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MARKET COORDINATION IN THE PROCESSED VEGETABLE SECTOR: A COMPARATIVE INSTITUTIONAL ANALYSIS OF THE PICKLE AND KRAUT CABBAGE SUBSECTORS

By

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ABSTRACT

By

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The primary purpose of this study is to analyze characteristics of market coordination and performance that work to create orderly marketing systems. The processed cucumber and kraut cabbage subsectors were selected as case studies because of their similar market structures and mechanisms for coordinating the market system.

The methodological approach used in the study is subsector analysis with emphasis on the producer-first handler interface. Information was gathered through interviews, analysis of written vegetable contracts and USDA data. Analysis of the coordination process for the commodity subsectors was based on how well each subsector has been able to meet four conditions of market performance considered necessary to achieve orderly marketing.

The primary findings of this study are that both the kraut cabbage and processed cucumber subsectors work well in coordinating demand and supply at all market stages. Most crucial to the coordination process is the actions of major processors who strongly influence all stages of the market. The practice of contracting raw product supply is also a major source of production and price stability within the two subsectors.

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INTRODUCTION

1.1 PURPOSE OF RESEARCH

Over the past two decades the U.S. food system has undergone considerable transformation. Market systems for food commodities no longer are characterized as localized and atomistic where producer and first-handler exchanges involve pricing mechanisms relying on spot supply and demand conditions. Instead the agricultural sector is becoming highly industrialized with market stages beyond the grower level controlling a much larger share of market activity. The growing industrialization of agriculture has necessitated the development of sophisticated coordination mechanisms by which to link stages in commodity market systems. Most notably, the emergence of alternative pricing mechanisms and forms of vertical integration have greatly altered the ways in which markets operate.

While changes in market organization have been significant, exploration into the impact of institutional transformation on subsector performance has been limited. Research is especially scarce at the commodity-specific level. Case study analysis is needed to better understand what specific institutional arrangements have developed within different subsectors and how these arrangements work to improve the coordination process. While a central concern is the efficiency with which markets clear,

additional means are needed to describe how well a subsector performs. This research is one effort to understand the vertical coordination process for processed vegetables by analyzing the organizational structure and performance of two commodity subsectors.

1.2 ORDERLY MARKETING

A central theme in this study is the relationship between the structural characteristics of markets, actions of market participants and subsector performance. This study does not attempt to evaluate the efficiency of any one aspect of a marketing process, but instead focuses on the system as a whole. It concentrates on identifying a workable framework for analyzing the major dimensions of "orderly marketing".

Orderly marketing is often referred to by participants as a desirable state for markets to maintain. Although the term is not well defined, synonymous phrases such as 'well-behaved', 'regular' or 'harmonious' shed some light on its meaning by suggesting that a stable market, free from chronic and erratic movements in supply, demand and price, is what should be strived for to bring desirable performance.

The neoclassical notion of the perfect market assumes orderly marketing to exist in commodity markets based on the efficiency of price mechanisms. Prices signal participants of changing supply and demand conditions so that adjustment

is automatic and efficient.

Real world agricultural markets do not meet the conditions of the perfect market. Chronic oversupply problems and volatile prices at the producer level plague numerous agricultural commodities. Market participants, responding to improper economic signals and lags in the adjustment process, do not have the benefit of full information on which to base their decisions. Markets are not synchronized. Attempts to analyze them as though they are may lead to the wrong decisions being made.

Because commodity markets share common characteristics only in a broad sense, conditions for orderly marketing must be made specific to each commodity. Orderly marketing characteristics for the fresh lettuce market are quite different from those for the the broiler industry. The central reason for these differences is the reliance on different institutional mechanisms for coordinating the various stages of each subsector.

The amount of vertical integration, the nature of competition and methods of pricing evolve to fit the unique characteristics of each commodity market. The characteristics of the product and structural aspects of the market set bounds on the types of institutional relationships appropriate for a well-functioning subsector. The actions of individuals and the rules they adopt for decision-making determine to a large extent how orderly the marketing system operates. The key to understanding orderly

marketing, then, is to look at the system operationally to understand how it achieves regularity and predictability.

1.3 INSTABILITY AND MARKET COORDINATION

All agricultural commodity systems face uncertainty in predicting future outcomes. At each stage of a market buyers and sellers face uncertainty associated with imperfect information on changes in supply and quality of inputs; variations in prices and demand for outputs; unforeseen changes in technical factors for production; or unforeseen government intervention. Reducing these uncertainties involves developing greater control of the market through planning. Efforts to improve planning require that markets be predictable, that is, markets remain stable over time. Instability in agricultural markets comes from a number of sources, all of which vary by commodity. Climatic conditions that alter the quality or quantity of product to market is to a large degree uncontrollable, or at least limited by technological capabilities. Perishable commodities, however, have considerable uncertainty associated with bottlenecks in the flow of product through the market system. To the extent that these sources of instability are controllable, institutional arrangements that work to reduce this uncertainty, thereby enhancing the predictability of future outcomes, are integral to orderly marketing. The greater the uncertainty the stronger the

incentive to adopt institutional arrangements that control and stabilize transactions.

A central point to addressing the issue of market coordination is the recognition of how transaction costs shape organizational arrangements in an economy. Transaction costs, referring to those costs associated with planning, adapting and monitoring transactions, vary with the type of organizational structure used. According to Oliver Williamson, the type of organizational arrangement adopted reflects participants' attempt to minimize transaction costs.1 Stated differently, "Transaction costs are economized by assigning transactions to governance structures in a discriminating way." Specific contractual arrangements, then, are the outcomes of how participants have developed means to deal with the unique characteristics of each market.

