TITLE: **Agribusiness Logistics: An Emerging Field in Agribusiness Education**

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Abstract

Agribusiness Logistics is a subject that is included as a separate course in an agribusiness curriculum, even as an elective. It is argued that the importance of logistical and supply chain issues in today's food and agribusiness industries make inclusion of such a course highly useful and valuable. The paper discusses the issues supporting that and then presents a sample outline to show how such a course might be organized. It is noted that agribusiness logistics or supply chain management is taught in four North American universities and in one New Zealand university.

Agribusiness Logistics: Opportunities in Agribusiness Education

Rarely included as a course in agribusiness education, business logistics can address a key set of business and economic concerns in food and agriculture and provide what one might call an efficient infrastructure perspective. Business logistics is the planning, implementing and controlling the efficient and effective flow and storage of raw materials, in process goods, final goods and related information from point of origin to point of consumption for the purpose of meeting customer requirements[1]. Because logistics deals with the flow and storage, one's attention may be drawn immediately to transportation and warehousing. However, transportation and warehousing is just a portion of business logistics, recall that the definition includes planning, implementing and controlling. Other concerns addressed within a business logistics perspective include (1) design and organization of value chains and supply chains that produce buyer value for the customer and strategic value for the firm(s), (2) coordination between value adding activities, (3) the flow of information needed to coordinate effectively and most efficiently, (4) network modeling to address spatial and temporal demands, and (5) global logistics.

Until more recently, the spot and futures markets were the dominant coordinating mechanisms in food and agriculture, especially for agricultural commodities. Now, the industrialization of agriculture and the information revolution are changing how those supply chains are coordinated. While many such concerns are addressed in agribusiness marketing courses, it will be shown here that the focus needs to be broader and from a different perspective, which argues for the value of separating logistics from marketing in agribusiness education. One may ask why emphasize logistics when only a few of the U.S. business schools have an emphasis in logistics. I shall argue that logistic is a good fit in an agribusiness education as either a requirement or an elective for two reasons. First, being focused on only food and agriculture makes agribusiness logistics a more manageable topic than business logistics that covers all industries. Second, the unique nature of food and agriculture makes it an excellent application of logistics. Food and

[1] Definition from the Council of Logistics Management, Oak Brook, IL, 1984, [Robeson].

agriculture more than any other industry interfaces with nature and natural resources, and that makes management more complex. Concerns of food safety and health are prominent. Supply chains in food and agriculture are quite long and have enormous geographic coverage.

The objective of this paper is to identify food and agribusiness issues for which a business logistics perspective offers valuable understanding. Those issues are reshaping the nature of the firm and the governance of the food supply chain. Furthermore, the implications and opportunities are changing rapidly, especially because of industrialization and consolidation in the industry, information technology developments and global market liberalization. Consolidation is creating new economic arrangements and destroying open markets as external sources of information. Simultaneously, information technology is changing how business is done [Evans & Wurster, Rayport & Sviokla]. As recently as a year ago, many argued that the Internet would destroy much of traditional business. Since the fall of the "dot-com" companies, the Internet is seen now as a tool to reshape, but not replace "bricks and mortar" businesses. Compounding change today is the rapid pace of market liberalization around the world. Business logistics, with what I will call its supply infrastructure perspective to providing customer value and strategic value to the firm, gives a structure for studying organizational opportunities that offer tremendous efficiency gains. Whether it is purchasing, information technology or industry restructuring—to name just three, agribusiness logistics can provide the analytical framework.

Identified in this paper are recent and emerging business issues and developments in food and agribusiness management that can be addressed with the total systems approach of agribusiness logistics. Many such issues transcend traditional boundaries of the firm, and in some cases, redefine the firm. Explored next is the definition and scope of agribusiness marketing and agribusiness logistics to show that much of what is considered agricultural marketing is really business logistics and risk management. Finally, a proposal for the subject matter coverage of an agribusiness logistics course is presented and discussed.

Logistics in Food and Agriculture

Changes affecting the flow and storage of goods and services in food and agribusiness have been in motion for a long time, but the cumulative affects have become most visible, lately. Consider separation and realignment of activities associated with the industrialization of agriculture [Boehlje]. Highly specialized production units, such as the commercial beef feedlot, the hog integrator or the grain farm, have replaced the traditional general farm that fed homegrown crops to livestock. While separation and realignment has increased the need for transportation services, the cost reductions in transportation and communication have made those realignments more feasible, especially when combined with the economies realized with large scale specialized production.

Accompanying that industrialization has been a systems approach to management, first within the firm, but then to the whole supply chain. Integrators in poultry and pork production realized a total systems management approach by vertically owning virtually all the steps in the supply chain and by exercising control through producer contracts over that which they do not own. By controlling the total supply chain, they are better able to meet consumer specifications of quality, especially product consistency. Elsewhere supply chain management is even when financial vertical ownership is infeasible. For example, non-integrated pork producers are working through cooperatives and other arrangements seeking to obtain similar efficiencies and product quality control.

