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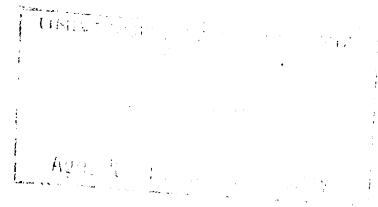
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Vertical Organization
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VERTICAL ORGANIZATION AND COORDINATION IN PROCESSED PEAS,
SWEET CORN, AND SNAP BEANS*

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Introduction

Vegetables for processing are not major components of agricultural income in the United States.^{1/} They are, however, of substantial regional importance and in general display some interesting coordination mechanisms. In this paper, we attempt to outline the general system of production, processing and distribution for peas, sweet corn, and snap beans and to discuss the features of coordination systems at the farmer-processor and the processor-retailer level.

General Production Characteristics

Peas, sweet corn, and snap beans are all annual crops with production concentrated in three regions: northeast, upper midwest, and northwest. The varieties of these crops grown for processing are in general distinct from those grown for fresh market outlets; thus the processing sector is in general independent of fresh market production.

Sweet corn and peas are highly perishable, losing quality if they are not processed within a few hours after picking. Snap beans can be held up to about 24 hours after picking without substantial losses in product quality. Their perishability characteristics are reflected in the location of processing facilities relative to production. Peas and sweet corn production are generally concentrated within 50-100 miles of processing facilities. In contrast, snap beans may be transported several hundred miles from production regions to processing plants.

In general, the production of all three of these vegetables occurs both as a complementary enterprise on grain-livestock farms and as a major enterprise for specialized vegetable farms. The pattern of specialization has a regional element with a greater portion of production occurring on specialized farms in the northwest than in the midwest and east. Snap beans are also more likely to be produced on specialized vegetable farms.

In those regions where production of these vegetables occurs primarily on diversified family farms, a major part of the specialized production and harvesting machinery and production technology is provided by the processor. In these situations, growers in general provide land and labor. Production decisions are supervised and coordinated by processor fieldmen.

In all three of these vegetables, perishability is a primary consideration encouraging close coordination between production and processing. In order to maintain an even and efficient flow of product through fixed processing facilities, it is necessary to space plantings over time. This insures that products will not mature in greater amounts than can be handled by processing facilities. In the case of snap beans, production timing is also manifested by production in different locations at different times of the year. Wisconsin snap bean processors may, for example, secure early season snap bean supplies from as far south as Arkansas. Later in the season, Arkansas processors will secure snap bean supplies from Wisconsin. In peas and sweet corn, limitations on the ability to transport raw products long distances reduce the geographic procurement range for a single plant. Irrigated production may also serve to lengthen the production seasons.

In addition to perishability, the nature of the major processing technologies also encourages close technical coordination between production and processing. Canning and freezing are the major processes for the transformation of peas, sweet corn, and snap beans from perishable raw products to storable consumer products. In general, canning and freezing as applied to these products produce minimal changes in the characteristics embodied in the raw products. Thus, if the final consumer product is to have certain characteristics of color, texture, sugar content, etc., then these characteristics must, in general, be embodied in the raw product. With the limited ability to change product characteristics

after production, it is essential that the desired characteristics be produced through the correct choice of seed and specific husbandry practices. In general, the close coordination of production and processing is accomplished through production contracts.

Processing Characteristics -- Market Structures

Several general characteristics are useful in describing the processing industry for peas, sweet corn, and snap beans. In general, processing plants for these products are multi-product. While some single product processors continue to exist, they are fast disappearing. The multi-product firm can achieve economies in the utilization of processing technology and can satisfy the demand for mixed shipments of several varieties of vegetables. In addition, the multi-product firm may be able to spread the cost of product differentiation, selling costs, and other transaction costs across several products.

Firms in this industry can be reasonably classified in two categories, national brand and private label. While some regional brands continue to exist, they are not a major portion of production. National brand manufacturers generally operate plants in several if not all major production regions. The multi-regional character of these firms allows them to reduce some of the risk of production variability. In addition, the multi-regional firms may have some transportation cost advantages in meeting regional demand with regional production.

