive quantities in the most cost-effective manner, often by large-scale farm operations. Industrialization will not stop the trend toward large-scale commodity production. Both systems will exist side by side, often in the same community. Agriculture will encompass a number of strategies and systems for the profitable production of agricultural products. No longer will all — or even most — of the farms in a community look and be alike in products produced and in the production systems used.

Industrialization will not Eliminate Economies of Scale

Technology will continue to expand economies of scale for farmers who produce commodities as well as for farmers who produce a differentiated product. Similarly, agribusiness firms will continue to strive to find ways to reduce production and distribution costs. Often the strategy will be to adopt technology that facilitates economies of scale and specialization. That is, farmers will continue to be pressured to innovate and add new technology to lower per unit production costs. Globalization of agricultural production, processing, and marketing also will add to those pressures. However, unlike the past, farmers will give more attention to expanding their businesses vertically by adding new steps in processing and marketing, or by establishing strategic alliances with those who do.

Even though industrialization offers an alternative to producing and marketing a homogenous commodity, industrialized agriculture is capital intensive. Consequently, industrialized agriculture, like commodity agriculture, requires extensive capital resources. Acquiring access to those capital resources probably implies greater use of strategic alliances and business partners. Many farmers will choose to structure their business as a cooperative, corporation, or limited liability company to accomplish this. In short, farmers will increasingly be forced to choose between controlling all of a smaller business, or sharing ownership and control in a larger business organization.

Industrialization will Cause Some Farmers and Agribusinesses to be Part of a Food Production System

The increased reliance on acquiring, using and controlling information will extend throughout the agriculture industry — suppliers, producers, processors, and marketers. For example in rural communities, suppliers will need to meet the unique needs of farmers who are producing differentiated products, rather than commodities. These suppliers may need to change the way they operate their businesses. They, and the farmers they work with, will, in many cases, become part of a vertically coordinated food production system. Within this system, input suppliers for one level will adjust their business to meet the needs of their buyers, as well as work with their suppliers to achieve a better match with the producers unique needs.

Will Industrialization Lead To More Specialization?

Industrialization is not likely to increase the extent to which farms and agribusiness firms specialize in the commodities or products they produce. These firms will specialize whether they produce and sell a commodity or a differentiated agricultural product. Specializing, as opposed to diversifying, will most likely create efficiencies within the firm.

Will Industrialization Lead To More Rural Employment?

Industrialization is not likely to lead to an increased number of workers in production agriculture. In agricultural processing, there probably will be additional employment opportunities, but only in the communities where supply or processing firms are located. A larger proportion of people involved in agriculture (both production and processing) will not be business owners, but instead be employees. Opportunities will shift from being the owner of small businesses to being an employee. Despite this trend, there will be room for more specialized firms that provide services to producers and processors. These firms will run the gamut from soil testing and fertilizer application to custom farming to pest management to harvesting to marketing and financial planning. These firms will employ a larger percentage of new entrants into the agricultural sector in the future than was true in the past.

Will Industrialization Increase The Need For Different Labor Skills?

Industrialization will probably result in some need for different labor skills, especially at the management level. A relatively small number of highly-skilled production mangers will be needed, as well as a relatively large a number of low-skill laborers, but this increase in jobs will unlikely be enough to offset the number and perceived income of displaced business owners. The primary difference in management skills will be in marketing, purchasing, financial management, human resource (labor) management, and quality control of production processes.

Rural Population May Not Stabilize

Industrialization will not stop the de-population of all rural areas. The efficiency of industrialization will reduce the need for traditional labor. It will offer opportunities for additional employment in a few locations where processing is expanded. Areas that experience declining rural population will encounter higher costs for government services.

A Greater Proportion of Business Relationships Will Be Vertical, Rather Than Horizontal

More of a firm's business relationships will be vertical, rather than horizontal. There still will be horizontal collaboration but these arrangements will be motivated by an attempt to gain economies of scale so a group can collectively participate in a vertically coordinated industry. The motivation will no longer be to wrestle market power from suppliers and buyers, but to strike alliances with them that provide increased profits. Businesses will view producers outside their group or alliance as competitors, and suppliers and buyers as potential partners.

