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Supply Chain Management: Improving Vertical Coordination in Fruit Industries

Donald Ricks, Timothy Woods, and James Sterns

Introduction

Supply chain management represents a collection of the management of activities exercised between vertically related firms to improve efficiency, vertical coordination, and overall performance and competitiveness of the participating firms within an industry. Considerable attention on supply chain management in both the trade literature and by food economists has been focused on the relationships between grocery retailer-wholesalers and food manufacturers. Supply chain management is also very relevant, with substantial opportunities for improved efficiency and performance, when applied to commodity industries. The goal for a commodity industry in this regard is to enhance its responsiveness and ultimately its competitiveness by two or more vertical segments, which together pursue innovative approaches to doing business, with emphasis being placed on the vertical linkages that mutually benefit all parties.

Effective supply chain management with an agricultural industry involves various coordinating aspects and vertical linkages, with the goal that the regional industry is responsive, efficient, and in a mode of continuous improvement, therefore enhancing its effective competitiveness compared to competing regional industries. Effective supply chain management for agricultural indus-

tries is especially important today because of the increased globalization of agricultural markets. Agricultural industries in the United States are competing directly with industries in many other countries—both for U.S. markets and for export markets. The importance of effective supply chain management in an industry context for competitiveness in today's global markets is appropriately described by Ross (1998), Cooper (1994), and Nitschke and O'Keefe (1997) who state from their perspective that the system of Australian growers-packers-exporters competes against the business systems of Chile and South Africa. It, therefore, follows that the competitiveness of the system is dependent on both the competitiveness of individual firms and the nature of the linkages between firms along the value chain.

The concept and objectives of supply chain management are discussed in this paper. Particular attention is given to the subject as it relates to certain food industries broadly defined to include not only retailers and food manufacturers but also processors, shippers, packers, and growers. Additionally, aspects of supply chain management related to regional commodity produce industries are examined. Some specific examples are discussed to illustrate ways in which supply chain management might be improved in certain commodity industries, such as the fruit or vegetable industries.

Donald Ricks is professor, Department of Agricultural Economics, Michigan State University; Timothy Woods is assistant extension professor, Department of Agricultural Economics, University of Kentucky; and James Sterns is visiting assistant professor, Department of Agricultural Economics, Michigan State University.

Supply Chain Management

The objectives of supply chain management have been to improve the coordination and performance of production and marketing systems.¹ Supply chain management generally represents the vertical coordination and logistics in a supply system. Porter's value chain and value system framework captures the essence of organizing activities within and between firms in order to transmit value (Porter, 1985). Companies within a market channel search for ways to improve their competitive position and to mutually develop new initiatives that are implemented within their terms of trade. Widely cited examples of such initiatives include just-in-time manufacturing (JIT), vendor-managed inventories (VMI), continuous replenishment (CRP), and efficient consumer response (ECR).²

These initiatives were developed with the goal of continuous improvement and enhancing the competitive position of a vertically linked sequence of participants in a market channel. The initiatives are typically driven by changes in the business environment. These generic changes include new retail distribution options (for example, supercenters, deep discount/mass merchandising formats), Internet trade, multinational procurement and production, industry consolidation, and more demanding consumers. These initiatives have more similarities than differences and can be grouped into one overall philosophy: supply chain management.³

This coordination in the food manufacturing and retailing system has been advancing in recent years under the general umbrella of efficient consumer response (ECR). This concerted effort to develop innovative marketing practices that would improve the coordination of trade between food manufacturers and retailers was driven by the mutual recognition of a need to change the entrenched standard operating procedures that had introduced excessive costs into the system. The Food Market

Institute Report by the Kurt Salmon Associates (1993) is pointed to by many in the food industry as being the beginning road map toward improved coordination. The reforms proposed under the ECR movement included a focus on efficiencies in product assortment, the logistics of replenishment, promotion, and the introduction of new products. Many different reforms to operating practices have since been implemented, and these changes have not been small. Indeed, some have referred to the ECR initiative in the grocery industry as "the re-engineering of the food supply chain" (King and Phumpiu, 1996).

King and Phumpiu conclude that advances in the performance in the food system supply chain through the ECR initiative indicate that "through collective action coordinated by trade associations, firms can work toward industry-wide benefits, even before the distribution of these benefits is known." In the minds of many food industry participants, progress toward achieving these efficiencies has been slower than many had forecasted. A *Progressive Grocer* survey in 1996 indicated that about three-quarters of the food industry executives felt trade relations had not improved from five years earlier. Further, the benefits to ECR, according to those who participated in the survey, was concentrated in a few large manufacturing firms and the major supermarket chains (*Progressive Grocer*, 1996). The observation of those in the industry appears to be that re-engineering the food supply chain is a slow process that involves many players and that the reforms do not necessarily benefit all participants equally.

