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Fruit and Vegetable Supply-Chain Management, Innovations, and Competitiveness: Cooperative Regional Research Project S-222

J. E. Epperson and E.A. Estes

As price increases have become largely infeasible, large retail concerns are pursuing profits through greater efficiencies in the distribution system and from suppliers. The pressures of Supply-Chain Management in the fruit and vegetable industry indeed have reached the producer/shipper level. This process is accentuated as the global economy continues its rapid evolution while upward pressures on costs are just as compelling in the form of new environmental and food safety laws. The purpose of Cooperative Regional Research Project S-222 is to provide knowledge that will lead to improved production and marketing efficiencies, improved market access strategies, better risk management strategies, and improved producer and consumer well-being.

Traditional sales tenets practiced by U.S. fruit and vegetable distributors and retailers are changing rapidly as a growing number of Americans place emphasis on added value and quality characteristics when making produce purchase decisions. During the 1990s, American consumers have broadened their definition of quality to include some nontraditional features, such as nutrition content, brand label, genetic composition, and pesticide residues. While standard demand factors—such as price, visual appearance, taste and maturity, and availability of substitutes—remain important purchase criteria, value-added characteristics undeniably have influenced overall buying patterns (Brooker, Eastwood, and Carver, 1996; Cook, 1996a, 1996b; Estes and Smith, 1995; McLaughlin, Park, and Perosio, 1997). Moreover—as a result of the 1996 Federal Agricultural Improvement and Reform (FAIR) Act, the Food Quality Protection Act (FQPA, 1996), the trend in industrialization, the Clean Air Act (1994), the Clean Water Act (1994), the General Agreement on Tariffs and Trade (GATT), and the North American Free Trade Agreement (NAFTA)—the fruit and vegetable sector is in the midst of a major revolution that is bringing about profound changes in how fruits and vegetables are produced, processed, distributed, and marketed in the United States and abroad (Burnham and Epperson, 1998; Caswell and Hooker, 1996; Hooker and Caswell, 1996; Ricks and Woods, 1996; Van

Sickle, 1996). Managers in the fruit and vegetable sector are being challenged by increased risk and uncertainty. Research is essential if a broad set of management strategies are to be suggested in the face of major changes.

The Expanding Produce Industry

U.S. consumers spend in excess of \$100 billion annually, or about 23 percent of all money spent on food, to purchase fruits and vegetables. During the past decade, domestic produce consumption has increased nearly 20 percent because many Americans have decided to eat healthier, more nutritious foods. Industry promotion programs, such as the “5-a-day” campaign, have emphasized the high nutrition content of fresh fruits and vegetables, and industry-sponsored efforts have contributed to an expansion in fruit and vegetable consumption. Retailers have responded to produce’s rising popularity by expanding shelf space as well as the mix and variety of offerings. In addition, retailers have emphasized added value and improved quality by trimming produce, pre-packaging garden salads, and offering in-store salad bars (McLaughlin, Park, and Perosio, 1997; Putman and Allshouse, 1999).

Changing Dynamics

Shipper-growers must adjust to the new dynamics in the procurement process by moving away from the sale of commodities only and toward the sale of bundles of commodities and services. The emergence of two competing retail produce pricing policies has been particularly

J.E. Epperson is professor, Department of Agricultural and Applied Economics, University of Georgia, and E.A. Estes is professor, Department of Agricultural and Resource Economics, North Carolina State University.

