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THE FRESH FRUIT AND VEGETABLE MARKETING SYSTEM: TOWARD IMPROVED COORDINATION

by

Edward W. McLaughlin, Assistant Professor
Agricultural Economics
Cornell University
and

Thomas R. Pierson, Professor
Agricultural Economics
Michigan State University

Expanded consumer demand for marketing services has accompanied the widespread specialization and industrialization of the food system. As these changes increase the size and complexity of the food distribution system, coordination between its stages becomes more difficult. Yet effective coordination is critical for desired performance. A more complete understanding of the dynamics of food system coordination is required to formulate better private and public policy and to predict the likely consequences of policy and managerial actions.

This report summarizes a major study which examines coordination processes in a major food category, the fresh fruit and vegetable subsector.¹ The economic importance of fresh fruit and vegetables has recently increased; and consumer interest has also risen. Despite this, the produce distribution system, perhaps more than most other food product categories, is marked by a lack of system coordination, and the coordination processes in existence are often poorly understood.

This report summarizes: (1) objectives and methodology of the study; (2) organization and current role of participants in the U.S. fresh fruit and vegetable distribution system,

including consumers; (3) current status of the retail produce department; and (4) principal conclusions of the study. Finally, several key questions are posed for consideration by leaders in industry, government and trade associations.

Introduction: Objectives and Methodology

The theoretical background and conceptual framework used to guide this research is elaborated in the complete study referred to above and is not pursued in detail in this report.

A primary research goal was, through an in-depth analysis of shipping point sales and wholesale-retail produce procurement practices, to create a more complete understanding of the systemwide nature of the produce industry. This goal is intended to provide private firm managers and public policy makers the opportunity to develop procedures and policy initiatives that will better prepare the fresh fruit and vegetable system for adjustments to change and thus improve performance of their industry.

The research objectives established for this study were the following:

- Describe fresh fruit and vegetable industry structure.
- Document the key standardized exchange and behavioral practices of fresh produce shippers and wholesale-retail buyers.
- Analyze the impacts of these practices on produce system coordination.
- Identify opportunities for and obstacles to, improved system coordination.
- Develop policy implications of these analyses.

Selection of the shipping point seller-supermarket buyer interface affords an excellent observation point from which to carry out the objectives of this study. These individuals in a very real sense act as the supply and demand agents on behalf of the entire produce system. Shippers, as a result of their location and sometimes integration into production activities, in effect represent supply forces; buyers, as a result of their knowledge derived from merchandisers and consumers, represent demand. The quantity and quality of the products and information that flow through the produce distribution system and that ultimately determine the degree of coordination achieved are thus heavily influenced if not controlled at this interface.

Analytical documentation of shipper-buyer operating practices constituted one of the major tasks of this research. The number of potential variables affecting the process is staggering. To simplify the task, only those practices which appeared to be "standard" were analyzed. Standard operating practices (SOPs) are the rules of thumb that decision makers generally rely on to make their jobs manageable. Since similar firms are frequently confronted with similar recurring situations, similar responses develop and, over time, SOPs tend to become industry-wide. One challenge presented by the highly fractionalized organization of the fresh produce

industry was determining which SOPs are specific to individual firms and which apply to the broader industry.

The methodology developed for the above purposes consisted of three phases. First, a comprehensive literature review was conducted of both scholarly reports and trade literature. The former assisted in identifying important theoretical variables while the later helped familiarize the authors with the particular institutional setting and current status of the fresh produce industry.

Next, approximately 15 months were spent in field interviewing and data collection. In an effort to catalog firm and industry SOPs, a set of nine themes of inquiry, particular to the produce industry, was developed to guide the interviewing process. Groups of questions were organized within each theme to capture as completely as possible the dynamic nature of the behavior leading to and circumscribing economic transactions of fresh produce buyers and sellers. The nine themes are as follows:

- Terms of trade
- Order balancing
- Buyer-seller selection
- Information handling
- Advertising
- Transportation
- Marketing transactions
- Trade associations
- Technology

Buyer and seller samples were stratified in a sampling technique designed to provide a representative picture of the U.S. produce distribution system. Shippers of many firm types and sizes, including shipping point brokers, were interviewed in depth in all major fresh fruit and vegetable production areas--Florida, Texas, California, Northeast, Northwest and Midwest. The wholesale-retail buyer sample included terminal market operators and encompassed firms that buy produce for retail stores in all 50 states. These firms

accounted for estimated, combined produce sales in 1980 of about six billion dollars, or approximately 36 percent of all supermarket produce sales. Finally, individuals from allied fields representing various perspectives of the produce system were interviewed: U.S. Department of Agriculture, trade publications and industry trade associations. In total, 201 individuals in 98 firms, approximately evenly distributed between buyers and sellers, were interviewed.

The "mirror image" interviewing technique employed in the research allowed buyer and seller decision makers to respond to similar sets of questions corresponding to each theme of inquiry, but in terms of the unique perspective from which each operated. Not only did this technique permit a logical unfolding of individual firm SOPs during questioning, but it served as a consistency check across firms. It revealed a number of intra-firm and produce industry conflicts and, consequently, opportunities for improved coordination.

Finally, the third phase of the methodology may be described as integrative analysis, an outgrowth of phase two. Once a variable (SOP) was identified, it was observed and/or discussed in a variety of different firm and organizational settings.

This last phase of the methodology also served to validate the information collected. To ensure that buying and selling SOPs reported in the study accurately represented reality in the produce trade, two additional steps were taken. First, when the body of the research had been drafted--when the standardized buying and selling practices had been identified and categorized--preliminary drafts were reviewed by a number of produce industry leaders for their reaction and comment. Second, preliminary findings were also presented in a general format to several fresh produce industry groups.

This "validation" assisted greatly in refining several areas of the report, as well as in establishing credibility of the study for further analysis and applied research with the produce industry.