Vertical Coordination and Market Performance for Vertically-Linked Subsectors

The study of the coordination of the system of production and exchange activities within a vertically linked commodity industry (that is, a subsector) has a long history in agriculture (for example, Shaffer, 1980; French, 1974; Marion, 1986; Bernsten and Staatz, 1992). Much of the study of coordination evolved around the structure-conduct-performance paradigm (Caves, 1967) and, in more recent years, the new empirical industrial organization approaches (Caswell, 1992). Both frameworks emphasize the development of market rules to enhance various measures of performance, particularly the exploration of institutional mechanisms that could enhance system transaction efficiencies and lower system costs. A need for research—which encompasses far more of

¹No distinction is made here between supply chain and channel management.

²Our appreciation is expressed to Judy Whipple for input on certain terminology. The language describing such strategic inter-firm linkages between multiple participants in market relationships has evolved along several fronts, but in most cases deals with essentially the same core concept.

³This discussion draws heavily on an article by Whipple, Frankel, and Anselmi (1999).

the total array of important factors than some analysts' traditional emphasis on issues of concentration ratios, market power, and empirical measurement—is emerging. The need is for research that focuses on broad vertical coordination and market performance issues and on inter-firm relationships that transcend the entire marketing channel and influence the efficiency and performance of vertically linked systems.

The issues surrounding the coordination of a sub-sector can also be considered in a somewhat different way. Firm-level strategic planning has emphasized the coordination of resources internally with a view toward changing opportunities and threats from the markets external to the firm. Planning principles and methods can also be adapted to facilitate improved performance in serving customer needs by a regional agricultural industry (Woods et al., 1998; Lyford et al., 1998, 1999). These methods include approaches for visioning for needed future strategic directions for effective competitiveness, developing and maintaining regional industry goals, completing situational and gap analysis, clarifying and prioritizing key issues, identifying and evaluating action alternatives, building consensus, developing implementation strategies, and establishing strategy evaluation mechanisms (Ricks and Woods, 1995). All of these methods can be used in the context of setting the stage to facilitate efficiency, performance, and ongoing competitiveness in a world of global markets and very dynamic economic conditions.

Opportunities for Improving Coordination and Performance in Regional Fruit Industries

Supply chain management from the perspective of a commodity industry, such as a fruit industry, is broader in perspective than supply chain management for an individual firm. With the industry perspective, supply chain management involves vertical coordination between several levels and many different types of firms within the marketing and supply chain. Opportunities—which explicitly include growers, packers, shippers, processors, and industry organizations—to improve coordination in the fruit and vegetable industries can be pursued. The supply chain management for such complex, varied, and vertically linked industries supplements and, in some respects, facilitates the value chain of the individual firms within these industries.⁶

⁶Porter (1985) distinguishes between the system of activities organized within a firm (the value chain) and the whole system of value-adding activities over all firms linked together in a market (the value system).

Innovation and high performance through supply chain management is especially important for agricultural industries today because of the increased concentration of grocery retailer-wholesalers and food manufacturers within the United States and other countries. Underscoring the pace of grocery retailing consolidation, recent estimates place 40 percent of the U.S. supermarket sales in the hands of the top five chains in 1999 as compared to that same share spread over the top 20 chains just five years ago. The amount of produce required does not appear to be changing, but the structure for grocery firms in the overall channels through which it is moved has been changing considerably. The survival strategy proposed by some analysts calls for grower-shipper firms to form marketing and distribution alliances. At the very least, the pressure will be on for them to find ways to eliminate inefficiencies and cut costs (Roselle, 1999).

Supply chain management is especially important for fruit and vegetable industries that typically involve many small firms at each of the vertically linked levels of the supply chain. There is a need within most agricultural industries to effectively achieve vertical coordination of the many relatively small farm firms, packer firms, shipper firms, and commodity processors. Competitiveness for a regional industry requires that these many small and vertically linked firms be well-coordinated in order to provide maximum value to downstream buyers.

Coordination over many small firms is generally difficult to achieve. Changes in standard operating procedures can be quite difficult to implement across all participants in a region. By contrast—for industries that are dominated by a few large oligopolistic firms, especially those that have *strong* consumer brands—the complexities of implementing a reform of activities toward increased efficiency associated with supply chain management by those few oligopolistic firms is a particularly more relevant and predominate perspective.