noteworthy for growers. First, the overwhelming success of Everyday Low Price programs, such as that used by Wal-Mart, suggests that sales growth can be achieved through regular low prices for all items sold in a store, including fresh fruits and vegetables. Alternatively, many retailers take the approach that additional sales can be generated by competing solely on the basis of value-added services; that is, produce purchase decisions are not driven exclusively by price. There is little disagreement that the per-unit price of fresh-cut lettuce contained in products like *Fresh Express' Ready Salad Pacs* (consisting mostly of leaf lettuces and/or head lettuce) is significantly higher than that of lettuce sold individually. In effect, the value-added dimension permits sellers to satisfy consumer needs, increase selling price per unit, and still maintain the "competitive price" image. Competitive position, market segmentation, and sales growth can be enhanced to the extent that value-added services focus on supplying the quality attributes that are important to buyers, such as convenience, maturity, and extended shelf life. For produce shipper-growers, it is important to recognize differences among wholesaler and/or retailer formats so that the appropriate set and mix of features and attributes (price, quality, value-added services, etc.) can be provided to customers (Cook, 1996a, 1996b; McLaughlin, Park, and Perosio, 1997; Ricks et al., 1996).

Producers have recognized that supply competition is now global; therefore, innovation, knowledge, technology, computerized linkages, quality and safety, and added value create market access, power, and wealth. The dynamic production and marketing environment of fruits and vegetables contrasts with that of many other agricultural commodities and often complicates local, regional, and national supplier efforts to match available supplies with effective market demand. While agronomic crop marketing decisions often focus on production planning and the timing of sales, factors—such as harvest timing, market access, method-of-sale logistics, vertical coordination arrangements, and risk management—are also essential details in the marketing of fruits and vegetables (Cook, 1996a, 1996b; Ricks and Woods 1996). Predictably, lower-than-expected grower prices and marketing problems abound during short-term periods when marketable output exceeds buyers' immediate needs.

Shocks to production patterns can impact growers in various parts of the world in different ways. El Niño weather influences during the 1997 and 1998 spring, summer, and fall growing periods illustrate how global sourcing can influence grower prices and income. Excessive moisture, delayed plantings, reduced yield, and average quality prevailed throughout the southeastern United States, but increased imports and more favorable crop-growing conditions in competitive supply areas increased aggregate supplies and limited the increases in grower prices (USDA/ERS, *Vegetables and Specialties Situation and Outlook Report*, 1998, 1999). To a large extent because of production-pattern shocks, a major concern in the industry is the lack of timely, relevant crop-specific information. The paucity of timely commodity information exacerbates short-term marketing difficulties and frustrates commodity assessments.

Globalization

The internationalization of produce markets (particularly supply competition) and increased emphasis on value-added characteristics are two important features that have changed the produce marketing and distribution system. It is expected that these trends will intensify in the near future and have profound impacts on fruit and vegetable marketing dynamics as well as regional competitive advantage. For selected growers and regions, however, globalization of markets has enhanced sales prospects (Burnham and Epperson, 1998; Caswell and Hooker, 1996; Estes, 1996; Marin, Epperson, and Ames, 1998; Ricks and Woods, 1996; Taylor, Melendez, and Fairchild, 1995; VanSickle, 1996).

Trade is playing an increasingly larger role in the U.S. vegetable industry. In 1998, almost 11 percent of total U.S. vegetable consumption was satisfied by imported products, up from 9 percent in the previous year and up from 7 percent in 1990. The United States exported about 8 percent of available vegetable supplies in 1998, the same volume that was exported in the previous year and an increase from 5 percent in 1990.

As in the previous three years, the United States was a net importer of vegetables in 1998. Even though export value increased 6 percent from the previous year, imports rose much faster—22 percent. Tomatoes were the largest fresh market import.

The value of U.S. vegetable imports from Canada has increased 16–34 percent per year for six consecutive years, with a 28 percent increase in 1998. Potatoes and tomatoes account for about 67 percent of U.S. vegetable imports from Canada.

Mexico continues to be the leading foreign supplier of vegetables. Imports from Mexico increased 22 percent in 1998, the largest increase since 1993. The value of U.S. fresh market tomato imports from Mexico increased 10 percent in 1998 (USDA/ERS, *FATUS*, annual supplements; USDA/ERS, *Vegetables and Specialties Yearbook*, 1999).

The magnitude and timing of the increase in Mexican import volume remains of great concern to selected sectors of the vegetable industry, particularly winter tomato growers in Florida. It is likely that import volume levels will continue to increase in the near term as U.S. policymakers study additions or adjustments to NAFTA (Jordan and VanSickle, 1995; VanSickle, 1996).