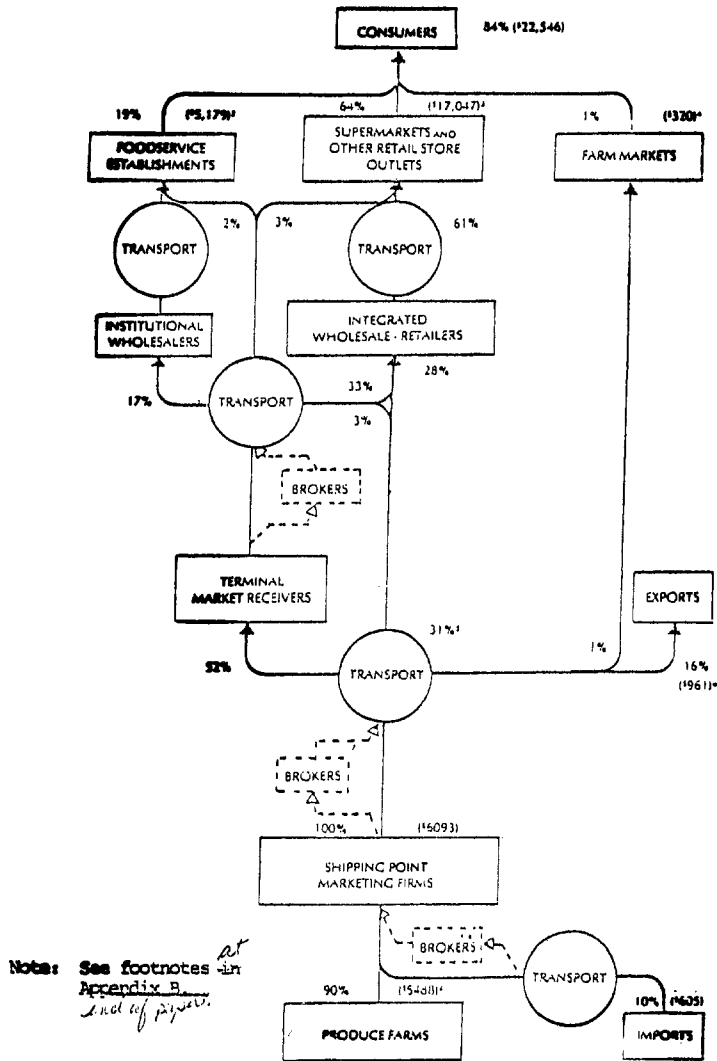
Organization of the Fresh Fruit and Vegetable Distribution System

The fresh fruit and vegetable distribution system is exceedingly complex. Large numbers of participating firms, considerable variety of internal firm organization and enterprise combination, great geographic dispersion and many other complexities, make a complete system description impossible. Nevertheless, certain characteristics and trends of the changing produce marketing system can be identified. These provide a foundation for the analysis of the vertical coordination system under focus in this study.

Figure 1 illustrates typical participants and marketing channels of the fresh produce system. Estimates are provided of the sources, outlets and sales for fresh fruits and vegetables through the U.S. distribution system. Not all of these distribution channels received in-depth treatment in this study, however. Only those included in the flow of fresh produce to U.S. supermarkets were analyzed in considerable depth. The percentages and dollar values in Figure 1, developed from a variety of sources, are approximations.² Comprehensive data documenting many of these sales figures are not available; hence, in a number of cases, informed trade estimates are relied upon.

The total produce sales to consumers from all marketing outlets is estimated to be approximately \$22,546 million. Figure 1 shows that these sales represent approximately 84 percent of shipping point volume entering the U.S. distribution system from U.S. produce firms (including importers); the remaining 16 percent is exported. Within the U.S., consumers obtain approximately 76 percent of their fresh produce from the various

FIGURE 1. U.S. FRESH FRUIT AND VEGETABLE MARKETING SYSTEM, 1980¹



Note: See footnotes at end of paper.

types of supermarkets and other retail outlets, 22 percent from food-service establishments and about 2 percent from farmers' markets, U-pick operations and roadside stands.

Produce firms at virtually all levels have followed the general trends of the overall food system with respect to firm numbers and firm size: specifically, numbers of firms have decreased while firm size, measured by both sales and number of employees, has increased. Figure 2, for example, illustrates a gradual reduction in the number of fresh fruit and vegetable wholesale establishments from 1954 to 1977--the most recent data available.

Although similar patterns of increasing concentration appear to dominate other groups in the produce system as well, including marketing cooperatives, food service establishments and especially wholesale-retail supermarket companies, these trends in declining firm numbers should not suggest that the numbers of produce buyers and sellers are proportional. In fact, whereas the shrinking number of wholesale-retail supermarket produce buyers (excluding field buyers, employed by approximately 12 supermarket companies) probably does not exceed several hundred, shipping point sellers may still be conservatively counted in the thousands. Despite this relatively large number of sellers, however, a growing percentage of fruit and vegetable production is concentrated in only a few areas. In 1980, for example, California and Florida combined to account for approximately 71 percent of all fruit and 60 percent of all fresh vegetables produced in the U.S.

Changing Consumers-- A Driving Force

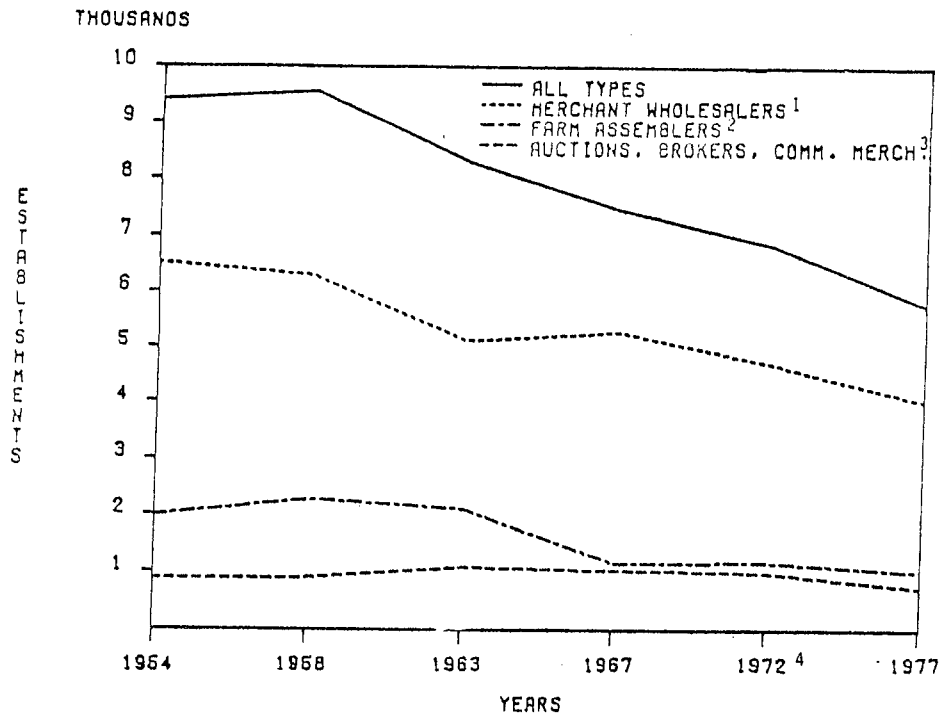
Changing consumer preferences, demographics and lifestyles continuously present the produce system with new challenges which require, but do not always obtain, responses from all system participants. Consumer interest in

nutrition, diet and healthfulness--all associated with fresh produce--has increased. This new interest has been spurred by endorsements from many national organizations including the USDA, Department of Health and Human Services and the National Academy of Sciences, calling for increased consumption of fresh fruits and vegetables to reduce health risks. A 1981 nationwide survey by Chain Store Age Supermarkets showed that when consumers were asked to rank 13 factors they viewed as most important in a grocery store, "quality produce" was listed as the highest priority in every market surveyed; ahead of "quality meat," "low prices" and "cleanliness."³