Common Supply Chain Management Needs From a Produce Industry Perspective

A number of common supply chain management needs exist from the perspective of an agricultural commodity industry, such as a fruit or vegetable industry. These needs include the following:

- Development of a *marketing* or *customer* needs perspective and guidance of strategic directions versus a *production* perspective;
- Analysis of the industry's primary customer needs, the value chain, and hence, opportunities for market expansion by the industry through the more effective servicing of changing customer needs;
- Acquisition of continually updated information on the preferences, needs, and requirements of the industry's customers;
- Production and supply of an adequate *quality* of products to the industry's customers; development and adaptation of new varieties, new products, and new uses of the industry's products for changing customer needs;
- Supply of consistent, adequate, but not surplus volumes when needed by customers;
- Provision of consumer access through retail grocery shelves and through the menu offerings of food service retailers;
- Means by which to overcome common obstacles for effective supply chain management from the commodity industry's perspective, including limited grocery retailer shelf space, grocery firms' category management, and slotting fees; and
- Development and expansion of export markets by meeting the special requirements for these markets in various export-receiving countries.

The degree to which a regional commodity industry achieves these supply chain management needs will have a major impact upon the competitiveness and long-run economic viability of that industry. The strategies that are used to achieve these supply chain management needs from an industry perspective can be important in supplementing the supply chain management strategies by the marketing, manufacturing, and farm production firms within an agricultural industry.

Firms within such an agricultural industry—including marketing and supply chain firms at various vertical levels—of course, develop and implement

strategies to achieve the above needs from the perspective of their firm. These supply chain management needs for the firms—such as food manufacturers, processors, or shippers—include both strategies to market their products to their customers and strategies to obtain the needed inputs or raw product supplies. In a somewhat similar fashion but with a broader perspective, commodity industries—such as the Michigan apple industry or the Maine blueberry industry—also need to consider certain strategic directions for supply chain management. Such an industry perspective can facilitate the development and implementation of strategies for effective supply chain management from the perspective of the firms. This is especially important in highly competitive, global market economies.

Supply chain management strategies tend to receive less attention and to be less well-developed at the farm level than they are for marketing, manufacturing, shipper, or processor firms within an industry. At the grower level, there tends to be more of a production orientation, with the main emphasis being placed on the production of traditional crops at the lowest possible cost for that commodity. There is typically less market orientation at the farm level than there is with shippers, processors, or manufacturers because individual farm firms view themselves as limited in terms of what they can achieve in these vertical arrangements. Shippers or commodity processors have somewhat more ability to influence and implement supply chain management innovations than growers do. Hence, supply chain management tends to be a somewhat higher priority for shippers and processors.

Firms that have well-established consumer brands are well-positioned to be “primary drivers”—channel leaders who set the pace by implementing effective supply chain management practices. Today, these firms—which are generally quite large—typically hold well-established consumer brands and have substantial ability to effectively perform all of the necessary roles of media advertising, promotions, retailer deals, market research, new product development, paying expensive retail grocery slotting fees, and performing category management leadership. Within most fruit and vegetable industries, however, relatively few firms exist that have strong consumer brands and the related abilities to accomplish all of the aforementioned important functions needed for effective supply chain management and consumer access.

A number of the more innovative and stronger commodity processors and shippers try to perform the needed roles as a "primary driver" for their commodity. They are often severely limited, however, in gaining sustained consumer access through grocery stores because of their lack of consumer brands, limited marketing power, and limited financial resources necessary to meet many of the expensive distribution requirements of modern U.S. grocery retailers. Therefore, effective supply chain management, from the perspective of a fruit or vegetable industry, often must involve commodity firms, such as processors operating in a role of a "secondary partner" through partnership arrangements with other firms who have the important abilities to be "primary drivers" for effective, modern supply chain management. Supply chain management, from the perspective of a commodity fruit or vegetable industry, commonly requires exploration and development of innovative partnerships between different types of firms to accomplish the needed market access.

The supply chain management challenge of stimulating growers to produce the varieties, types of products, and qualities that are needed to effectively serve the customer's needs is especially challenging for perennial crops. This is because of the long-term nature of the perennial crops, their related, large long-term investments, and the difficulty of switching to new varieties, or new crops, or different qualities as the market and customer needs change over time.