The beef industry realizes that to increase demand it must assure the consumer of a more lean, tasty, consistent product, and that requires coordination from conception to the retail shelf. Various groups and firms in the industry are using alliances, contracts, advanced information technology and other supply chain management tool in an effort to provide the product consumers prefer. Because the supply chain for beef is longer than that for chicken or pork, those coordination arrangements are necessarily more complex and difficult to manage and can be expected to continue to evolve significantly in the coming years.

Products of biotechnology are replacing commodities, and as such, must be segregated from the commodity it replaces in order to provide added value to the consumer and to reward the supplier. High oil corn, for example, is better suited for

certain applications and in certain markets where animal fats are less available and more expensive. In order to capture that value, the grain must be segregated from other corn—its identity must be preserved. This leads to new problems of materials handling, transport and exchange, which raises questions of the value of those new grains. While multinational grain companies, now, are handling identity preserved grains, the problems of efficiently handling such grains are far from being resolved. Furthermore, seed and biotechnology companies continue to explore supply chain arrangements that will allow them to capture more of the value created by their biotechnology.

Logistics is integral to the whole area of supply chain management. Key to supply chain management is the physical and informational flows to meet consumer requirements and to provide value to the firms involved. Supply chain coordination can be obtained through means other than the spot markets or vertical ownership, such as through long- or short-term contracts. If contracts are used there are issues of monitoring those contracts to safeguard the interests of the principal relative to the performance of the contracted agent. At the same time, the loss of open markets means the loss of valuable management information that must be acquired in another fashion, such as through benchmarking or estimating competitor's costs.

Information technology, by offering cheaper and more powerful communications and data collection and processing, is rapidly changing the way business is done up and down the supply chain, and it offers new tools to address opportunities once considered infeasible. A simple example is the electronic ear tags for cattle. The ear tag makes it possible to track the husbandry and performance of an animal all the way from birth to slaughter and to share that information back to those who participated in the production of that animal. That makes it possible to reward participants for the value they created. Another is the smart card for recording grain shipments. Business and economic models to take advantage of these advances are still evolving.

ECR or Efficient Consumer Response is the food industry's response to the threat from Wal-Mart Stores, a leader in business logistics [Briskin, Wagar, Kinsey]. ECR involves the use of information technology and alliances to connect food retailers and manufacturers to deliver product at the right time and at the right location at the least cost.

Finally, I will mention e-commerce for marketing grains and feed ingredients. Last fall saw the beginnings of the sorting out of players in this arena. On October 25 ADM, Cargill, Cenex Harvest States, DuPont and Louis Dreyfus announced the formation of Pradium, a separate company to provide online business-to-business marketplace and information for all agricultural commodity traders, regardless of size (*Feedstuffs*, October 30, 2000). The impact of that announcement was major. On November 2, Rooster.Com announced that Andersons Inc., Bunge Corp., IMC Global Inc. and Louis Dreyfus Group had become their strategic investors (*Feedstuffs* November 6, 2000). With Farmland Industries and Seaboard invested in ICECorp.Com most of the large trading and commodity-handling firms were now members of an e-commerce alliance. The speedy process of alignment seems to indicate the perceived importance of such alliances to the survival of those e-commerce sites and, maybe, even to the survival of the traditional grain handlers—both groups may be at risk.

Agribusiness Marketing and Agribusiness Logistics

The first issue to address is why agribusiness logistics is just not part of marketing. I shall argue that supply chain and business logistics issues as sufficiently important and complex to benefit from being considered separate from marketing. Yes, business logistics interfaces with marketing, most especially at the last of the four P of marketing—place or customer service, but marketing is most effective when it focuses on product, price and promotion. While marketing will address place in terms of distribution to the customer, the issues of the efficient, effective flow and storage of physical inputs and products as well as related information along the supply chain benefits from a perspective that differs from that of marketing. That is a perspective that addresses the needed infrastructure, the efficient coordination, the assurance of quality and the assessment of competitive advantage. That can be either at the industry level or at firm the firm level. Agricultural economists regularly study industry level issues such as these, but many such decisions are at the firm level, too. Increasingly, large firms have added a logistics department to address the concerns of coordinating along the supply chain and that department or office's responsibility is to interfaces with all the other

departments in the firm. Because of that, business logistics must provide a systems approach or focus to address those needs.