These trends and attitudes have led to recent moderate increases in per capita consumption of fresh produce. Since 1973-1974--a period of rising oil prices and recession when many consumer purchase patterns were observed to undergo considerable change--until the most recent 1980-1981 period, average per capita consumption of fresh fruit and vegetables increased 15.2 percent and 8.7 percent, respectively.⁴

Within the produce category, however, per capita consumption of some individual items changed dramatically. Consumption of leading noncitrus fruits like bananas, apples and peaches, for example, rose sharply during the 1973-1974 to 1980-1981 period, 15 percent, 26 percent and 30 percent, respectively. Popularity of salads has similarly led to increases in the consumption of leading vegetable items like tomatoes, lettuce and green peppers by 10 percent, 12 percent and 24 percent, respectively, during the same period. Per capita consumption of many of the minor fruits and vegetables increased even more rapidly. For example, although small in absolute terms, over the 1970s consumption of nectarines increased 133 percent and avocado consumption increased 225 percent. Although more clearly defined consumer segments and a surge in consumer interest in fresh fruits and vegetables are major forces driving many of the changes in

FIGURE 2. FRESH FRUIT AND VEGETABLE WHOLESALE ESTABLISHMENTS, 1954-1977



SOURCE: Compiled from Bureau of Census, U.S. Census of Business, Wholesale Trade, 1954-1977

¹Merchant wholesalers refers to a Bureau of Census definition of establishments primarily engaged in buying and selling merchandise on their own account, including wholesale merchants or jobbers, importers and exporters. Although the produce sales of some voluntary and cooperative group wholesalers may be included here, most are found reported elsewhere in the Census with dry groceries. This group can, therefore, be thought of primarily as "terminal market wholesalers".

²Establishments who purchase directly from farmers and market the product at wholesale. This corresponds roughly to the use of the term "shipper" in this study (see text).

³Establishments primarily engaged in buying and selling for others including auction companies, commission merchants, merchandise brokers and selling agents.

⁴In 1972 the Bureau of Census began to group Farm Assemblers with Merchant Wholesalers. Since the number of Farm Assemblers as a percent of total Merchant Wholesalers was approximately stable from 1954 to 1967 (between a 22 percent and 28 percent range), the 1972 and 1977 figures were disaggregated following this historical trend.

today's produce system, much more detailed knowledge regarding the changing produce shopper is needed.

Status of the Retail Produce Department

Retailers are responding to changing consumers in a number of ways. Expansion of the produce department is a typical strategy. As new grocery store formats such as warehouse stores, specialized boutiques, superstores, etc., proliferate in retailers' attempts to differentiate themselves from competitors, produce departments have received increased space, as well as prime in-store locations. Many supermarket organizations now attempt to create distinctive and attractive "images" based upon innovative merchandising and variety of selection in produce departments.

Although the percentage of a typical store's selling space allocated to produce is about 9 percent, it should be pointed out that this is an average for all stores, old and new. Older stores, built or remodeled before the renewed interest in fresh fruits and vegetables, devoted a relatively small share of the store to produce, as low as 3-4 percent. Newer store prototypes, however, have doubled and even tripled the percentage of the store available for the produce department. While published data are not available, a conservative estimate from retail organizations interviewed in this study would put the percent of produce selling space in new store layouts at approximately 11-13 percent of the total selling space.

Expanded variety in produce departments has paralleled the growth in space. Whereas the number of items carried in produce departments averaged approximately 65 only eight years ago, a Food Marketing Institute study revealed that the average number of items in the produce department in 1980 was 135.⁵ Today, it is not uncommon for some larger stores to carry over 250 items.

Produce department sales, slightly above 8 percent of store sales in 1981, are not composed entirely of fresh fruit and vegetables. Although approximately 91.5 percent of sales is fresh product, a growing proportion of sales--8.5 percent in 1981--is accounted for by nonfresh items.⁶ Nonfresh speciality items, for example, account for up to 5-6 percent of all produce sales in some stores, up from about 1 percent 10 years ago. Included in the nonfresh category are such items as refrigerated salad dressings, nuts, certain "exotics," bird seed, garden seed, bulk candy, fertilizer, charcoal briquettes, bottled fruit juices and dried fruits.

In 1980, the produce department had the highest average gross margin, approximately 31 percent, among the major grocery store department categories.⁷ Considering only food sales, if dried fruits and vegetables, and nuts--all frequently located in the produce department--are credited to produce sales, produce is only exceeded by dry groceries and meat in the percentage of gross profit (10.8 percent) contributed to store operations. While information on net profit is scanty, industry spokesmen generally assume that produce is one of the highest, if not the highest, contributor to net store profit. The industry seems to accept estimates of produce contribution to net store profit in the 25-00 percent range. One United Fresh Fruit and Vegetable Association study concluded that the share of store net profit accounted for by the produce department may be as high as 36.5 percent.⁸

Floral sales, too, are increasing. Although there is some recent tendency to separate the responsibility between the produce and floral areas, most floral departments are still managed from the produce department. Although industry average floral sales as a percentage of produce sales appears to be approximately 3.3 percent, many companies with fresh cut flowers, foilage plants and accessories report sales in the 5-11 percent range. In a

1982 survey sponsored by "The Packer" trade paper, 86 percent of all responding supermarket organizations handled floral products, either on a regular or seasonal basis.⁹

Summary of Principal Research Conclusions

The identification and description of the standard operating practices of produce buyers and sellers, along with the subsequent analyses, lead to a number of conclusions regarding the contribution these practices make, or fail to make, to the coordination of the vertical produce system. The principal conclusions of this study are summarized in this section under five major categories:

- Need for systemwide understanding
- Coordination mechanisms: price and merchandising
- Incentive structures
- Forces driving change
- Structural directions

Need for Systemwide Understanding

Analysis of the SOPs employed by produce buyers and sellers repeatedly reinforced one inescapable conclusion of this study: firms need a deeper understanding of their own operations, as well as the operations of their suppliers, customers and competitors, in terms of the positions, objectives, strategies, SOPs and impacts each has on the common commodity system of which each is a part. The produce system is highly diverse and dispersed. There are few undisputed leading organizations. To ensure systemwide coordination in this environment, a steady, timely and accurate information flow among the system's constituent parts is essential, yet generally is not present.