The structure of the farm to processing market generally approaches local oligopsony. Scale economies in processing operations combined with limits on the geographic procurement area engendered by product perishability seldom allow more than a few minimal optimal size plants to operate in a given region. On the farm production side, peas, sweet corn, and snap beans may be produced on relatively unspecialized land, and in those regions where processors provide

specialized resources, can be produced with little or no specialized skills. Thus, there are a large number of potential growers. A key consideration in the nature of competition at this level is the fact that growers usually have several alternatives to vegetable production. In those regions where specialized vegetable production dominates, the number of potential growers tends to be less and their economic alternatives tend to be fewer. In these regions, both bargaining and processing cooperatives play a greater role. This reflects, in part, the increased stake which growers have in vegetable production. Where processing cooperatives are important, they tend to produce for the private label market. In general, they have not been successful in developing their own brands in any significant degree.

Major structural change in the vegetable processing industry has been rather slow. National concentration ratios have not shown substantial or rapid change. In peas, sweet corn, and snap beans, national four-firm concentration ratios have increased to about 60 percent. Changes have been more substantial at a regional level with the number of firms generally declining, especially for the small single-product firm. This trend will likely continue as environmental and safety regulations push the industry toward new capital investments. In addition, average returns to processors have been at or below competitive levels (for undifferentiated commodities) for several years. Thus, several factors will combine to produce increasing concentration, especially at the local market level. In some cases, the reduction in the number of alternative buyers will lead to the growth or formation of processing cooperatives as a way to protect market access.

Coordination Between Growers and Processors

As has been pointed out above, there are several technical reasons for close coordination between production and processing of peas, sweet corn, and

snap beans. In addition, there are some economic incentives for coordination. Given perishable commodities and a limited number of buyers, both growers and processors have an incentive to establish prices prior to initiation of production. The supply of vegetables at harvest is extremely inelastic; thus changes in demand at this time would cause wide fluctuations in prices. Local oligopsony with recognized interdependence reinforces the potential volatility of prices at harvest. Thus, it is quite logical for both growers and processors to attempt to establish prices in advance of harvest. This not only reduces price volatility but allows more time for the seeking of alternative buyers (sellers) and thus reduces the risk of a bad bargain.

Vegetable production can be quite risky in terms of yields, especially during early or late production periods. Processors can increase plant utilization rates by lengthening the processing season and lower average fixed cost. Thus, growers are seeking assurance of adequate compensation for early or late season production and processors are willing to pay a premium for this production. Without explicit agreements, it would be difficult to accurately communicate the mutual needs of the two groups. In some cases, processors resort to growing their own commodities, especially for early and late season supplies. This may be done for lack of a mechanism which can accurately measure risks and appropriate rewards.

Vegetable processing is somewhat unique among agricultural commodities in that initially canning firms often began as completely vertically integrated in farm production. As demand grew, firms began to lease land to complement that which they owned. In recent years, processors have relied mainly on production contracts with vertical integration accounting for 10-15 percent of production. The typical production contract puts the locus of control on most dimensions of production in the hands of the processor. The contract specifies

the production from a specific land area will be the exclusive property of the processor. Most aspects of husbandry will be specified or approved by the processor fieldman. Price schedules relating quality and price will be established as will the cost of any inputs supplied by the processor. Contract negotiation and agreements will take place prior to planting. Information available to processors at this time includes inventories from the preceding year, historical bookings with their buyers, and general industry information on the supply and demand outlook for the coming year. Critical information for the farmer generally centers on the price outlook for alternative crops. Uncertainty surrounding cropping alternatives can lengthen the contracting process. For example, uncertainty concerning the set-aside program for feed grains delayed the signing of many contracts in Wisconsin this spring until the last possible moment. Price uncertainty for alternative crops has encouraged experimentation with contracts which index vegetable prices to field corn prices. The extent of these contracts is not known; however, they are apparently not new. Several industry sources indicated that such contracts have historically appeared whenever price uncertainty for alternative crops has threatened the processor's ability to negotiate with growers.

A key limitation on coordination as accomplished by the contracts currently in use for peas, sweet corn, and snap beans is the persistence of yield variability. The acreage form of contract does not provide control over gross tonnage produced. This may cause problems if total tonnage from contracted acreage exceeds the desired season pack or if weather variations cause excesses within the season relative to processing capacity. In the past, processors controlled this problem through the use of a passed acreage clause in their contracts. This clause dealt with compensation for crops which were suitable for processing but were not harvested at the processor's discretion. Historically, the passed acreage

problem has been an issue of controversy. In recent years (with the development of organized bargaining in some regions and the increase in prices for alternative crops), processors have generally improved the provision for passed acreage to more equitably compensate growers. This has, however, severely limited the use of passed acreage as a quantity adjustment device and has encouraged processors to avoid passing acreage.