Business Persons Will Be More Dependent on One Another

Vertical relationships will lead to less independence on part of the producers, but will increase opportunities to learn from those with whom they do business. They will have access to information that may not otherwise be available, at any price. Farmers and business persons may feel more like members of a team than individual business owners.

Farmers and business persons will specialize in their activity, knowing that others in the production chain also will specialize in their activity. They will know what products need to be produced; they will place less emphasis on just producing as much as possible. They will risk losing their place in the production chain if they are not able to fulfill their commitments of product of specified quality. Business planning will involve working with both suppliers and buyers.

"Many retailers now have extensive information about which products are selling and to whom. Such information permits food companies to fine tune product formulations, packaging, and marketing strategies with much greater precision than before."

Dr. Mark Drabenstott, Federal Reserve Bank of Kansas City, excerpt from *Industrialization of Heartland Agriculture*

More Emphasis on Acquiring, Analyzing, Using, and Protecting Private Information

As more information becomes private, fewer people will be capable of providing needed services and products because they lack the necessary information. Increased reliance on controlled information (production and marketing) will impact producers as well as those who provide service and products to producers. One method of acquiring and controlling information will be through strategic alliances which may be as simple as a supply contract and may be as complex as a multi-year commitment to deliver a defined quality and quantity of product on a pre-selected schedule.

Business Persons Will Decide Who They Will Conduct Business With

Producers and agribusiness persons will decide who they will do business with. They will make those decisions even before the production process is completed. They will obligate themselves to deliver a specified product or service. They will manage risk that they are able to produce the quantity and quality specified in the contract. In return for managing this risk, the business persons will be assured of a market for a specified price and quantity.

Purchase decisions will not be based solely on price and quality, but increasingly, purchase decisions will be based on how well the supplier can meet the particular needs of the buyer. The needs of the buyer include timeliness, quantity, consistency, and precision characteristics. A high quality, low cost item that does not meet the particular needs of the buyer will be of little value to the buyer.

Everyone will not have equal access to information; even a willingness and ability to buy information will not assure access. Farmers in strategic and contractual alliances may view their neighbors as competitors, rather than as friends involved in the same industry. Farmers will view agribusiness firms as potential partners, rather than as "greedy middleman."

Partnerships will not be limited to the business next door. Firms will be able and willing to enter into business agreements with firms that are located many miles away (even in other nations).

There appears to be concern among those who fear not being permitted to participate even though they are willing to and consider themselves capable of successfully being part of a vertically coordinated agriculture industry. Those who do not participate in industrialization and lack the resources to be large scale commodity producers will likely need to find substitute income for family living, either in the form of leaving the farm or finding off-farm income to supplement the farm income.

Industrialization Changes Risk Exposure And How It Can Be Managed

Accepting these contracts also exposes the parties to risks that commodity producers and processors do not currently face; the risk of having to deliver or accept delivery according to the contract regardless of the cost of complying. There will be different risks—farmers and other agricultural businesses will be expected to fulfill their contracts (and bear the consequences if unable to do so), but they will be assured a market for their product and a source for their inputs. Managing these new and different risks will be made easier by an array of market based risk management tools, many of which are already being developed by commodity exchanges and insurance companies.

Business Decisions May Not Be Made By Members Of The Community

People may feel that some of the decisions are being wrestled away from them — for both their business and community. The community may feel that it has less control over how businesses are operated in the community. This is especially true for those who do not participate in strategic alliances, contractual arrangements, cooperatives, or similar relationships.

Will Industrialization Adversely Impact The Natural Environment?

Some express concern that new decision makers will not be concerned about the community in which the business operates, either about its human resources or natural resources. The type of products and the production techniques are often of concern to the community. However, increasingly, regulations will be used to manage a variety of community welfare and environmental issues. Communities cannot be assured that their welfare and environment will receive greater attention under traditional systems of commodity production, however. Indeed, through the use of regulation, integrated business firms may prove to be better corporate citizens than small undercapitalized traditional business firms.