This study examined several sets of circumstances where the absence of recognized interconnectedness of the produce system impedes effective system coordination. Generally speaking, these

circumstances suggest a lack of understanding of important components relating to the operations of firms engaged in buyer-seller transactions. Buyers, for example, may fail to distinguish between shippers integrated into production activities and those who are not; yet integrated grower-shippers are often able to offer considerably greater flexibility in sales programs and sometimes make quicker decisions than the latter group as a result of not being accountable to a separate group of growers. Shippers, conversely, often lack an understanding of many wholesale-retail activities: retail level multiproduct pricing, for example, as well as wholesale-retail firm organization--chains versus voluntary and cooperative wholesalers--are generally not well understood by many shipping point firms. In the absence of this knowledge, production and marketing plans are based on less than sufficient information.

Improved understanding is important on three levels: within individual firms, between firms and systemwide. First, it was pointed out that due to the prevailing short-run orientation of the industry, relatively unsophisticated cost control systems exist in some firms and produce marketers often do not know with adequate precision all of their own costs. The extent of product losses is only one case in point. Lack of management data which documents the magnitude of losses, as well as where losses occur within the firm has not only resulted in the continuance of large losses, but has slowed industry efforts to reduce the problem.

A National Science Foundation study, however, estimated total system losses from all causes to range between approximately 9 percent and 17 percent of the total value of produce entering the wholesale stage of distribution (Table 1). Although these systems losses translate into a staggering \$859 to \$1,695 million range in 1982 dollars, many produce executives indicated that actual losses may be much higher. Further documentation on actual systemwide losses would provide produce marketers with the information required to break away from

TABLE 1. ESTIMATED RANGES OF 1977 PRODUCE LOSSES IN THE DISTRIBUTION SYSTEM^a

Distribution Activity	Losses ^b (percent)	Value of Losses ^c (millions of dollars)
Transportation	3.80 - 5.00	268.70 - 379.81
Wholesaling	2.50 - 5.03	176.86 - 381.75
Retailing	2.74 - 6.58	194.01 - 500.33
System Losses	9.04 - 16.61	639.57 - 1261.89

Source: Thomas R. Pierson, John W. Allen, Edward W. McLaughlin, Produce Losses in the U.S. Food Distribution System, Agricultural Economics Report 422, Department of Agricultural Economics, Michigan State University, East Lansing, Michigan, December 1982.

^aLosses cited are estimated values of physical quantities of food lost for human consumption. Costs of recoup, trimming, salvage operations and numerous indirect costs associated with losses and damage are not included.

^bPercentage losses are based upon dollar values of losses in each phase of distribution as a percentage of the wholesale value of products entering the distribution system. Wholesale values of products entering the system are estimated to have ranged from \$7,071.00 million to \$7,596.22 million. This range accommodates the given loss rates and supermarket produce sales of \$9,506.49 million.

^cLosses in transportation and wholesaling activities are valued at wholesale prices and losses at retail are valued at retail prices. The estimated retail gross margin of product is 31.7 percent.

system-induced inertia and spur action to reduce this problem.

Second, as noted above, interviews frequently indicated a lack of thorough understanding of operations of customers and suppliers. With the exception of a few, generally larger, or better managed firms, shippers demonstrate little knowledge of exact firm types, internal organizations or merchandising strategies of their buying clients. Although buyers, on average, are slightly more familiar with supplier operations than suppliers are with buying operations, buyers, too, are often unaware of structural arrangements and supply contingencies at shipping point. Lack of thorough customer knowledge leaves a company vulnerable to unanticipated strategic maneuvers and causes misallocation of firm, and ultimately, system resources.

Third, following directly from the above, is the need to develop an accurate understanding of the total produce system. Examination of issues surrounding standardization and utilization of shipping cartons, for example, leads to this conclusion. The implementation of a set of standard shipping containers has the potential to significantly increase marketing efficiencies and reduce costs for the entire produce system; yet adoption has lagged. Although systemwide benefits appear to be of considerable magnitude, the benefits to individual participants have not appeared large enough to induce action. The lack of suitable institutions to foster this systemwide understanding is a major component of the problem.

Recognition of systemwide interconnectedness is especially called for by the nature of ongoing cost and risk shifts in the vertical produce system. Wholesalers and retailers are increasingly

moving costs and risks to growers, shippers, and also brokers and transportation agencies. Growers and shippers are increasingly expected to provide many of the packaging, handling, information, and transport services that were formerly performed at wholesale or retail levels. This trend is likely to continue. The consequences of these cost shifts are not necessarily adverse for shippers; however, one important implication is that growers and shippers need to carefully weigh costs of these new activities against expected benefits.

Indications of increasing cost burdens on growers and shippers, however, do not tell the whole story in a dynamic, vertical system context. Specifically, some of these cost shifts appear to result in systemwide efficiencies. Trends toward increased source packaging for those produce items sold in retail packages, for example, have transferred considerable labor activity from wholesale-retail levels where unionized wages commonly exceed \$10 to \$12 an hour to shipping point levels where wages rarely reach one-half that amount. Similarly, today's larger shipping point inventories, often a consequence of shifts from wholesale-retail levels, have reduced high-rent wholesale warehouse space requirements and substituted much less costly shipping point space which is also apt to be designed for greater compatibility with the precise temperature and humidity requirements of specific commodities. It is probable that in both of these instances systemwide cost savings result.

Other current trends also have the potential to improve systemwide performance, at least along certain dimensions. Retail demands for more precise transportation arrivals, for example, place increased coordination costs on shippers and transporters, but at the same time appear to result in faster wholesale-retail inventory turnover, reduced product losses, and deliveries of higher quality, fresher

produce to consumers. Likewise, increased retail demands for more and better information from shippers are likely to produce better decisions from both buyers and sellers, and thus improve the matching of supply and demand.

The overriding conclusion of shifting costs and risks is this: while growers and shippers should closely evaluate the potential costs and benefits on an individual firm level before undertaking new, formerly wholesale or retail level, activities, it is probable that many of these transferred activities possess the potential for improving systemwide coordination. Increased costs at one (or several) vertical stage(s) may still result in overall increases in systemwide efficiency. It is the net change that is crucial for evaluating systemwide coordination and performance.

Coordinating Mechanisms: The Role of Price and Merchandising

The fresh produce industry has been described as fragmented and dispersed, especially on the supplier-side. The highly perishable nature of the product requires harvesting and marketing with a minimum of delay. These characteristics combine to produce a system of loosely coordinated parts. The coordinating mechanisms that have evolved to cope with this rapidly changing industry are primarily private rather than public. Although certain formal coordinating mechanisms exist, such as federal grades, marketing orders, futures markets, and others, it is price and exchange agreements that serve as the principal coordinating devices of the produce system.