Processors have also been pressed especially hard by high short-term interest rates. As processors assumed the inventory function for the subsector, their short-run capital costs were greatly accentuated. In addition to processor-provided inputs (in some cases, seed, pesticides, harvesting, and planting) which were financed through the production season, processors were also burdened with financing finished product inventories. In some cases, processors have attempted to pass part of these inventory costs to growers through delayed payments for the product. The pressure for delayed payment provision has been drastically increased in recent years. When processors have not had the market power to accomplish delayed payments to growers, the pressure to move inventories rapidly has been intense.

In general, the coordination of production and processing through production contracts has been successful in accomplishing technical harmony between the two stages. It has not, however, been able to alleviate the economic uncertainty which processors face. In fact, the relatively fixed commitment of processors puts increasing pressure on this industry to seek effective coordination of the distribution function. It might also be added that the annual nature of the grower-processor contracting process does not provide a means for encouraging long-run stability. While in some senses a limitation on long-run coordination, annual contracts do allow for flexible response in the short-run.

Organization of Retail Procurement

Sweet corn, snap beans, and peas are biologically distinct and require specific individual consideration in growing and processing. These crops, however, tend to lose their specific identities as they move up through the food system. To grocery buyers, individual vegetable crops become part of either a canned or frozen vegetable family group. Each of these groups in turn are included with other canned or frozen products to form the canned and frozen goods product categories. To understand the vertical coordination of these commodity subsectors, it is helpful to understand the behavior and motivations of food buyers.

Processed vegetables, like all food, are sold through the two food channels; the grocery store (at-home) and the away-from-home (restaurants and institutions) channels. The largest market segment for processed vegetable products is sold from grocery store shelves.^{2/} Thus grocery store buyers play a pivotal role in the coordination of these commodity subsectors.

Processed peas, corn, and snap beans are sold either under differentiated brand labels or the private or controlled labels of food distributors. There are significant differences between procurement and sales of branded and private label products. There are also significant differences between canned and frozen forms of processed peas, corn, and snap beans. The industrial and institutional market channels are relatively more important for frozen vegetables. As a result, the retail grocery market is not the driving force leading to coordination in this segment. Private label products dominate the sales of frozen vegetables to a much greater extent than in canned products. Also, the ability to run sales and merchandise frozen products is more difficult than for canned products. All of these factors result in different coordinating mechanisms and forces at work in the canned and frozen segments of the subsector. The coordination

process discussed below is most directly applicable to the canned corn, pea, and snap bean segment. Since the vast majority of these products is grown and processed in the upper Midwest, the conclusions reached will be applicable directly to the firms and institutions in that part of the U.S.

Although branded and private label vegetables are sold beside each other on the grocery shelves, they go through different procurement channels in the retail firms. Recognizing the organizational and behavioral differences between the buyers in each of these channels provides a foundation for understanding how coordination takes place in the subsector.

Branded food products are purchased by buyers located at the distribution headquarters of food retailers. In food chains, the buyers of food products are located at headquarters for the single division chains and at division or regional headquarters of large national chains. The independent grocer has products bought at wholesale or retail cooperative headquarters of the buying organization to which he/she is affiliated. While the control of distribution of the product to the stores differs between chains and independents, all branded product buyers usually buy canned vegetables in similar ways. A buyer's attention span for any product is usually limited to current needs to reorder that product. Should prices need to adjust in the system, manufacturers issue promotions and allowances to buyers to induce them to alter shelving or pricing policies on their products. These manufacturer-sponsored promotions may be tied to the manufacturer's advertising and sales force actions. A promotion on a canned vegetable product is weighed against promotions available on all other grocery products. In other words, buyers view peas and Pringles as perfect substitutes for their attention. Therefore, those branded product manufacturers who understand buyers' concerns and needs are able to structure their promotions properly and gain improved access to grocery shelves. There are

varying degrees of expertise among branded vegetable manufacturers. Some national firms are very proficient, others are not. Some regional firms are excellent marketers, others are not.