Communities Will Be Redefined

Some communities will find their population decreasing; others will experience new growth, especially those that attract agribusinesses. Communities with declining population will need to serve larger geographic areas in order to have a population base adequate to economically provide public services. But, it is not primarily industrialization that is changing the communities. It is technology — production, transportation, and communication technologies.

"Realistically, the six-mile community was a time-bound form, reflecting the limitations of movement characteristics of a pre-modern world."

Rev. Gary E. Farley, Atlanta Georgia, excerpt from *Industrialization of Heartland Agriculture*

Discussion *Questions*

Which consequences of industrialization are positive?

Which consequence of industrialization are negative?

Which consequences of industrialization can be altered even if the trend cannot be stopped?

How would one go about altering these consequences?

How does my business and my community fit into an industrialized agriculture?

What steps can my neighbors and I take to assure success in this new agricultural era?

Can we use our cooperatives to help us in doing so?

What special skills will my neighbors and I need to be successful in this new environment?

Where will I turn to learn those skills?

What responsibility does society have for those who are displaced by industrialization? Is this responsibility similar to when the local grocery store or implement dealer went out of business, or is this different? Or, is the responsibility more like when a factory or mine closes and employees are thrown out of work?

Opportunities In An Age Of Growing Industrialization

John Lee, Chairman of the Department of Agricultural Economics at Mississippi State University, in his summary remarks at the *Industrialization of Heartland Agriculture* Conference reminded the audience that if change is inevitable it is better to spend effort at determining how to prosper under the new environment than to, in a failed effort, stop the change. That is good advice.

Many farmers and residents of rural communities continue to either disregard or oppose trends toward an industrial style production system in livestock. Similarly, the argument is made that while some industrialization is occurring in the livestock sector, the crops sector is as yet largely untouched by the trend toward an integrated production system. Hence, we need not consider how to function within an integrated system in the crops sector. These views may be self-defeating. It seems likely that much of U.S. livestock production will take place under a system characterized by coordination across different components of the industry. Moreover, genetic engineering for specific characteristics in crops will set the stage for retained control by plant breeding firms or processors and contractual arrangements linking farmers to seed suppliers and processors.

Thus, it seems reasonable to discuss opportunities for agricultural producers that recognize and accept a trend toward increasing levels of vertical coordination or control linking farmers to suppliers, processors and possible food marketers through a variety of arrangements.

What are the opportunities under which farmers can prosper in this business world? We offer four opportunities in which, we believe, farmers can prosper. These will, in some respects, resemble opportunities currently familiar to farmers and in other respects pose new approaches toward developing profitable opportunities.

The first opportunity is to be a high volume, low cost producer producing for an undifferentiated commodity market. To be successful in this strategy, farmers must produce at a scale that puts them well out on the long run average cost curve. In this strategy farmers will earn narrow profit margins, but because of their scale of production will earn attractive incomes.

This strategy is similar to that currently being pursued in the Western Cornbelt, by Great Plains wheat producers, by large New Mexican or California dairies, by large scale cattle feedlots and by very large western cattle ranchers. Here scale is important. Risks to be managed are large. But to succeed producers must do almost every thing right almost all the time. In a competitive market place, these producers must be able to produce at as low a per unit cost as any of their competition, domestic or foreign. This probably means a large capital investment and implies limited use of debt financing. It also suggests great difficulty for new entrants to get established in the business, unless they come in as partners of those already successful in the business. Much of the future U.S. corn and wheat production could be characterized by this model. This is also a model that supports only a relatively few widely dispersed communities.

A challenge may be to identify how producers can develop and operate a business that allows them to capture the efficiencies of specializing, but at the same time, manage their risk by diversifying. One suggestion may be for producers to share ownership in a business or businesses that produce an array of commodities. For example, a farmer who specializes in wheat production forms a co-owned business with another farmer who produces feeds, and a third producer who raises livestock. Such a co-owned business offers the benefit of having a member specializing in each commodity it producers as well as the opportunity to manage risk through diversification. These businesses will probably not be created through growth, but more likely will arise from the merger of several successful firms that are seeking ways to specialize and diversify simultaneously.