Although the price mechanism was seen to be the principal coordinating device in the fresh produce industry, a number of situations were examined which supported an initial supposition of this study: price alone is often unable to carry all the information necessary to coordinate supply and demand. The most significant of these situations appears to be multilevel-multiproduct pricing. Due to theoretical and practical diffi-

culties involved in the systematic allocation of fixed costs in multi-product enterprises, and to the additional flexibility that results, retailers use multiproduct pricing techniques. Because of the large amount of retailers' overhead costs, different combinations of which generally apply to each produce--including produce items--and the great number of products carried in contemporary supermarkets, allocation of these costs to particular products is necessarily somewhat arbitrary. Thus the meaning of individual prices gives way to overall department or store performance. In the produce department, this often means that a retail competitor's produce price structure figures more importantly in retail price setting than do individual product costs.

This study found that the recent accelerating importance of multicommodity suppliers further obscures individual price identity. As shippers increasingly add to their commodity offerings to meet expanded retail buyer demands, they too are beginning to use multicommodity pricing strategies. To accommodate a buyer's need for a particular ad price concession, for example, multicommodity shippers reported that other prices could be adjusted accordingly, at least within the constraints of their competition and their own targeted profit objectives.

With multiproduct pricing thus extended to multiple levels--wholesale, retail, and shipping point--direct correspondence between retail and shipping point price movements is often only accidental. This may even be true in the long run. Although multilevel-multicommodity pricing is likely to lead to resource misallocation to some degree for all system members, the coordination consequences of such practices for growers and shippers attempting to make long-run investment and planting decisions are dramatic. Price "averages" that multiproduct-multilevel pricing tends to generate may provide misleading guidelines for growers and

shippers, especially limited-line growers and shippers, who are not as able as multicommodity shippers to adjust resources among many commodities. One result of these pricing techniques is significant shifts in the risks and costs associated with system resource misallocation to grower-shipper levels.

Multiproduct pricing is one example of retail merchandising that inhibits price from being always and everywhere an efficient coordinator. The concept of retail "price points" provides another example. Retailers recognize that, because of the thousands of items in a contemporary supermarket, food and produce shippers do not perceive all price changes. Retailers capitalize on this consumer cognitive limitation by using pricing strategies, such as "pricing-on-the-nines," which attempt to approximate the price insensitive range of consumers. This study demonstrated that it is theoretically possible that these insensitive ranges--where price changes elicit little or no quantity movements--are extended vertically backward to shipper and grower levels.

This retail pricing-merchandising phenomenon helps to explain two frequently criticized characteristics of produce prices. Although "price points" often play a role in retail pricing, many other food products, especially further processed products, have considerable amounts of joint inputs that serve to spread and dampen producer level impacts of "sticky" retail prices. The actual farm commodity may constitute only a small proportion of overall retail product value for many manufactured foods. In fresh produce, however, insensitive retail and consumer price thresholds result in sometimes dramatic price swings at shipping point. A change in supply must often be relatively large before any price change is brought about, say from a retail price of \$.89 to \$.79, or \$.69. Therefore, retail pricing points contribute to both produce price volatility and to the lack of simultaneous adjustment between farm and retail prices.

One other factor is critical, however, in explaining both shipping point and retail produce price volatility: perishability. At shipping point, produce is influenced importantly by the vagaries of weather and the lack of storability of most fresh commodities; the combination of these factors can often cause wide f.o.b. price swings. At the retail level, perishability is also a key factor in explaining price volatility. Small retail price reductions often induce very little, if any, increase in retail sales for two reasons: first, as noted above, many shoppers are not likely to perceive small price changes; and second, even those who recognize bargain prices are very limited in the increased quantities of an item they are able to purchase due to its inherent perishability.

One retailer reasoned that the type of price-conscious shopper who is apt to recognize a moderate price reduction in the produce department, where 50 percent of the average number of 135 items may change price weekly, is also apt to be an individual who has learned by experience what happens to fresh produce when too much is purchased relative to family needs. It is thrown out. Hence, in order to stimulate produce sales, in addition to merchandising techniques covered below, a common retail SOP is to reduce prices dramatically, perhaps as much as 25 to 40 percent below normal levels for key "feature" items. This practice magnifies price volatility originating with various shipping point conditions.

The application of UPC scanning to the produce department will permit retailers to much more precisely determine these consumer price perception thresholds. If these thresholds are greater than currently estimated, price variability at the shipping point could be amplified even further. However, with improved produce department management and better knowledge of individual product costs that will accompany UPC scanning and related technologies, it

is likely that retailers will be more sensitive to shippers' price changes, thus reducing price volatility at shipping point levels. It should be noted that some retailers are already tracking "Direct Product Profit"--net profit for individual grocery items--via electronic technologies.

At the same time that the above retail merchandising SOPs tend to impede the efficient vertical transmission of prices, other merchandising techniques tend to improve system coordination. It was found, for example, that many advertised retail produce items--probably the majority--are not run at significantly reduced gross margins, if they are reduced at all. Even 25-40 percent price reductions for main "feature" items often reflect large, although likely somewhat smaller, f.o.b. price reductions. This is perfectly rational retailer behavior if, after all, consumers are unlikely to perceive modest price reductions. Rather, the key to produce promotions is more often the increase in display space and related merchandising activity. It is not unusual for movement of advertised "line items"--those with small, if any, price reduction--to increase two to six times as the result of media advertising and extensive in-store merchandising activity. Such activity acts to influence consumer shopping behavior in ways that price often cannot. Hence, price reductions alone do not appear capable of inducing sufficient demand increases to coordinate supply contingencies without accompanying merchandising assistance.

Finally, bounded human intellectual capacity may contribute to price not carrying adequate coordinating information. Interviews revealed that although f.o.b. prices charged by the same shipper, as well as by different shippers, may often be similar, the nonprice factors can, and often do, differ considerably. Quality and consistency of product, assurance of supply during shortages and reliable deliveries are critical in the fresh produce industry; yet assigning dollar values to the often subtle

distinctions between these factors is difficult. Faced with this complex calculus many shippers employ an SOP of a given price for a given grade, but then differentiate one sales transaction from another with other, often more critical, nonprice factors.

Incentive Structures

Success or failure in system design is generally determined by the incentive structure facing participants. Certain incentives confronting members of the produce system were shown in this study to present barriers to more effective system coordination. Separation of the functions and reporting channels for buyers and merchandisers in many chain organizations, for example, often create incentives at cross-purposes and lead to intra-firm communication breakdowns. Likewise, lack of formal authority relationships between produce managers in independent stores and their affiliated wholesalers often result in produce managers responding to a set of incentives not always well-synchronized with the program needs of suppliers.