Unlike his branded product counterpart, the private label buyer usually has considerable expertise and historical knowledge about the individual products he buys. This is because there are fewer private label items and each buyer has fewer products under his control. In addition, private label products are undifferentiated commodities until the private label distributor adds labels and marketing expertise. Therefore, the private label buyer has to be much more familiar with the specifics and conditions under which his products are produced. As a consequence, private label buyers are specialized buyers. They usually get training from internships with large specialized private label organizations or from extensive training in the canning industry. Often they do not have actual store management experience which is usually required of branded product buyers.

Another unique feature about private label buyers, in addition to their expertise, is the observation that there are fewer private label buyers than brand buyers for the same types of products. Private label buying is more concentrated than brand buying. The main reasons for this are the facts that large chains have one set of private label buyers for the whole chain, whereas each division has a set of brand buyers. Also, many retailers and retail organizations buy private label products through private label buying organizations. The private label procurement system contains a variety of different buying and organizational arrangements. Some span several different firms.

Vertical Coordination Retail-Processor

Buyers, both branded and private label, work within the internal structural arrangements of their corporate bureaucracies. These bureaucracies filter the

economic forces at work in the general economy into definable rules or standard criteria by which buyers must operate. The most pressing criteria established which affect both types of buying involve rules on inventory management. The rapid rise a few years ago in short-term interest rates forced many retailers to adopt rules which require buyers to minimize inventory costs. This is done by carrying minimum safety stocks and requiring frequent and smaller shipments of products. The adoption of these procedures has important implications for supplier selection.

Corporate bureaucracies also impose rules for buyers generated by the internal needs of the bureaucracy for continuity and harmony among the various internal factions in the firm. What a buyer does impinges on warehouse, headquarters, and store personnel's performances. One binding condition on buyers is the stock level in the stores. If a product is out-of-stock on the shelves, consumers vent their concerns on store personnel. To keep internal harmony, firms impose stock level criteria on buyers. Given minimum safety stocks, one delayed shipment will often cause a product to become out-of-stock. Buyers, therefore, place great importance on reliability. They select suppliers accordingly.

Vertical coordination at the retail-processor level is, therefore, a direct consequence of the composite behavior of branded and private label behavior and the resultant reactions of processing firms. Between harvest and final consumer sale, each can of product needs to undergo a processing, marketing, and procurement function. Processing is simply the act of converting raw perishable products into storable canned products. Procurement refers to the act of buying or deciding to present the product to consumers. Marketing refers to that whole set of functions which transform an undifferentiated processed commodity into an identifiable product sold to the consumer. All these are necessary. Who in the subsector has responsibility for which of these functions

determines the details of vertical coordination.

Branded canned vegetable manufacturers, for the most part, process their own product needs. In years when their own processed production falls below their needs, they will purchase canned products from other processors. With branded canned vegetables, the manufacturers perform the majority of the marketing functions. They design the labels, formulate market strategies, execute advertising plans, and are basically responsible for the performance of their products. Food retailers decide shelf location and in-store merchandising strategies. Within the constraints set by retail firms, brand manufacturers control the destinies of their products.

Retail buyers buy on a demand on order basis. Typically, the buyer will order X hundred cases at some point in time. This pattern of buying is altered only when manufacturers offer promotions or special deals. Buyers will adjust their patterns to take account of these deals. This type of buying does not transmit any information about future demand and requires no forward product commitment by the retail sector. Variations in supply or demand which require subsector adjustments, therefore, fall directly on the manufacturer. To the extent that manufacturers have the ability to shift needed adjustments to grocers, they will attempt to do so.

Given a contracted acreage, the production of that acreage will be processed. If yields are above normal, brand manufacturers will adjust their promotion/advertising and/or sell surplus product to the private label market. Conversely, below normal yields will force cancellation or redirection of advertising and promotional effort. Sometimes brand manufacturers will go on the open market to pick up additional supplies from other canners. Adjustments in subsequent seasons will be accomplished via changes in contract acreage. In addition, those manufacturers who make the buyer's job easier will be favored. Buyers

are particularly concerned about transportation arrangements and reliability, in the structure of trade deals, fair and equitable treatment, help with store work, etc. Those brand manufacturers which successfully implement needed coordination strategies and consistently provide retailers with the mix of service they want prosper. Those firms who do not, gradually lose sales and market share.