The need for certain kinds of supply chain management approaches, from an industry perspective, is related to the above difficulties and limitations of commodity firms to effectively meet all of the challenges of supply chain management. This is especially the case with commodity industries of many small firms and is common in fruit and vegetable industries. The stimulation of effective supply chain management from an industry perspective can be facilitated by the use of an industry generic promotional organization, industry associations, or some type of an industry visioning or futuring council. Such an approach can aid in an appropriate industry perspective and can encourage a marketing perspective rather than only a production perspective. This kind of an approach can also facilitate the visioning for future industry directions.

Analyzing Customer Needs, the Value Chain, and Market Expansion Opportunities: The Michigan Apple Industry

Effective supply chain management in an industry of many small commodity firms may be enhanced by certain kinds of market research in regard to changing customer needs. The information provided by such market research can be quite useful to various firms within a commodity industry and for the performance of the industry as a whole, including several vertical levels of the supply chain, in serving the industry's customer needs. On the other hand, typically small commodity firms, such as produce shippers or commodity processors, usually do not have well-developed abilities or inclinations to do much market research. Thus, this is an area in which there is often an important public good aspect for appropriate market research that can be beneficial for the needed supply chain management goals of various firms within the industry.

An industry approach to analyzing customer needs, and hence to achieving improved supply chain management performance in serving these changing customer needs, can be illustrated with an example from the Michigan apple industry. This case example involved a number of key elements in this industry approach to improve its performance in serving the changing customer needs. These elements will be explained and summarized below.

Several years ago, the Michigan apple industry leaders decided that they needed more comprehensive and concerted efforts to reduce some of their industry's problems, to adapt more quickly and appropriately to the changing needs of their customers, and to analyze various strategic directions that were needed to help them be competitive in the marketplace, in view of the increasing U.S. and global competition. As a part of this overall visioning analysis for the needed strategic directions for the industry, industry leaders decided that more comprehensive information on the changing consumer and trade customer requirements and preferences for apples was a high priority need for the industry. Therefore, the industry requested that a series of market research studies be conducted in relation to Michigan apples.

These studies were conducted by Michigan State University to provide more specific information on the modern tastes, preferences, percep-

tions, and buying behavior of consumers and trade customers in regard to Michigan apples. These market research studies were requested and partially financed by the apple industry. Apple industry leaders and organizations also worked closely with the university in developing the specific questions and types of information to be analyzed. The close partnering relationship between the industry and the university in developing the market research also included subsequent analysis of the results along with development of strategies by the industry to better serve the customer needs, which were identified through the market research. Industry leaders also worked closely with the university in a partnering fashion to develop the successive stages of the series of apple market research studies.

The industry has recently implemented a number of strategies to accomplish these goals of serving their customers in a more high-performance fashion. Industry organizations were especially important in working with the university and in implementing strategies to serve their customers. These strategies were based upon the results of the Michigan apple industry's generic promotional organization, the shippers association, and a think tank group of all the various vertical segments of the industry that have focused on industry futuring, visioning, and problem-solving.

After being developed in close partnership with the industry leaders, the series of apple market research studies was completed over a six-year period by the university. This interrelated series of market research studies included the following:

- (1) *Initial survey of the industry's apple shippers.* This survey was used to obtain information on the perceptions of these key mid-chain firms regarding consumer and trade customer needs, preferences, requirements, and priorities.
- (2) *Consumer focus groups study.* This study emphasized information on consumer preferences, perceptions, and buying behavior regarding apples.
- (3) *Large-sample consumer telephone survey.* The results of this survey enhanced the results of the focus group study and provided information from a much larger sample of consumers, regarding their preferences, quality needs, varieties, types of packs, and buying behavior.
- (4) *Consumer taste tests regarding consumer preferences for fruit crispness and flavor.*
- (5) *Visual tests of consumers regarding their preferences for overall apple appearance as well as fruit color and size.*
- (6) *Another more specifically targeted survey of shippers regarding their analysis of their customers' preferences for apple varieties for the fresh market.*
- (7) *Similar survey of apple processors regarding market preferences for apple varieties for processing market uses.*
- (8) *Grocery trade survey.* This survey obtained information from these key grocery trade customers on their needs, preferences, operating procedures, their perceptions of consumers' behavior, and the performance of the apple industry.

Supply Chain Management for Improving Quality

A common supply chain management challenge for many agricultural industries is the need for continuous attention to adequate quality in order to effectively meet the preferences of their consumer customers. Providing adequate quality is especially challenging for fresh fruits and vegetables because of their perishability. This is particularly noteworthy in contrast to manufactured food products.

