

VALUE CHAINS IN THE AGRICULTURAL INDUSTRIES

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Preface

The U.S. agricultural industry is in the midst of major structural change — changes in product characteristics, in worldwide production and consumption, in technology, in size of operation, in geographic location. And the pace of change seems to be increasing. Production is changing from an industry dominated by family-based, small-scale, relatively independent firms to one of larger firms that are more tightly aligned across the production and distribution chain.

And the input supply and product processing sectors are becoming more consolidated, more concentrated, more integrated.

Agriculture in the 21st Century likely to be characterized by: 1) adoption of manufacturing processes in production as well as processing, 2) a systems or food supply chain approach to production and distribution, 3) negotiated coordination replacing market coordination of the system, 4) a more important role for information, knowledge and other soft assets (in contrast to hard assets of machinery, equipment, facilities) in reducing cost and increasing responsiveness, and 5) increasing consolidation at all levels raising issues of market power and control.

These profound changes in the agricultural industry present new challenges and new opportunities that require new opportunities that require new ideas and concepts to analyze and implement. They require new learning and thinking. Some of those new ideas and concepts are presented here, not as empirically verified truths, but as “thoughts” to stimulate different and better thinking. They have been developed based on observations, analysis and discussions with numerous managers and colleagues in agribusinesses in North America and Europe. This series focuses on Value Chains in the Food Production and Distribution Industries; companion series are also available on Farming in the 21st Century (Staff Paper 99-9), and Financing and Supplying Inputs to the 21st Century Producer (Staff Paper 99-11).

Our purpose in sharing these “thoughts” is to invite discussion, dialogue, disagreement — in general to encourage others to develop better “thoughts”.

Keywords: Value chains, value decay, product differentiation, information, structural change

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Knowledge, Information and the Structure of Agriculture*

Significant structural changes are occurring in agriculture — not only in size and ownership of farm firms but also in the linkages/coordination of farm production activities with input suppliers and product purchasers. More and more of these linkages are occurring through personal negotiated/contractual/ownership arrangements rather than impersonal open markets. Although numerous forces and drivers are contributing to these structural changes, information and knowledge play a significant role. As in other industries characterized by negotiated/personal linkages, those individuals with unique and accurate information and knowledge have increasing power and control in the food production system. And with power and control is the capacity to garner profits from and transfer risk to others with less power.

The increasing role that knowledge and information play in obtaining control, increasing profits and reducing risk is occurring for two fundamental reasons. First, the food business has become an increasingly sophisticated and complex business in contrast to producing commodities as in the past. This increased complexity means that those with more knowledge and information about the detailed processes as well as how to combine those processes in a total system (i.e. a food chain approach) will have a comparative advantage. The second development is the dramatic growth in knowledge of the chemical, biological and physical processes involved in agricultural production. This vast expansion in knowledge and understanding means that those who can sort through that knowledge and put it to work in a practical context have a further comparative advantage. Thus the role of knowledge and information in success in the agricultural industry is more important today than ever before. The measurement and monitoring systems that are at the core of precision farming are the key elements of this information system in crop production.

The logical question for individuals in the food manufacturing chain is how to obtain access to this knowledge and information. Historically, particularly for the independent producers in the farm sector, this knowledge and information has been obtained from public sources as well as from external sources such as genetics companies, feed companies, building and equipment manufacturers, packers and processors, etc. In general, independent producers have obtained knowledge and information from external sources in much the same fashion as they have sourced physical and financial resources and inputs. In contrast, ownership/contract coordinated production/processing/distribution systems have sourced their knowledge and information from a combination of internal and external sources. Many of these firms or alliances of firms have internal research and development staffs to enhance their knowledge and information base. And the knowledge they obtain is obviously proprietary and not shared outside the firm or alliance; it is a source of strategic competitive advantage.

Furthermore, the research and development activities in coordinated systems are more focused on total system efficiency and effectiveness rather than on only individual components of that system; it is focused on integrating the genetics, equipment design, fertilizer program, pest control, marketing strategy, etc. rather than on these areas or topics separately. And in

*Adapted from Boehlje, Michael. "Information and Technology Transfer in Agriculture: The Role of the Public and Private Sectors." *Privatization of Information and Agricultural Industrialization*, ed. Steven A. Wolf. Chapter 2, pp. 28-38, 1997.

addition to more effective research and development, such alliances or integrated firms have the capacity to implement technological break-throughs more rapidly over a larger volume of output to obtain a larger volume of innovator's profits. In the case of a defective new technology, ownership/contract coordinated systems generally have more monitoring and control procedures in place and can consequently detect deteriorating performance earlier and make adjustments more quickly compared to a system with impersonal market coordination.

With the increased context specificity and decision focused nature of information in recent years, it has become more valuable. And as information becomes more valuable, the incentive for the private sector to provide that information and capture some of that value increases. Consequently, growth in the private sector data gathering and information service firms is not surprising given the growing value of information.

Because of the increased value of information and the expanding role of the private sector in providing it, the issue of the proprietary nature of and access to data and information becomes more important. With the increasing value of information and its use as a strategic competitive advantage, there is less free exchange of data and information. And the issue of who owns the data and information becomes critical. For example, with respect to site specific soil characteristic information, who owns it — the grower who paid for it or the service company that gathered it? Can a grower obtain this information from one company such as a fertilizer or chemical dealer and then provide it to a competitor who might have a lower price on fertilizer or chemical products? Does it make a difference if a grower pays for the service and how much she/he pays, or if the information service is provided as part of a bundled package with the product? If coordinated production systems have the potential to obtain superior information, how can a producer that is not part of that system obtain access to similar information to remain competitive? Will a producer have to become part of the system — “in the loop” — to obtain latest information to be competitive?

As knowledge and information become more valuable and more important as a source of strategic competitive advantage, those who have access to them will be more successful than those who do not have access. Given the declining public sector funding for research and development and knowledge and information dissemination, which has been the major source of information for independent producers, the expanded capacity of integrated systems to generate proprietary knowledge and technology and adapt it rapidly enables the participants in that system to more regularly *capture* and *create* innovator's profits while simultaneously increasing control and reducing risk. This provides a formidable advantage to the ownership or contract coordinated production system compared with the system of independent stages and decision-making.

In a broader context, the public policy issue of intellectual property rights and the role of the public sector in making information a public good that is broadly available to all potential users becomes critical. The intellectual property rights debate has historically focused more on research and development and innovations protectable under patent or copyright law. Particularly in agriculture, the public sector has played a major role in the research and development activity and thus provided broad access to new technology and ideas. In this context, part of the public purpose was developing and disseminating new ideas in a sufficiently broad fashion that a wide spectrum of users benefited, so that individual firms could not restrict access and capture the value associated with the new idea. The public sector role was that of leveling the playing field so that all participants competed on the same grounds vis-a-vis access to new ideas and

information.

But as more and more of the research and development, and thus new ideas, come from the private sector, and more of the information dissemination system becomes privatized, individual firms have more potential to capture value at the expense of end users. They have the potential to restrict access to new ideas and information to particular users, thus favoring some producers and excluding others from the ideas, technology or information necessary for them to be competitive. The concepts of intellectual property rights including patent and copyright law as applied to agriculture were developed in an era of domestic markets and national firms; a relatively large public sector research, development and information dissemination system; and a limited role of information as a critical resource. These concepts should be reevaluated in the current context of global markets and multinational business firms; the shrinking role of the public sector in research and development and disseminating information; and the increasing importance of information compared with other resources as a source of strategic competitive advantage.