The coordination of private label canned vegetable channels differs remarkably from the brand product channel. The private label manufacturers do not have control of the marketing function for the products they process. The marketing factors are added by the retail private label buying organization. Private label buying organizations design quality specifications, labels, advertising schemes, and all the things typically done by brand manufacturers. These are in addition to pricing, shelf policies, and merchandising display functions normally the prerogative of retail organizations. Therefore, any adjustments needed by the private label processing sector need the full and conscious marketing support of the retail buying sector. The level of vertical coordination in this channel is thus dependent on the formal and informal relationships between private label processors and private label buyers and merchandisers.

The buyers and sellers are linked formally via a product booking system. When a buyer books a canned vegetable product, he/she is saying "I will buy X thousands of cases of No. 303 canned sweet peas packed to my specification during the next pack year, subject to my approval of product price and quality at time of shipment." Bookings for canned peas, sweet corn, and snap beans which are made before pack time, but after the contracting and planting season, give suppliers some idea about the amount of product being demanded. Thus bookings only help processors allocate committed acreage to various markets (retail or institutional). Bookings are non-binding, non-contractual relationships. Given abnormally high yields, suppliers need to move larger processed

inventories. The only option available to a private label processor is to lower prices to the retail buyer. Since the buyer and his organization have the marketing function, it is up to them to make the necessary advertising, display, and/or pricing decisions which would result in increased movement. Conversely, they would need to make the adjustments if suppliers were really short. The processor can only regulate price.

Notice, the booking system does not convey any longer-term planning information. Given a long crop, retail buyers are not legally bound to take "their" bookings from a processor if that processor does not match current market prices. Yet in a short crop year, the buyer "expects" to be shipped his full booking. Under this system, the supplier receives little information and bears all the risks of price change.^{3/}

Since the retail organization has total marketing responsibility, the buyers place great stock in the processors' service and quality levels. The retailer's name on the product requires that the product be the designated quality. Service level is a catchall phrase used as a proxy for all other retail-oriented prerequisites. The biggest component of this service level is transportation or shipping lead time and reliability. Given inventory costs, buyers want processors who can ship minimum order sizes with regular frequency. They have a distinct preference for multi-line processors who can ship mixed trailer loads on a regular basis. Given that all suppliers have similar prices, buyers then select on the basis of processor service level and quality control.^{4/}

Total subsector coordination depends on the actions of the retail private label marketers. Their behavior, as it turns out, is directly connected to the actions of the branded product manufacturers. Simply stated, private labels cannot exist without brand label products against which they are compared. Basically, private label products take their identity from their comparative

value to a national brand product. Retail trade practice is to price private label products at some set and fixed percentage lower than national brands. If the price differential between a branded and private label product narrows, consumers will shift to branded products. The reverse happens if the spread widens. Thus private label coordination tends to be linked to branded product coordination. It is changes in branded product prices and practices that induce retail private label merchandisers to induce private label buyers to alter their buying patterns. Thus price movements in both channels are closely linked and move in the same direction. For the most part, brand manufacturers achieve their desired levels of sales and product movements because they control the majority of the marketing process. Private label processors, however, need to have the retail sector respond in the proper ways in order for the sales and movements of products to be those necessary for coordination of the system. In many cases, a price decrease in branded products causes a price decrease in private label products, but retail merchandisers will choose to promote branded products. This is because brand manufacturers require this as a condition for receiving the price reduction and retailers get more "store drawing power" by advertising national brands. The end result is that private label prices have decreased but expected and desired movement has not been forthcoming. Therefore, private label prices will remain at lower levels after the branded producers raise their prices. Whether these still low prices will result in increased product movement is still dependent on the retail private label buyers' and merchandisers' decisions. Some private label merchandisers will promote, others will not. The composite effect of this behavior is that suppliers of private label processors then bear the cost of disposing and/or carrying the surplus inventories. Their only choice is to reduce contracted acreage for the coming year. The failure of retailers to merchandise excess supplies results

in cyclical price and acreage movements of greater magnitude than probably would have occurred had the subsector been better coordinated.