Incentives in many firms are narrowly directed or short-run. Both wholesaler and chain produce buyers, in almost all cases, are responsible for procurement functions only. They are judged by short-term sales and profit performance in procurement-related activities. Yearly and quarterly evaluations are standard. Buyers have little or no incentive to invest in, for example, shipping point innovations such as cooling, packaging or handling techniques that may improve productivity or performance elsewhere in the company or overall produce system. This type of short-run orientation is equally, perhaps more, dramatic in shipping firms, and understandably so. The rapid-fire nature of shipping point sales, triggered largely by product perishability and quickly changing supplies, leaves little time for consideration of long-run planning.

The recurring, and serious, problem of immature produce at retail levels, for example, revolves largely around a structure of short-run incentives: suppliers often tend to ship "green" fruit to obtain early season prices, to facilitate handling, and in some cases, to improve their cash flow position; while many buyers, unwittingly, encourage the practice as they are rewarded for "beating competition" with new seasonal items. The result of these short-run incentives is unripe fruit on retail shelves and potential long-run alienation of displeased consumers.

Short-run incentives also contribute to the need for merchandising produce in bulk form. Consumer lack of confidence in prepackaged produce has resulted from both packers' and wholesale-retail wrappers' tendencies to include varying quality in many packages in order to meet their target shrinkage objectives. The temptation is strong to reduce losses by including soft tomatoes in otherwise quality packages. By purchasing bulk to avoid the possibility of getting concealed bruises or damaged produce, consumers bear the burdens of greater systemwide costs due to higher handling expenses and increased product losses generally associated with bulk produce.

The packaging incentives causing these higher costs may shift, however. Recent advances in packaging materials and handling methods coupled with sophisticated produce movement information generated from UPC scanning possess the potential to greatly reduce many types of produce losses. The potential offered by packaged produce for increased efficiency, better product and profit control, and significant loss reductions may significantly realign current incentive patterns. A subsequent movement away from bulk sales toward marketing packaged produce would be a direct reversal of current trends and could create fundamental changes in the operations of shipping point handlers.

These examples show that produce practitioners often have few incentives

to take a broad or long-run view. As it currently stands, most produce buyers and sellers limit their vision to the short-run as dictated by their incentives. Few rewards are given for experimentation or innovation. Indeed, no produce firm was encountered in this research where recognition for long-run performance was incorporated into incentive structures.

Overall, the consequences of individual and firm oriented incentive structures, designed primarily to produce short-run results, lead to nonoptimal system coordination: Costs are increased to all system members, including consumers and growth of the produce industry is reduced. Marketing firm managers would undoubtedly adopt more innovative approaches if they believed that they had the authority, responsibility and were remunerated on the basis of longer term goals such as cumulative sales or net profits over longer-run periods than at the present time. Such programs might spur greater experimentation on the parts of produce firms and accelerate the adoption of new technologies, an area where the produce system has typically lagged many other food commodity systems. Furthermore, it is likely that responsibility for longer term goals would provide the impetus for mutually beneficial generation and communication of longer-run information between buyers and sellers. This would be particularly useful for tree fruit growers and shippers, for example, who currently are forced to base long-run planting and investment decisions on relatively short-run information.

Forces Driving Change

Although many forces shape produce industry perceptions and operating tactics, two themes were dominant in this study. The first of these may be summarized as follows. Consumers are splintering into ever-more distinguishable segments. Retailers are responding with attempts to differentiate themselves in order to market more

effectively to these segments with new store formats and distinctive merchandising strategies. These retail responses, in turn, transmit different signals to shipping point firms as new services, different product mixes, and more clearly delineated price-value relationships are sought by retail buyers.

This phenomenon has been especially pronounced in the retail produce department where a resurgence of consumer interest has launched produce into the premier image-maker for many companies. Expanded departments and the recent doubling of items carried has had a number of implications for the produce industry; one aspect is increased complexity of the produce buying functions. Increased source packaging requirements, "inability" of produce buyers to accept off-quality or out-of-condition products, and a new receptivity to information are manifestations of this trend.

A closer retailer alignment with consumers than in the past has accompanied perceived shifts in overall retailer orientation vis-a-vis suppliers. These changes in produce appear to have paralleled a changing relationship between retailers and grocery manufacturers. Specifically, the locus of power in these relationships is evolving toward retailers as they continually have direct access to more and higher quality information resulting from emerging technologies, especially UPC scanning and the related technologies, discussed below. Increased identification with consumer interests and greater bargaining strength derived from technological advances have combined with a desire to offset declines in profit and are resulting in greater retailer demands on suppliers in all food categories, produce as well.

Hence, shippers increasingly face a buyer who perceives himself as the consumers' buying agent and no longer as the shippers' marketing agent. The distinction may seem subtle, but is imposing considerably greater discipline on shipping

firms. Shippers' responses to new demands by retailers will greatly influence the future nature of shipping point markets.

This leads directly to the second major theme of the forces driving change in the produce subsector--technology. New electronic technology is being implemented at all levels in the product system, ranging from planting and packing equipment to retail checkout lanes.

Of greatest significance for the entire food and produce system, however, is the gradual adoption of UPC scanning and related technologies such as Price-Look-Up systems at the retail level. As these systems aid in the collection with and analysis of detailed information on product purchases and, eventually, are connected with local demographic information available through check cashing cards, retailers will have more precise breakdowns on product sales by household size, income, occupation, and so on. For the first time, retailers will be able to accurately assess the actual effectiveness of various merchandising techniques on a timely basis and at feasible costs.

Although this type of sophisticated information retrieval and application is only now emerging, it is clear that the adoption of this technology will shift additional benefits to food and produce distributors. Accurate individual product performance information will be generated and analyzed for all retail products; and it is probable that those not performing according to established criteria will be discontinued. Retailers will no longer be forced to rely on major suppliers for information on the effectiveness of various sales techniques; on the contrary, suppliers will increasingly rely on retailers. Here, however, many smaller produce suppliers may be disadvantaged relative to large grocery suppliers. This latter group may be better able to gain access to retail demand information via purchases

from private data collection and analysis companies.

Many produce suppliers, however, may not possess the resources needed to purchase such data. Moreover, if they did, it is uncertain how useful the data would be to highly fragmented individual firms with neither significant market shares nor with well-established brands. Often, for example, shipper label identity is lost in wholesale or retail repacking and preparation operations. On the other hand, some large multicommodity shippers have already developed significant market shares in a few commodities, and for them, retail data acquisition may afford the opportunity to formulate marketing plans based on more accurate demand information. In so doing, improved systemwide coordination would result.