Efficiency and Technology Factors

Despite increased market complexity and evolving market structure consolidation and reorganization, the fruit and vegetable industry remains an example of an industry that is technology-driven, where early adopters realize productivity gains, above-normal early season prices, and enhanced market access. In addition, domestic markets that are unencumbered by complex legislative programs typically reward innovative firms that discover the true desires of customers. At the same time, fruit and vegetable market forces remain unforgiving, especially for firms that produce while ignoring critical elements, such as strategic planning, financial and risk management, collection of relevant information, and attention to marketing detail (Burnham and Epperson, 1998; Cook, 1996c; McLaughlin, Park, and Perosio, 1997; Ricks and Woods, 1996).

In the past few years, suppliers, handlers, and sellers of U.S.-grown produce have needed to react to a number of changing domestic and trade policy variables that impact profits and affect industry welfare: (1) the implementation of NAFTA and its impact on market share and competitive position; (2) increased consumer and media attention to handler sanitation and food safety practices and enactment of Hazard Analysis and Critical Control Point (HACCP) programs; (3) applications of computer

technology in Supply-Chain Management (SCM); (4) evolution and expansion of the fresh-cut produce industry; and (5) partial acceptance of Efficient Consumer Response (ECR) and Efficient Foodservice Response (EFR) principles by wholesalers, chain stores, mass market retailers, and food service firms. In addition, grocery chain stores have established in-store home meal replacement centers, mainstreamed ethnic and organically grown fruits and vegetables, and inundated shoppers with point-of-purchase promotion materials (Bailey, 1996; Burnham and Epperson, 1998; Caswell and Hooker, 1996; Cook, 1996a, 1996b; Cook, Gorgues, and Escribano, 1996; Cotterrill, 1996; Estes and Smith, 1995; Hooker and Caswell, 1996; McLaughlin, Park, and Perosio, 1997; Ricks and Woods, 1996; Underhill and Figueroa, 1995).

The value accumulation process has encouraged wholesalers, distributors, and retailers to explore new sales methods and formats. One result is the invasion of a variety of new approaches, with accompanying terms and acronyms added to the produce grower's vocabulary. EDLP, SCM, ECR, Electronic Data Interchange (EDI), Price Lookup (PLU), and Continuous Replenishment Programs (CRP) are industry-promoted programs designed to improve sales and to automate the food distribution system from supplier to check-out. By minimizing waste and improving logistics for reducing system costs, the overriding intent of the "acronym" programs is to bring better value to customers and to increase consumer satisfaction. The implementation of some aspects of these programs has lagged in the produce industry; nevertheless, the industry appears to be embracing the need for less system waste, with improved coordination between supplier and receiver. For the most part, the new programs have originated with retailers and/or distributors rather than with suppliers, such as shipper-growers (Cook, 1996c; Cotterrill, 1996; McLaughlin, Park, and Perosio, 1997; Ricks et al., 1996).

Concentration

In addition to the above issues and concerns, findings from S-222-member research have noted a change in the basic structure of the U.S. produce industry. The industry has moved away from its historic, decentralized, fragmented structure to a structure that is more highly integrated through direct ownership, joint partnerships, strategic alli-

ances, and/or various new formal and informal vertical coordination arrangements among producers, distributors, and sellers. U.S. Department of Agriculture statistics indicate that fewer farmers generate an increasing proportion of output; this, in turn, provides them with greater market access and enhanced leverage in price negotiations. Concomitantly, since the 1980s, the number of integrated produce wholesale-retail buyers has declined while average sales per firm have increased. Only 86 integrated wholesale-retail firms accounted for nearly two-thirds of total U.S. retail produce sales in 1996. This concentration trend likely will continue in the coming years because of unfavorable wholesaler financial ratios (debt-to-asset) and because many small-volume suppliers will have difficulty in satisfying wholesale-retail demand for value-added services, such as fresh-cut products, extended shelf life, price lookup and bar coding, country-of-origin labeling, and expanded year-round availability. Reliance on production and marketing strategies that worked just a few years ago may no longer be effective. For the near future, it seems certain that success in fruit and vegetable marketing will be linked closely with the value accumulation process, that is, the bundling of services and attributes intertwined with the commodity (Cook, 1996a, 1996b, 1996c; McLaughlin, Park, and Perosio, 1997; Ricks and Woods, 1996).