Another challenge is how to capture the efficiency of large-scale equipment to assure timely field operations but at the same time not incur the cost of having the machine idle for 9 to 10 months each year. Again, cooperating with other producers may offer an opportunity, but in this case, producers may not be cooperating with a neighbor who needs the machine at the same time. Instead, the potential co-owners could be producers from several regions of the country with different growing seasons. For example, is it possible to share ownership of a combine among a winter wheat producer in the southern plains, a spring wheat producer in the northern plains, and a corn/soybean producer in the Cornbelt? Would such an arrangement offer the advantage of ownership, and the benefit of having the machine operating most of the season, without the concerns of relying on custom harvesters? Would the more intensive use of the machine permit more frequent replacement to assure up-to-date technology? Would the more intensive use of the machine justify a full-time operator would who operate the machine as it is moved among the owners' operations? Does modern communication technology (phone, fax, e-mail) assure the owners will be able to remain in contact despite their disperse locations?

"Instead, the ability to segment markets, including segments based upon attributes created on the farm, is emerging as a means to compete for agriculture's share of the consumer dollar."

Dr. Steven T. Sonka, University of Illinois, excerpt from *Industrialization of Heartland Agriculture*

The second opportunity is to identify specialty product markets that offer above average profits. Identifying such niches takes vision, and pursuing them takes courage and nimbleness in production and marketing. Yet, opportunities for above average profit currently exist and are likely to continue. Some examples are production of exotic game animals for food and other products (such as buffalo), organic soybeans (for export to Asia, as an example), seasonal produce for sale to local and regional supermarket chains and roadside marketing, and production of seed and breeding stock for commercial producers of crops and livestock. Specialty markets also can be identified for commodities with unique characteristics. Businesses can participate in such markets through a contractually linked production system which preserves product identity, or a vertically integrated firm.

Since these products and markets will be quite specialized, a good understanding of market trends and product marketing will be required to prosper. Not all specialty markets last forever as high profit opportunities, especially as such markets become oversupplied. It is important to understand the dynamics of a particular market, knowing when to enter the market, when to exit it and when to move on to another product or market. Specialized knowledge of production systems and marketing will be the keys both to prospering as a niche producer and to restricting new entrants into these markets. Note that scale of production is not the key to success in this strategy. Family farms can exist and prosper by pursuing specialty markets.

Smaller scale production units, specialized production and production support systems and specialized marketing systems in niche markets provide greater opportunities for community business persons and for more closely spaced communities.

The third opportunity can be found in networking with other producers to create critical mass in production and marketing of products, commodity or specialty products. Farmer ownership of input suppliers, processors and marketers will characterize this approach as farmers seek to move further up the production chain while processors seek to move further down the chain. In this way profit margins from additional stages of the input supply, production, processing, marketing, and food sales chain can be captured by farmers. Much of this will likely come as a result of farmers' cooperative ownership of allied business firms in the food chain.

This strategy maximizes farmer independence, consistent with voluntary coordination across the food chain to create product uniformity, to add maximum value to farm production before it leaves farmers control and to link with consumers who believe farmer control of the food chain helps to assure high quality and high value.

Needless to say, this strategy requires top-flight management of the allied farmer-owned businesses and requires, as well, that farmers involved in this system coordinate key facets of their production processes. Current examples of such systems might be sugar beet producers and their cooperatives, tree fruit producers and their cooperatives and cotton producers and their cooperatively owned gins and marketing organizations.

This strategy can be community-friendly if it heavily relies on farmer ownership of supply and processing, marketing and food retailing businesses.

The fourth opportunity can be found in the kind of contractual arrangements that characterize the current integrated production of poultry, swine, vegetable production and processing and certain specialized crop production systems such as minor oil seeds where contractual arrangements with processors are common practice. Because consumer preference for uniformity and quality will continue to drive production, processing and marketing and because technology advances enable greater control to be exercised over each stage of the food system, we will probably experience substantial increases in the use of these integrated systems.