At shipping point, new technology is also changing traditional ways of conducting business. Electronic information and communication systems, for example, allow constant, immediate communication between sales offices and packing sheds. This has prompted, for example, the development of easily transmitted, more objective quality control information; visual inspection of many products thus has become less critical. New storage and transportation technologies are other areas contributing to changes away from traditional practices in the produce system: examples include controlled atmosphere, storage facilities, improved hydrocooling and vacuum cooling techniques, field wrapping equipment, temperature and humidity-controlled long-distance transport containers and distribution centers, and others.

These technological developments and others like them, will have a dramatic influence on the future of produce industry practices and structure. For example, the spread of large, multicommodity shippers--decentralized production areas and packing plants linked to one or several sales headquarters--has been one direct result of the confluence of several of these technological developments.

Structural Directions

The dynamic interaction and evolution of product buying and selling SOPs has had, and continues to have, marked impacts on the structural configuration of the produce industry, in particular at shipping point levels.

Increasing concentration of integrated wholesale-retail supermarket organizations has had two predictable consequences on shipping point firms: buyers' bargaining strength has increased and their volume, as well as variety requirements are greater. In the produce area, these consequences are magnified as produce buyers attempt to procure vastly increased numbers of items over extended periods of time to meet the wants and needs of contemporary consumers. Large, year-round volume needs of growing wholesale-retail buyers require larger and often year-round shippers. These conditions have converged with economies of size that appear to exist in marketing, and in some cases the production of fresh fruits and vegetables, to create an increasing disparity between the small core of large, multicommodity-multi-region shippers at one end of a spectrum and the great number of small, single region, limited-line suppliers at the opposite end. The result is a "structural dichotomy" of shipping point markets. The firms distributed along the structural spectrum are approaching one of the two poles with increasing speed.

This study revealed that many multicommodity shippers, especially those marketing 20, or 30, or more commodities, are much more apt to think, like buyers, in terms of the total universe of fresh "produce" rather than in terms of individual commodities--a market orientation. Multicommodity shippers, by the nature of their firms, are encouraged to take the broad view, instead of being driven from season-to-season and from transaction-to-transaction by short-run expediency like many smaller suppliers.

This more similar view of the produce system appears to be one of the most important factors strengthening the bond between buyers and multicommodity suppliers and widening the gulf between this latter group and their single region, limited-line competitors.

The growth of multicommodity suppliers has brought a certain degree of countervailing power to the produce shipping industry where, historically, buyer dominance has been the rule. Competition is being reoriented more along nonprice rather than price bases with many multicommodity shippers. Differentiation according to service levels, for example, is increasing as are advertising levels, especially to the trade. With several notable exceptions--Chiquita, Sunkist, etc.--the lack of extensive media advertising budgets, very few retail field forces, and frequently, absence of year-round availability has prevented even large suppliers from developing consumer franchises for their fresh produce products. Increasingly, however, shippers are developing a "franchise" with the individual who matters to them most, the wholesale-retail buyer. Today, for example, a multicommodity suppliers' "family of produce products" is often highlighted to buyers. The shipper strategy is that, as with consumer franchises, the buyer will tend to extend the high quality of one commodity in the shippers' "produce family" to other offerings in the multiple product line.

The structural dichotomy is also partly geographical. Production of fruits and vegetables is increasingly concentrated in fewer states. Despite the marketing disadvantage presented by recent increases in transportation costs, the value of U.S. fresh vegetables accounted for by California and Florida has continuously increased over the past decade. This is surprising, given that the production plans for fresh vegetables, unlike, say, tree fruits, can generally be adjusted quickly in response to changes in market conditions such as rapid transportation cost increases. Natural climatic comparative advantage appears to be

combining with "marketing comparative advantages" of the multicommodity shippers concentrated in these areas to the disadvantage of shippers in other parts of the country.

The survivability of single-region limited-line shippers will be determined by their response to this growing dichotomy of shipping point markets. Shippers of minor fruits and vegetables or geographically disadvantaged shippers, particularly, risk being passed over in the future unless action is taken by them to strengthen their marketing programs.

Questions for the Future

The produce industry is in transition. Changes are rapidly occurring at both shipping point and at wholesale-retail levels. This study raised many questions for private and public decision makers. Answers to these questions are necessary to enable firm managers and policy makers to prepare for, rather than simply react to, changing market conditions. Three of the most important questions are addressed below.

Who in the system will collect information? Emerging electronic information collection and processing technologies possess the potential to significantly alter the operating environments of produce marketing firms. UPC scanning and related technologies, for example, will put new information regarding individual product performance, never before available, into the hands of wholesalers and retailers. Computerized trading systems, another example, have the potential for lessening the information disparity among certain traders and, depending on the circumstances, could be substitutes for information functions currently performed by existing middlemen.

Moreover, on an industry-wide level, policy makers must recognize the scarcity of adequate data in the produce system on which to base

decisions. Traditional groupings of produce industry participants (e.g., Bureau of Census classifications) no longer contain--if they ever did--similar firms. Further, publicly collected data is less comprehensive than in the past, both at receiving points and shipping points. The number of cities where fresh fruit and vegetable unloads information is collected, for example, has been sharply reduced and numerous data series regarding supply conditions have been eliminated. Thus, the development of a more complete information base describing the current produce system, including food service, foreign trade and direct-marketing outlets, should be given a high priority. Who will organize, gather, process and control this critical information is yet to be determined, but exists as a pressing issue.

Who will market fresh fruits and vegetables? Increasing concentration of wholesale-retail buyers and increased importance of produce departments within retail organizations is resulting in demands for greater variety, larger volume and stricter quality control at shipping point. This trend is expected to continue. In many instances, multi-commodity-multiregion shipping companies will be in a position to meet these requirements and, increasingly, on a year-round basis. At the same time, it appears unlikely, given the current environment, that many smaller growers and shippers will be able to produce sufficient quantities, consistently graded and packed, over a sufficient time period to supply the needs of the growing number of large buyers. It is probable, therefore, that many smaller growers and shippers will tend to orient their activities toward the needs of smaller super-market buyers, terminal market operators and brokers, all of whom can typically make use of seasonal products and smaller volumes. Although these latter groups of fragmented buyers should provide market outlets for many limited-line suppliers, this diverse buyer group represents a declining portion of overall fresh produce sales. Finally, an increasing proportion of business is likely

to be directed toward food service and export outlets, both of which are experiencing real increases in produce sales.

A word of caution is in order, however. Although multicommodity, geographically diversified firms have been shown to possess some decided advantages over smaller, single location shippers, significant expansion or diversification, is not a recommended policy for all firms for several reasons. As noted earlier, some firms have developed successful businesses by targeting a particular market niche. They may already be of an appropriate size for their specialized marketing strategy. Other firms have achieved adequate volumes for today's more exacting assembling, grading and packaging requirements through various types of collaborative efforts--joint ventures with larger firms, cooperatives, marketing orders and others. Finally, many small firms may not have the managerial capacity to accommodate higher levels of produce diversity. Given this condition, diversification primarily to escape a declining business may simply hasten the decline.