Objectives and Procedures

The two basic objectives for Regional Research Project S-222 are linked, and thus, the findings are expected to be interrelated. The objectives are (1) to assess the evolution of SCM in the fruit and vegetable sector, identifying strategic organizational and marketing implications for firms and specific commodity subsectors, and (2) to analyze the relative competitiveness of fruit and vegetable subsectors—regionally, nationally, and globally—using new and established analytical paradigms that incorporate theories from business schools and other fields.

The membership, organization, and procedures of the project facilitate the development of methodologies, interdisciplinary collaboration, and applications of results to current market situations and economic issues. Researchers with specialization and expertise in different areas (production, marketing, and trade) are identifying

and developing common methodologies, data sets, and empirical approaches to address the impacts on producers, marketers, and consumers. Specific areas to be addressed include ECR, EFR, SCM, and regional, national, and international competitiveness. The size of the project allows strains of complementary research to be pursued under each procedure.

Anticipated Results

Concrete analyses are expected to discern the extent and financial impact of ECR, EFR, and SCM on the U.S. fruit and vegetable industry, with special emphasis on industry competitiveness, national and international sourcing practices of producer/shippers, and changing business practices at all echelons of the market channel. Measures of changes to market structure; price discovery models leading to improved variety, quality, and service; and lower real prices to consumers are expected. Delineation of the critical paths that small and mainstream producer/shippers should follow to achieve competitive advantage is anticipated.

Important insights into the potential for niche market inroads and partnering or strategic alliance arrangements for actual and potential producer/shipper stakeholders—which can be quickly incorporated into Extension Program strategic plans—are expected. Identification of potential market inroads are expected for small or would-be producer/shippers to obtain better quality and service at lower real prices to consumers.

Unfolding insight is anticipated in the changes and in the depth of such changes in the competitiveness of U.S. fruit and vegetable firms as a result of the dynamically evolving market and economic setting influenced by the FAIR Act, free trade agreements, the Clean Air Act, the Clean Water Act, and food safety regulations. Knowledge—on how producer/shippers can use out-sourcing and partnering/strategic alliance arrangements to manage risk and to stay on the critical path to competitive advantage in the face of revolutionary changes in the industry—is expected. The net gains and losses to consumers in terms of variety, quality, service, and real prices are being assessed. The manner in which producer/shippers must change production practices so as to remain on the competitive path and the extent of improved quality, variety, and real prices for consumers are being determined.

A clearer understanding of the importance and effectiveness of various labeling and promotion venues, regarding the competitiveness of U.S. fruits and vegetables in domestic and foreign markets, is anticipated. Methods by which producer/shippers can expand markets through effective labeling and promotion and methods by which the quality and variety demands of consumers can be enhanced are being assessed.

Research is expected to clarify the extent and variation in conventional risk management strategies for producer/shippers and allied agribusinesses in these changing times. In particular, research is illuminating the types and extent to which the relatively unconventional modes of risk management—partnering/strategic alliance arrangements with other agribusinesses—can be adopted. An evaluation of the economic welfare effects on producer/shippers, allied agribusinesses, and consumers—that is, who gains and who loses and to what extent—is anticipated.

The organization of S-222 is designed to bring together researchers from several states and agencies to address the critical needs for better understanding of a changing fruit and vegetable industry. Improved production and marketing efficiencies, improved market access and risk management strategies, and improved producer and consumer well-being are products of increased knowledge for this important industry. The benefits of the research will accrue to consumers, fruit and vegetable producers, processors, food distributors, and educators as well as government policymakers.

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