Potential Changes in Organization and Coordination

Several implications follow from the above analysis. First, smaller specialized vegetable processors characteristic of the upper Midwest production region will have a difficult time surviving in the future. Bargaining and increased returns to alternate crops has prevented processors from using passed acreage clauses to balance supplies with anticipated demands. Thus processors must pack the production of all contracted acreage. If the retail sector does not adjust merchandising and pricing practices to help coordinate the pack movement, the specialized private label processor bears the cost of inventory holding and production adjustments. Those larger private label firms which pack a variety of products can internally cross-subsidize a given commodity item which is out of adjustment. Combining this with the decided preferences of buyers for multi-product processors who reduce transportation and inventory costs, this suggests that many smaller firms must expand or leave the business. Given the capital requirements of expansion and compliance with government regulations, many of these small processors will exit from the industry.

Mechanisms now in place to shift supply uncertainty in the subsector might result in significant structural change. Private label processors who have little marketing power now bear the cost of subsector adjustment. Many processors faced with strong bargaining at the grower level, strong buyers at the retail level, and short- and long-term capital needs have stated they will leave the industry. This position may spur growers to buy the processing facility and operate it as a cooperative processing firm. This institutional change shifts risk-taking back to the grower. Costs of coordination still are embodied

in the processed inventory, but now it is grower-owned and financed. Distressed sales below total costs will be financed by the depreciation of grower-owned plants. In addition, cooperatives have distinct financial advantages over comparable proprietary firms.^{5/} Thus the move to cooperatives induces other proprietary firms to convert to cooperatives. In some geographic areas, in some commodity subsectors, processing cooperatives dominate private label processing. Of the three functions, procurement, marketing, and processing, processing has the greatest amount of risks. Given large cooperative processors, national brand manufacturers have shown some interest in disintegrating processing and marketing. In the future, the large national vegetable processors may no longer contract and process peas, sweet corn, and snap beans. Rather, they may buy processed products from cooperative and/or specialized processors and apply their marketing expertise and labels. This scenario implies a different subsector organization than we now have.

Casual observation indicates that the pea, sweet corn, and snap bean subsector of the upper Midwest has yet to undergo the significant organizational changes witnessed in the California, and to a lesser extent, the Pacific Northwest processed fruit and vegetable subsectors. Production and grower organization in the upper Midwest will temper some of these organizational effects. However, the forces set in motion by the current state of vertical coordination will probably drastically alter the organization of this subsector.

Summary

The processing vegetable subsector is a subsector in gradual evolution.

To facilitate comparison with other subsectors, the following summary highlights are presented.

1. The nature of these vegetable products requires close coordination of production and processing. Production coordination is generally accomplished through production contracts.
2. Persistent output variation among these crops generates risks which must be borne by someone in the system.
3. Returns to alternative crops and grower bargaining have reduced the availability of using passed acreage contract provisions to shift risks to growers.
4. Processed vegetable products are sold through semi-autonomous branded and private label product channels.
5. The ability to balance processed vegetable inventories caused by output variation depends on successful marketing. Branded product manufacturers execute their own marketing programs. Private label processors must rely on the marketing actions of food distributors.
6. The effects of failing to coordinate sales with supply, servicing retail accounts, and changing government regulations are combining to induce structural and institutional change in the subsector.

FOOTNOTES

- 1/ This paper was prepared as a supplement to symposium discussion. We have chosen not to document in detail. Documentation and sources will be found in two publications in process.

Gerald R. Campbell and Annie Yuen, A Subsector Analysis of Peas, Sweet Corn, and Snap Beans, University of Wisconsin, Department of Agricultural Economics, Working Paper in Process.

Larry G. Hamm, The Implications of Food Retailer Procurement Practices for Food System Organization and Coordination, forthcoming Ph.D. dissertation, Michigan State University.

- 2/ In 1976, approximately 76 percent, 85 percent, and 84 percent of the peas, corn, and beans, respectively, canned were put in consumer-size cans.
- 3/ If retail buyers consciously "overbook" product, the information communicated is actually of negative value.
- 4/ Depending on the image that the private label buying organization wants to project, they may pay higher prices to some suppliers in order to get the quality and/or service they desire.
- 5/ Lower total tax rates, federally subsidized capital, and deferred product payments to growers are several of these advantages.