Some would argue farmers give up their independence and 'economic manhood' when they participate in integrated systems. However, many farmers in the South, East of the Appalachians, and West of the Rockies have long and positive experience in such integrated production systems. Rather than simply oppose these systems, it might be more productive for farmers to band together in contracting cooperatives to assure that contract terms in integrated production systems treat producers fairly.

An integrated system can be community friendly, as well, by providing part time employment opportunities in agriculture and by locating processing facilities in rural areas close to centers of production. On the other hand, small local supply and marketing businesses may be bypassed with greater reliance on the integrator firm to provide inputs and marketing.

Non-Agricultural Opportunities will Arise

Communities and rural businesses also will find opportunities. Agribusinesses will have a chance to serve industrialized firms by meeting their specific needs. There will be demand for more professional services, such as crop consultants, and nutritionists. Specialized service and support skills will be required for farmers and agribusinesses. Likewise, processing firms that locate in rural areas will offer new employment opportunities. But if these jobs do not offer adequate wages or attractive opportunities; the firms may need to rely on persons moving into the area in order to have access to an adequate work force.

Employment growth due to expanded agricultural processing may be limited to relatively small areas. However, rural communities do not have to limit themselves to agriculture. Technological advances in communication are making available new non-agriculture activities. Communities can use the technologies and strategies that are changing agriculture to provide services and offer employment to their residents. But a firm that can readily move into an area, can also move away. The result may be more variability in employment opportunity (for communities) as an increased number of services and high-end manufacturing firms are geographically flexible as to location — people will not have to live where they work, and companies will not have to stay in area or feel obligated to stay in the area after the cost of their facilities have been recovered

Summary

There are alternatives that farmers, rural businesses, and their communities can adapt in response to the growing trend toward industrialization in agriculture. Certainly, other alternatives and combinations of alternatives will develop. The trend toward industrialization will occur at different speeds in different parts of the country and with different commodities. None the less, where industrialization adds new economic value to consumers, it will be very difficult to stop. Concurrently, new and profitable opportunities will be available for farmers and communities willing to look at their future in new ways.

Change causes uncertainty. Uncertainty causes anxiety. The energy associated with uncertainty and anxiety can be put to constructive use, however, in identifying—individually or collectively—new strategies by which farmers and their communities can reshape themselves and share in a productive future. It is our hope that you will use these educational materials as a springboard for re-shaping and re-invigorating your own and your community's future.

Reluctance to participate in industrialization will not preserve jobs or lifestyle. Participating in industrialization will provide an opportunity to direct the impact of the changes. There will be only a limited opportunity to direct the impact through public policy for those who do not participate in industrialization. Of course, participation in the process does not assure success. As with any broad sweeping change, there will be winners and losers. Participating in the process will help achieve success, but will not assure success.

Finally, it might be useful to ask what society's role is in easing the adjustment for those who will be disadvantaged as a result of industrialization. Sweeping change requires developing new skills and perhaps relocating in order to prosper. Often the costs associated with such 'retrofitting' of a career exceed the resources of an individual worker or family. Yet society typically benefits when all participants are gainfully employed at their highest capacity. Should society seek to play a role in assisting people to gain new skills and location? If so, how? And if society is to play a role, who should pay for it?

Summary

Agriculture continues to change and the forces that are causing the change probably cannot be stopped. At most, these forces and changes can be somewhat directed. Consequently, agriculture will consist of large-scale low-cost producers who will participate in a commodity market (perfect competition). Other producers will pursue a range of strategies to differentiate their product or service from those of other firms (imperfect competition). It appears that small-scale commodity production will need to be subsidized from off-farm sources. If these observations are correct, producers, rural businesses and rural communities will not be able to rely on small-scale commodity production for a livelihood. The strategies of industrialization offers persons involved in the food industry opportunities to break out of perfect competition, rather than rely solely on being a low-cost producer in a highly competitive world market.