The need for continuing attention to improving fresh quality, including efforts at various vertical levels within the supply chain, is illustrated by the results of the apple industry market research that is summarized above. One of the highlights of these research studies was that a very high percentage of the consumers indicated that their apple purchases are strongly influenced by their preferences for firm, crisp apples. These market research results further showed that a very high percentage of consumers regard the crispness of the apples as being much more important in their purchases than other quality characteristics, such as highly red color and large fruit size, which have traditionally been emphasized by the trade customers.

The market research results, which emphasized the importance of crisp apples to consumers—along with a recent trend of increasing attention to crisp apples by certain grocery customers—accentuated

the priority importance to the industry for emphasizing strategies that help provide firm, crisp apples to the industry's customers. Industry leaders discussed this important topic and developed a series of strategies to give greater attention to improving apple quality in regard to crispness. The necessary action strategies to accomplish this goal of better serving the customers' needs by necessity involved supply chain management aspects, including vertical coordination of the needed steps by growers, packers, storage operators, and shippers. Thus, this is a good example of supply chain management for improved performance on quality by an agricultural commodity industry.

The development and implementation of a series of strategies by the industry to improve the crispness of apples for the industry's customers was facilitated by discussions of industry leader representatives from the various industry segments, vertical levels, and industry organizations. This important process for improved industry performance was aided by the use of an industry problem-solving and think-tank council comprised of the various industry segments. This group considered how to improve communications and vertical linkages so that all phases of the industry—including growers, packers, storage operators, and shippers—did their part to produce and market top-quality, crisp apples in order to best serve their customers' needs.

The set of strategies that were emphasized by the Michigan apple industry to improve its performance on key condition or crispness factors included the following:

- (1) To provide information to all segments of the industry on the importance of top-condition, crisp apples in order to serve customer needs and to expand the demand for the industry's fresh apples. This information included explanations of the integrated set of technological and managerial strategies that are needed to accomplish the fruit condition goals, relevant technological and market research results, and the industry's need for coordinated efforts for crisp apples by all vertical levels within the apple industry. The informational programs involved efforts by shippers, packers, and industry organizations, such as the shippers association and the industry's promotional commission, as well as close partnering efforts by university extension and research faculty and agents.
- (2) To develop strategies to improve the coordination and interrelated management steps for top-condition apples at several vertical levels.
- (3) To provide harvest timing information. The importance of ideal timing of the harvest for crisp apples going into storage was emphasized by shippers, packers, and University extension personnel.
- (4) To conduct technological research on apple maturity and ideal harvest times for different varieties. This was accompanied by special emphasis by university research and included extension of the results of this technological research on ideal harvest timing to growers, packers, and shippers.
- (5) To emphasize top storage management techniques for crisp apples.
- (6) To conduct research on the most advanced and effective storage technologies.
- (7) To develop orchard modernization strategies to contribute to the most advanced production systems for crisp apples.
- (8) To expand usage of pressure testing at all vertical levels of the supply chain.
- (9) To encourage switching to superior varieties that inherently produce crisper apples.
- (10) To divert more marginal condition fruit for processing instead of for the fresh market.
- (11) To attempt to sell top-condition crisp apples for premium prices.

As a result of the above set of effective strategies taken by the industry to improve quality, some shippers were able to obtain small price premiums for top-condition apples from some grocery trade customers in some years. However, in many instances, price premiums for top-quality apples have not been attainable from the trade customers. This has been especially the case when apple supplies were more than adequate, or in surplus. The suppliers of top-quality apples (in regard to crispness) were, however, more likely to obtain customers' business than were suppliers with lesser-quality apples (in regard to condition).

The aforementioned series of strategies—designed to improve the industry's performance in providing top-quality, crisp apples to customers—was given substantial emphasis by the Michigan industry during the past several years. This series of industry-developed and -implemented strategies has resulted in substantial improvements in the performance of the Michigan industry in regard to providing this important, but difficult, aspect of quality for fresh apples. This improvement in the industry's performance was documented by a 1998 survey of grocery trade customers who were asked for their evaluation of the performance of the Michigan apple industry in regard to apple quality. This trade survey was conducted several years after the industry began to place greater emphasis on the supply chain management type of strategies for improved quality.

In this recent trade survey, most of the grocery customers were highly complimentary of the progress that the Michigan apple industry has made toward improving its overall quality in recent years. Many of these trade customers indicated that Michigan had made great progress toward improving its quality and hence its competitive position in the fresh market as well as the demand for its products. Many of these trade customers indicated that the Michigan industry's performance was especially noteworthy compared to the period before it implemented this set of quality-improving strategies.

