

# **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 21<sup>st</sup> 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 21<sup>st</sup> Century (Staff Paper 99-9), and Financing and Supplying Inputs to the 21<sup>st</sup> 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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## **Value Capture and Value Decay in Value-Added Agricultural Production**

With the recent increased interest and opportunity to significantly modify both the agricultural production process and the characteristics or attributes of the products produced through biotechnology, nutritional technology and other technological innovations, the fundamental issue of capturing value from these innovations has become paramount. The biotechnology industries in particular have struggled in recent years with commercialization of their products and recouping the substantial R&D investments that are necessary to develop innovative new products. In fact, the financial performance of many biotech companies has lead some industry observers to conclude that the opportunities for payoff from these substantial R&D investments are sufficiently limited that significant discounts must be applied to the earnings prospects of such companies. To better understand the potential for capturing value from new technological or product innovations, it is useful to understand not only how value is created, but the sources of value decay in a dynamic market environment.

Value creation is not new and it is not just a technological phenomena. The basic principle of value creation is to produce or provide a product or service that has sufficient value for customers or end-users that they will pay for that product or service. In production agriculture, this value creation process has traditionally focused on production of commodities with relatively generic characteristics; because of the nature of commodity production, competitive market forces have typically resulted in the cost of producing these products (the cost of creating value) sufficiently close to the value created that profit margins have been relatively thin. One of the appealing dimensions of some of the new technologies from genetic manipulation is the potential to enhance various attributes of these agricultural products, and in the process convert them from commodities to differentiated products that have enhanced value to end-users in the food and industrial product industries. Hopefully, the result is higher producer profit margins. Whether it be in the form of differentiated or commodity products or services, the concept of creating value is the same — generating something that someone else is willing to pay for.

But once value is created, it does not stay constant over time. In dynamic markets where new innovations are constantly occurring, the value of a product, attribute, or service will change over time. And the typical direction of that change is a reduction in value or value decay. From a individual company's perspective, there are five fundamental sources or causes of value decay.

Loss of property rights — Essential to benefitting from value creation is the opportunity to capture that value. Value capture is significantly dependent upon the property rights that one has in an attribute or a product or technology. These property rights may disappear for various reasons including litigation or expiration of licensing agreements or patent rights. For example, the patent on RoundUp herbicide will expire soon, resulting in significant value decay for this technology. And litigation in the biotech industry concerning property rights and licensing agreements for seed technology has increased the uncertainty of who owns these technologies, again resulting in the potential for significant value decay.

Substitution — A major source of value decay is the potential for substitution. This substitution can be in the form of products that are already in the market, or from the development of new products and services over time. For example, the value of high oil corn in feed rations is significantly dependent upon its ability to compete with fat in ration formulation. As fat prices decline with increased fat production from livestock, fat can be substituted for oil in feed rations and the value of high oil corn declines.

Replacement — Another source of value decay is that of replacement. New technological advances may make old technologies less valuable; for example Bt corn has the potential to substantially replace or displace insecticides that have traditionally been used to control corn borers. Chemical weed control has to a significant degree replaced or displaced mechanical weed control of the past. In fact, one of the most significant opportunities for value creation in the biotechnology industry has been the replacement of mechanical and other means of insect and weed control with biological controls. Yet future advances in biotechnology have the real potential to replace or displace current biotechnology created products, thus resulting in significant value decay for those current products.

Commodization — Almost all products exhibit a typical product life cycle that is characterized by a single or few suppliers at the early stages of that cycle and increasing numbers of suppliers as the market matures over time. As the number of suppliers increases, competitive pressures result in lower prices and value decay. The speed with which a product moves through this commodization process depends to a significant degree on the ability to maintain uniqueness and protect differentiated characteristics from being replicated by competitors. But over time, competitors figure how to produce the same product or service, and frequently at a lower cost, which then puts pressures on prices and margins, thus resulting in value decay.

Mitigation — A fifth source of value decay is mitigation — the process by which buyers attempt to find better products or ways to obtain the same attributes at a lower cost. Companies involved in down-stream processing in the agricultural industries have the incentive to mitigate the attempts that those further up the channel are making to add value and charge higher prices for inputs or raw materials. For example, if high lysine corn or high oil soybeans must be sourced at a higher cost to processors, they will have the incentive to develop new technologies or processes that will reduce the need for these attributes in the raw material and alternatively create what the end-user wants in the processing stage. Thus, those down the chain have an incentive to mitigate the attempts of those further up the chain to create and capture value, and this incentive increases as the price of the raw material increases. Mitigation strategies by down-stream processors can be a significant source of value decay.