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. The 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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The Dynamics of Supply Chain Governance

A major transition is underway in the agricultural industries from using open market mechanisms for coordinating the various economic stages of the value chain from genetics to consumers to negotiated coordination involving governance forms such as alliances, joint ventures, contracts, franchising agreements and ownership. A critical question being asked by many farm and agribusiness managers is what form this non-market coordination or governance system will take in the future. Will ownership integration as is common-place in the poultry industry dominate the other agricultural industries? Will less hierarchical structures such as strategic alliances, joint ventures and contracts predominate? And once a governance system is in place, is it stable or will it evolve over time?

Three critical trends in the food production and distribution industries appear to be encouraging and facilitating the formation of more tightly aligned value or supply chains. First, consumers are increasingly specific in their end-use demands. The higher the specification of end-user attributes required, the higher the level of accurate, responsive, messaging needed, the higher the need for and payoff from a more tightly coordinated supply chain. Second is the development of differentiated products with more of that differentiation occurring across the chain rather than primarily in food manufacturing and marketing. Increased differentiation across the chain again requires better messaging — more accurate information. More tightly aligned supply chains result in more accurate and rapid transmission of information between stages and enhance the ability of a system to adjust to changing consumer demands, economic conditions, or technological improvements.

Furthermore, more differentiation and specification in general results in more complex production/manufacturing processes and thus the potential for more errors or mistakes in those processes. With increased complexity and potential errors, more structured systems of control are essential to reduce those potential mistakes. This increased control is easier to obtain in more tightly aligned supply chains in contrast to open access markets. Thus, more tightly aligned supply or value chains are encouraged by: 1) increased specificity of consumer and end-user demands, 2) increased opportunities to produce differentiated products throughout the food chain, and 3) increased complexity of the production process or the opportunities for potential mistakes.

The hierarchical nature of the governance structure for food supply chains depends on a number of factors. Mahoney suggests that the form of coordination or business linkages will be a function of three characteristics of the transactions and the industry: (1) asset specificity, (2) task programmability, and (3) task separability. Asset specificity refers to the specialized nature of the human or physical assets that are required to complete the transaction; the more idiosyncratic the asset, the stronger the linkage or bond required for the transacting parties to invest in that asset. Task programmability indicates that a transaction is well understood by all parties and often repeated, thus not requiring intense discussion or negotiations and easily accomplished by impersonal coordination mechanisms. Separability refers to the ability to determine and measure the value of the contribution and thus the reward that should be given to each participant in the transaction. If that can be accomplished easily (and thus the transaction is separable), coordination systems that are less hierarchical such as joint ventures or contracts are relatively more efficient and effective than when separability does not exist. Based on these

arguments a taxonomy of expected governance mechanisms can be developed as summarized in Figure 1.

Figure 1. Predicting organizational forms of alternative business linkages

Factors	Low programmability		High programmability	
	Low asset specificity	**High asset specificity**	**Low asset specificity**	**High asset specificity**
Low nonseparability	Spot market	Long-term contract	Spot market	Joint venture
High nonseparability	Cooperation (strategic alliance)	Cooperation or vertical ownership	Inside contract (hybrid)	Vertical ownership

Source: Martin, L., R. Westgren, L. Schrader, L. Cousineau, N. LeRoc'h, R. Paguaga, and V. Amanor-Boadu. "Alternative Business Linkages: The Case of the Poultry Industry." Working paper 10-93, Food Industry Research Group, George Morris Centre, University of Guelph, June, 1993..

Barney argues that the form of governance (hierarchical structures such as ownership or majority equity investments vs. non-hierarchical structures such as open markets, licensing agreements, contracts, etc.) chosen by firms in an uncertain environment will be determined by four objectives:

1. Minimize the threat of opportunism,
2. Maximize flexibility,
3. Learn about the value of an uncertain investment, and
4. Secure property rights to capture investment value.

As summarized in Figure 2, if the threat of opportunism is high, transactions cost theory suggests that a more hierarchical governance structure will be chosen to reduce that threat; if the threat of opportunism is low or limited, non-hierarchical structures are appropriate. If flexibility is to be maximized, real options theory suggests that a non-hierarchical governance structure is preferred; flexibility will be limited with a hierarchical structure. If organizational learning is endogenous (i.e. from learning by doing and tacit, subtle knowledge unique to the arrangement), organizational learning theory suggests that a hierarchical governance structure is preferred; if organizational learning is exogenous (i.e. from common, public knowledge external to the arrangement) a non-hierarchical arrangement is preferred. Finally, if value is to be secured and value decay minimized, property rights theory indicates that unless secured by endogenous learning or other mechanisms, value is better protected with a hierarchical governance structure; if value is secured otherwise (for example through endogenous learning, patents or copyrights, etc.), a non-hierarchical governance structure is preferred.

Figure 2. Governance Choices Under Uncertainty

Concept and Theory	Hierarchical Structures (Ownership, majority equity investments)	Non-Hierarchical Structures (Open markets, licensing agreements, joint ventures, strategic alliances, contracts)
Concept: threat of opportunism Theory: transactions cost	Reduce threat	Limited threat
Concept: degree of flexibility Theory: real options	Minimize	Maximize
Concept: nature of learning Theory: organizational learning	Endogenous (private knowledge/information, learning by doing)	Exogenous (common/public knowledge/information)
Concept: value capture/decay Theory: property rights	Protect insecure value; minimize value decay	Secure; immutable; not easily duplicated

Adapted from: Barney, Jay B. and Woonghee Lee. "Governance Under Uncertainty: Transactions Costs, Real Options, Learning and Property Rights." Fisher College of Business, The Ohio State University, Ref# 124140, 1998.

Irrespective of the incentives to use various governance structures, a second critical question is whether this governance structure is stable over time. Following Barney's arguments, the form of coordination structure is likely to change overtime — as more is learned about the value of an investment for example, a strategic alliance or minority investment or licensing agreement might evolve into a merger or acquisition. Or an increased threat of opportunism might result in a licensing agreement being converted to a majority equity investment to manage or reduce that threat.

An additional argument that suggests dynamic evolution of the governance structure is related to the information and logistics systems and the incentive mechanisms that must be put in place to capture the benefits of a tightly aligned supply chain. The argument is that it is very difficult to get integrated inter-firm information and product/logistics flow systems in place. Computers won't talk to each other, accounting systems are incompatible, people don't communicate or fight about turf and responsibilities, equipment doesn't interface — all forms of conflict can develop in putting together inter-firm, inter-stage coordination. Consequently it may be that the only successful way to accomplish this inter-stage coordination is to own the stages — to use a hierarchical decision structure to resolve the conflicts and put the inter-stage information and product/logistic flow systems in place.

But it is not always the case that ownership can provide the right incentives for an inter-stage system to perform efficiently and effectively over time. The incentive structure associated with entrepreneurship is critical for continued innovation, and some times this entrepreneurship is stymied in hierarchical structures. So a natural evolution for a hierarchical, ownership structured value chain over time would be to transition to a set of interrelated entrepreneurial firms that are tightly aligned through strategic alliances, qualified supplier programs, and other similar governance structures. In essence, the argument is that the ownership phase of value

chain formation is necessary to get the systems in place and train the people and personnel to operate in a truly integrated supply or value chain structure, but once that is accomplished, the incentive and innovation benefits of entrepreneurial ownership favor the evolution of this ownership, hierarchical structure to a tightly aligned system of entrepreneurial firms coordinated through joint ventures, strategic alliances, franchising arrangements, qualified supplier programs, and similar less hierarchical governance structures.