Supply Chain Management Considerations for Developing and Marketing New Products and Uses: The Tart Cherry Industry

A common challenge for commodity industries, such as the fruit and vegetable industries, is the need to develop and market new products and uses to meet changing consumer preferences. There are many supply chain management considerations for this type of common challenge for commodity industries. These aspects can be illustrated by the situation and some of the challenges that are faced by the tart cherry industry as this industry seeks to adapt its products to modern consumer preferences.

The U.S. tart cherry industry has historically marketed much of its production in the form of sweetened desserts, such as cherry pies, cherry cobbler, cherry pie filling, and cherry cheesecake. A challenge to this industry is posed by the trend in consumer preferences away from high-calorie, sweetened desserts, such as pies. Therefore, the

cherry industry has been devoting considerable and concerted efforts to developing and marketing a series of new cherry products and new uses for tart cherries that do not involve sweetened desserts. A major goal of the industry in this regard is to develop a number of successful, major-volume products that use tart cherries and that fit today's consumer preferences for uses, such as snacks, drinks, breakfasts, lunches, main meal dishes, and many other non-desert uses. To accomplish these goals, some of the newer products and usage categories for tart cherries that are being pursued include dried cherries; cherries in meat products, such as hamburger and sausage; and combinations of fruit juices and drinks, including cherry juice, cherry paste for snack bars, single-serve size cherry side dishes, and cherry brandy.

Dried cherries are one relatively new category that is well-suited for the changing tastes of many U.S. consumers. Dried cherries can be marketed for a number of important modern consumer uses, including (1) dried cherries as a snack instead of candy or cookies; (2) dried cherries as an industrial ingredient in manufactured food products, such as breakfast cereals and baked goods; (3) dried cherries in food service markets, for example, use as a salad ingredient or use on a buffet; and (4) dried cherries in manufactured snack bars.

Each of the above types of newer cherry products or product usage categories are currently in different stages of development. Some have developed to a stage of important sales volume that may be near a point of more rapid growth in the near future. Others are in their very early stages, with limited sales volume, but seem to have substantial potential opportunities for market growth in the future. Still others are more in the idea stage for a usage category that may be developed into volume markets at some time in the future.

Supply chain management considerations are important for the tart cherry industry to be able to effectively develop these new cherry products and new market usage categories. One key consideration is that tart cherries, which are a crop that is entirely processed, are processed mainly by commodity processors who do not have recognized consumer brands. Therefore, the industry has relied heavily upon the sales of processed cherries, such as frozen cherries, to food manufacturers to be used as an ingredient in manufactured consumer products, such as cherry pies, cherry turnovers, cherry cheesecake,

etc. Because of this feature of the main supply chain for tart cherries, a key consideration in the development and marketing of new cherry products and new uses is: What type of firms or segments of the supply chain have the ability and the inclination to take the lead in developing and marketing these new cherry products and uses? This is a major supply chain management challenge for an industry that primarily markets its products as a commodity ingredient to food manufacturers. A key consideration is: What type of firm can and will be a "primary driver" for all of the necessary supply chain management linkages and functions that are required to be successful in developing and marketing new cherry products and uses in the modern U.S. food marketing system?

The tart cherry industry is attempting to use a combination of different strategies with the use of various types of firms as the "primary drivers" for the different new cherry products, along with various partnering arrangements with "secondary partners" within the industry. The cherry industry is also making substantial use of the industry's generic demand-expansion organization to facilitate the development and establishment of the new products and uses. The industry is attempting to develop a number of innovative combinations of approaches including vertically-linked partnerships for success in developing and marketing the new products and uses in the context of effective supply chain management for this commodity industry.

Conclusions

Supply chain management involves the implementation of a wide array of coordinating activities within the food system. The implementation strategies that will effectively advance the interests of a regional fruit industry, however, necessarily involve leadership from channel firms. Strategies additionally require a mechanism for coordinating new activities across many smaller firms. The opportunities for innovation that can improve the competitiveness of the regional supply chain often can be identified by individual participants within the supply chain, but leadership for reengineering the regional value delivery system may also need to involve larger coordinating forces.

Individual firms within a regional agricultural industry may be inclined to support or pursue more activities that can realize regional and individual firm benefit, such as market research, new technol-

ogy research, new product development, and modern production systems, if they can overcome the obstacles inherent to identifying these innovations and implementing them industry-wide.

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