Agribusiness Logistics

I have argued the importance of business logistics to food and agribusiness management and for its inclusion in an agribusiness curriculum, at least as an elective. Now, I will present a sample outline for an agribusiness logistics course (figure 1). This outline addresses many of the issues facing either a firm or an industry concerning the supply chain needed to deliver the final product to the consumer. Such a course could provide the tools to identify efficiency and effectiveness improvement possibilities and evaluate the return from those improvements. The introduction lays the foundation for logistics thinking. There is the focus on the various dimension of business logistics, the fundamentals of value chains and supply chains and, finally, on coordination within a supply chain.

Transportation and materials management, being major dimensions of logistics, are covered next. Transportation discussion would cover the modes of transportation, government regulation of transportation and its impact on shippers, and contracting arrangements between shippers and carriers including long running concerns of shippers, such as the concerns of grain and feed dealers concerning railroad rules and behavior.. Additionally, the opportunities that have come with transformation of the transportation industry can provide understanding of managing transportation in a changing environment. Materials management, today, is based on the premise of supplying mostly from production not stock. Seasonal production common with agriculture puts limits on that and raises issues of how and where agricultural product could be stored most economically, near production or near use.

Traditionally, coordination has been heavily through the spot market and agricultural producers relished the independence associated with the using the spot market. But the signals from the spot market may fail to coordinate fully. New business models to coordinate have come about with new hardware and software. Students could explore the economics of new technology adoption and their introduction.

Figure 1. Suggested Outline for Agribusiness Logistics Course

I. Introduction
   a. Business logistics defined
   b. Logistics strategy
   c. Value chains and supply chains
   d. Functions of a supply chains
   e. Alternatives to the spot market for supply chain coordination
II. Logistics and Transportation
   a. Government policies affecting transportation
   b. Sourcing transportation services in a changing transport industry
III. Materials Management
   a. Starting with demand forecasts
   b. Reasons for inventories
   c. Distribution resource planning
   d. Purchasing
   e. JIT manufacturing and logistics
   f. Packaging
IV. Logistics Network Modeling
   a. Uses of network models
   b. Plant location: simple network modeling
V. Information Technology and Supply Chain Coordination
   a. Evolution of the use of IT by firms
   b. Enterprise resource planning software and the sourcing of direct inputs
   c. e-procurement of indirect inputs and potential for sourcing direct inputs
   d. Internet and consumer marketing
   e. ECR for food manufacturing and distribution
VI. Measuring and Enhancing Logistics Performance
   a. Activity based accounting
   b. Quality program
   c. Benchmarking
VII. Supply Chain Management in Animal Products industries
   a. Supply chain coordination in poultry and pork industries
      i. Through vertical financial ownership
      ii. Through other forms of coordination
   b. Supply chain coordination in the beef industry
      i. Quality needs
      ii. Alliances, joint ventures and other forms of coordination
VIII. Supply Chain Management in Plant Products Industries
   a. Commodity grain marketing: Basis marketing as logistics and risk management
   b. Supply chain management strategies with IP grains
IX. Global Agribusiness Logistics
   a. Supply chain development under market liberalization
   b. International competitiveness, logistics and global sourcing
   c. Logistics of entering another market in another country

Critical to good business management is good information. The next section would explore the financial data needs for logistics decisions. Activity-based accounting is presented as providing the mechanism to obtain the information needed to make decisions concerning activities within the firm as well as marginal change decisions. Benchmarking is presented as a means of obtaining information on performing functions within the firm. Benchmarking has become increasingly important as margins and the information from spot markets decline. In addition, quality programs to enhance total operation effectiveness may be associated with logistics because it interfaces with virtually all other functions within the firm and must address supplier quality as well as customer satisfaction.

The remainder of the course deals with specific logistics issues in agribusiness. The choice of these could be adapted to regional concerns and opportunities. The global issues could span a considerable range. For example in a country undergoing market liberalization process, the topics could be tuned to the specific management concerns given the stage and pace of liberalization. A wholly different topic would be addressing the concerns of firms taking their business into the global marketplace. This is very relevant to food and agribusiness, because so many food and agribusiness firms already have international operations.

The outline above is similar to the coverage in two different courses at Kansas State University. Agribusiness logistics was first introduced in 1994 as a senior level elective course in the undergraduate program. Then in January 1998 a graduate level agribusiness logistics course was introduced for the Master of Agribusiness distance program. While the levels differ, the coverage is similar. Both courses use a combination of lectures, guest presentations and student research papers and in-class presentations. In addition students are required to develop a website using Microsoft Frontpage. The website is to market, as a consultant, their expertise based on their research paper. Agribusiness logistics or supply chain management courses are available at a number of other schools such as Purdue University, North Dakota State University and Prairie A & M University in the U.S., University of Manitoba in Canada and Massey University in New Zealand.

The goal of agribusiness logistics teaching should be for students to have a more holistic view of the handling of the supply chain and the tools needed to address the emerging issues. In addition it provides a venue to address the evolution of information technology adoption in agribusinesses and how such information technology may be used to gain competitive advantage.

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