The bottom line is this: in markets characterized by more clearly defined segments than ever before, clearly focused marketing plans are essential for today's fruit and vegetable marketing firms.

What new forms of marketing institutions will emerge? The role of produce trade associations has already been expanded to encompass more than its historical function of furnishing promotional support. Provision of market and merchandising information, for example, is now a regular service of many trade groups. These groups could become increasingly involved in the emerging electronic information technologies through development, financing, and operation of various forms of these technologies. Certain information supplied by trade associations to industry members--a market

"information clearinghouse" concept-- may be more effectively tailored to individual commodities and perhaps less costly than a publicly provided facsimile. Currently, however, trade associations, just as the industry they support, are somewhat fragmented; more inter-association coordination is needed. Innovative institutional combinations might assist trade groups to facilitate more effective system-wide coordination.

Similarly, despite evidence that both produce buyers and sellers attach importance to stable, or at least predictable, prices and despite considerable acknowledgement by both groups that longer-run forecasting is desired, very little fresh market produce is currently bought or sold on strict contractual terms. This is true for a myriad of reasons. Yet advance pricing has the potential to reduce short-run price fluctuations, simplify ordering and bookkeeping and eliminate adverse effects of inevitable attempts to outguess the market. Creative policy must promote institutions that foster the needed requisites for relative system price stability and for long-term investment planning; yet flexibility for required short-term adjustments must be preserved. New forms of produce "contracts" may merit consideration by product policy makers. New electronic technologies are leading, for example, to electronic trading; this may, for the first time, make new longer-term pricing techniques feasible.

What rule changes and inducements are needed to create new arrangements for supplying the "stability-with-flexibility" requirements of the produce distribution system? Current institutions--trade associations, marketing orders, quasi-contracting, collective bargaining with retailers--merit reexamination in light of the changing conditions in the produce system. To make way for continued growth in the fresh produce industry new organizational and marketing mechanisms should be developed which foster system-wide understanding and encourage partnerships between shipping point firms and wholesale-retail buying organizations.

Footnotes to Figure 1

¹Numbers adjacent to the marketing channels are percentage estimates of the value of fresh produce distributed through the U.S. marketing system. Their sources are given below. In parentheses are the dollar estimates of production values at the various levels indicated (e.g., retail levels are estimated at retail prices). Dollar figures are in \$1,000,000.

²Estimated from Restaurants and Institutions' 1980 report of \$111,853 million in food services total food sales combined with informed trade estimates that fresh fruit and vegetable sales comprise approximately 4.6 percent of the total. This estimate is consistent with that provided by the 1981 Produce Marketing Almanac's estimate that 17 percent of the farm value of all fresh fruits and vegetables are sold via institutional outlets, when the farm share of the fresh produce food service dollar is assumed to be in the 18-25 percent range.

Other estimates, however, arrive at a figure considerable higher than \$5,179 million. Elsewhere, in the same 1981 Produce Marketing Almanac, for example, fresh produce purchases are estimated to constitute approximately 10.3 percent of food service total food purchases. Given standard industry markups (40-60 percent) and the food purchases of commercial and noncommercial food service operations as percentages of their total sales (67 and 41 percent, respectively), food service fresh produce sales calculated in this way would be nearly twice the estimate used here. The lower estimate used above appears to be more reasonable and receives greater corroboration from industry sources.

³Obtained by applying the 1980 Produce Department sales as a percentage of store sales (8.18 percent) to all grocery store sales (e.g., supermarkets plus "small stores"). Chain Store Age Supermarkets, March 1981; and Progressive Grocer's 1982 Marketing Guidebook.

⁴"Farm Markets" includes roadside stands, farm markets and Pick-Your-Own operations. The estimate here was derived from Farmers to Consumer Direct Marketing in Six States, USDA, ESCS, Agricultural Information Bulletin No. 436, July 1980. Six states representing 35 percent of all direct marketing operations reported 1978 fresh fruit and vegetable direct marketing (i.e., "farm market") sales of \$84.4 million. The sales estimate here assumes that these six states account for the same proportion of total sales, 35 percent of U.S. direct marketing total, and has been adjusted to 1980 dollar figures.

⁵The distribution of produce sales among the various wholesalers was based on unpublished USDA reports on the "Percentage of Fresh Fruit and Vegetable Unloads in 30 Cities Delivered Direct to Chain Stores" and on a study conducted of wholesale-retail fresh fruit and vegetable procurement patterns by Marcom Associates, a research branch of Vance Publishing Corporation, "How Do You Measure Up," Chicago, Illinois, 1982. It should be noted that these unpublished USDA reports cover only approximately one-half of all unloads in the U.S. and, even then, the reporting took place in 30 major U.S. cities where a greater percentage of produce is believed to move through terminal markets. It is probable that this reporting procedure is responsible for estimating the percentage of produce moving through terminal markets as substantially higher than approximations given by the trade.

⁶Imports and export values were compiled from USDA, 1981 Handbook of Agricultural Charts, Handbook No. 592, U.S. Department of Agriculture, October 1981.

⁷Dotted lines represent produce sales transacted by the various brokerage firms and agencies which generally do not physically handle nor take title to the product.

⁸Value of fresh vegetable production was obtained from USDA, Agricultural Statistics, 1981. Value of fresh fruit production was calculated from USDA,

Noncitrus Fruits and Nuts, 1981 Annual Summary, 1982 and USDA, Citrus Fruits, 1981-1982 Crop Year, September 1982.

FOOTNOTES

¹McLaughlin, Edward W., "Buying and Selling Practices in the Fresh Fruit and Vegetable Distribution System: Implications for Vertical Coordination," Ph.D. Dissertation, Michigan State University, forthcoming.

²See Footnotes for Figure 1 for explanations of the derivations and the sources of the estimates contained in Figure 1.

³Chain Store Age Supermarkets, selected issues, 1981, 1982.

⁴USDA, Fruit Outlook and Situation, ERS, July 1981, 1982; USDA, Vegetable Outlook and Situation, TVS-225, July, 1982.

⁵Food Marketing Institute, "Industry Speaks, 1980," FMI Convention Proceedings, May 1980.

⁶Vance Publishing Corporation, "How Do You Measure UP?" Marcom Research Services, 1982.

⁷Produce Marketing Association, Inc., Produce Marketing Almanac, 1981, Newark, Delaware.

⁸Chain Store Age Supermarkets, April 1979.

⁹Produce Marketing Association, Inc. Produce Marketing Almanac, 1982, Newark, Delaware.