Consumers' increased and varied expectations is offering opportunities for producers who are willing to try to meet those demands. Consumer demand for low-cost food drives commodity production, while a willingness by other consumers to pay for products with distinctive characteristics is driving the specialty markets. Fortunately, emerging technologies allow producers to respond to both of these desires.

Despite these opportunities persons living in rural areas must ask "how will we use production, communication and transportation technology, coupled with our understanding of consumers, and our willingness and capacity to assume risk to produce and market either a commodity or a product?"

Discussion *Questions*

What might consumers be interested in that your community has to offer?

What production and marketing information is needed? Where will the information come from? Will it be purchased or will we develop it? Who will have access to it?

What resources does the community have?

What are the goals of the community?

What is the risk bearing capacity of the community?

What is the community's willingness to accept risk exposure?

What capital is available? What capital is needed?

What public and private resources are available to local businesses?

What are the advantages or strengths of the community?

What skills do community members possess?

What infrastructure is in place in the community — such as, schools, roads, electronic communications, supply and marketing firms?

Additional Readings

Benjamin, G.L. (1997). "Industrialization in Hog Production: Implications for Midwest Agriculture." *Economic Perspectives*, Federal Reserve Bank of Chicago, January-February, 1997. Also available at http://www.frbchi.org/pubs-speech/publications/periodicals/ep/welcome.html

Boehlje, M. (1996). "Industrialization of Agriculture: What Are the Policy Implications?" in Halbrook S.A. and C.E. Merry eds., *Increasing Understanding of Public Problems and Policies — 1995*, Farm Foundation, 1211 West 22nd Street, Oak Brook Il., 60521-2197.

Breimyer, H.F. (1996). "Understanding the Changing Structure of American Agriculture." in Halbrook S.A. and C.E. Merry eds., *Increasing Understanding of Public Problems and Policies — 1995*, Farm Foundation, 1211 West 22nd Street, Oak Brook Il., 60521-2197.

C-FARE (1994). "The Industrialization of Agriculture: Policy, Research and Education Needs — A Symposium." Council on Food, Agriculture, and Resource Economics, 9200 Edmonston Rd. Suite 117, Greenbelt, MD 20770.

Drabenstott, M. (1995). "Agricultural Industrialization: Implications for Economic Development and Public Policy." *J. Agr. and Applied Econ*. 27(1), July, 1995:13-20.

Duncan, M.R. and D.M. Saxowsky, eds. (1995). *Industrialization of Heartland Agriculture — Challenges, Opportunities, Consequences, Alternatives*, conference proceedings, July 10-11, 1995, Minneapolis, Agricultural Economics Miscellaneous Report No. 176, Department of Agricultural Economics, North Dakota State University, Fargo, 58105-5636. Also available at http://agecon.lib.umn.edu/ndsu/aem176.html.

Hamilton, N.D (1994). "Agriculture Without Farmers?: Is Industrialization Restructuring American Food Production and Threatening the Future of Sustainable Agriculture." Drake University, Agricultural Law Center, Des Moines, IA 50311.

Paarlberg, D. (1996). "Understanding the Changing Structure of American Agriculture." in Halbrook S.A. and C.E. Merry eds., *Increasing Understanding of Public Problems and Policies — 1995*, Farm Foundation, 1211 West 22nd Street, Oak Brook Il., 60521-2197.

Roy, E.P. (1972). *Contract Farming and Economic Integration*, second edition, The Interstate Printers and Publishers, Inc. Danville, IL.

Schertz, L.P. and L.M. Daft, eds. (1994). *Food and Agricultural Markets — The Quiet Revolution*, Economic Research Service, USDA, and Food and Agriculture Committee, National Planning Association, 1424 16th Street, NW, Suite 700, Washington, DC 20036, NPA Report No. 270.

Urban, T.N. (1991). "Agricultural Industrialization: It's Inevitable" *Choices*, Fourth Quarter, 1991.

Ware, A.E. (1997). "Value-Added Opportunities for Small Farmers" in *Proceedings of the National Small Farm Conference*, Plant and Animal Production, Protection and Processing Division of USDA-Cooperative State Research Education and Extension Service, Washington, DC 20250, March 1997.

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