The theoretical approach outlined by Williamson incorporates several important behavioral assumptions for the study of contractual arrangements and market performance. First, its assumptions of bounded rationality, whereby market participants form decisions based on limited information are important for understanding how individuals can be influenced by others in the system. Integral to its application is an understanding of the nature and use of information in the system since this is what decisions are

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1 Williamson, Oliver, The Economic Institutions of Capitalism. (New York: The Free Press, 1985).

based upon. Second, the recognition of opportunism where individuals act on 'self-interest with guile' is important since most market participants engage in strategic behavior during the decision-making process. The degree to which opportunism is kept in check is largely influenced by the distribution of power within the system.

Building on these behavioral assumptions, several attributes of transactions can explain the emergence of institutional arrangements within a market system. Asset specificity, a term used to describe the magnitude of durable investments as well as the exclusiveness of use for these investments, becomes an important consideration when continued access to market transactions are needed to make investments profitable. As Williamson surmises,

> Parties engaged in a trade that is supported by non-trivial investments in transaction-specific assets are effectively operating in a bilateral trading relation with one another. Harmonizing the contractual interface that joins the parties, thereby to effect adaptibility and promote continuity, becomes the source of real economic value.2

Participants with large specialized investments are more willing to bear costs associated with specialized institutional arrangements for governing transactions.

The amount of uncertainty in transactions shapes the adoption of institutional structures. The greater the amount of uncertainty, the greater the motivation to integrate vertically, thereby increasing control over

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2 Williamson, Oliver, ibid.

adjacent stages of the marketing system. The frequency of transactions also partially determines the need for specialized governance structures. The volume and number of transactions must be large enough to support costs from specialized institutional arrangements.

The type of institutional arrangement adopted is a major determinant of the distribution of benefits and costs to market participants. It is also a representation of initial distribution of rights and responsibilities of subsector participants. It reflects the relative power of different parties in shaping contractual arrangements that protect and extend their own interests. While these arrangements may constitute improvements in subsector performance, their end result may be a less than desirable means of coordinating market activity. If institutional structures encourage excessive instability at the producer or consumer level or fail to develop the type of product desired by consumers, then alternative coordination mechanisms may be needed.

1.4 VERTICAL COORDINATION AND THE PROCESSED VEGETABLE SECTOR: A SUMMARY OF RECENT RESEARCH

Considerable research has already been conducted to refine a vertical coordination approach to analyzing the food system. Several studies published under the North Central Region Research Project NC-117 on the organization and control of the United States Food System focus on vertical coordination issues in various commodity

subsectors.3 Studies focusing specifically on processed vegetable subsector coordination have been conducted by a number of authors.4 These studies predominantly concentrate on the producer-first handler level of exchange and major mechanisms used to reduce uncertainty.

The development of a conceptual framework for analyzing market coordination in food subsectors from producer to consumer has been addressed by Bruce Marion.5 He defines coordination as a process where the various vertical stages of a system are brought into harmony. For him the coordination process is responsible for synchronizing the system to gain stability while facilitating adaptability. The primary goal is to manage two often conflicting needs: to maintain predictability through stable markets for planning future production, while not eliminating the flexibility in allocating already produced goods.

An expansion of the concept of coordination is given by Shaffer and Staatz who define four levels from which to view the coordination process.6

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3 Coordination and Exchange in Agricultural Subsectors, NC 117 Monograph 2 (Madison: University of Wisconsin, Research Division, College of Agriculture and Life Sciences, 1976).

4 Campbell, Gerald, "Theoretical and Mechanical Issues in Contract Price Reporting", NC 117 Monograph No. 9, 1976.

5 Marion, Bruce W., The Organization and Performance of the U.S. Food System. (Lexington, Massachusetts: D.C. Heath Company, 1986). pp.

6 Shaffer, James D. and Staatz, John, "Potential Coordinating Functions of Farmer Cooperatives", Department of Agricultural Economics, Michigan State University, 1985.

1. Coordination within firms (micro-micro coordination)

2. Coordination between individual firms (micro coordination)

3. Coordination of total supply with total demand for commodities or industries at each step in the production-distribution process (macro coordination)

4. Coordination of aggregate demand with aggregate supply for the entire economy (macro-macro coordination)

A study of market coordination should scrutinize each of these levels and consider them in combination to gain insight into their inter-relatedness.

Although all aspects of coordination deserve in-depth analysis, this study primarily focuses on micro and macro coordination. The levels of coordination alone cannot explain the motivations for organizing markets. The determinants of coordination must also be included. That is, the structural aspects of a market, the incentives and flow of information within a system, all influence the types of coordination mechanisms that evolve.

1.5 MARKET PERFORMANCE

Several authors have attempted to establish operational measures for analyzing market performance. Market performance has a number of dimensions, some of which are more readily observed and measured, while others must be described or inferred. Performance in this study is assumed to be the outcome of market structure and subsector

participants' behavior. Market structure and basic market conditions, as defined by Marion, in large part shape the types of decisions made that in combination form the coordination process.

Performance, in a comparative institutional analysis, requires that criteria be set such that performance within a subsector be compared not to an ideal market perfomance but to that which could be obtained under alternative coordination mechanisms. The goal is to determine, if needed, how overall performance could be improved by altering institutional arrangements within a subsector. It involves an examination of advantages and disadvantages for coordinating a subsector under alternative governance structures.

Marion and Shaffer have identified four dimensions of market performance especially appropriate to an analysis of the processed vegetable sector. In this study a subsector is considered to perform well based on the following criteria:

1) The quality, quantity and type of commodity produced should match the quality, quantity and type demanded at each stage of the market system. The pertinent question is how well the quality, quantity, type, timing and location of supply are matched with that demanded.

2) Prices should be sufficient to cover the costs of production for a well-managed farm or firm over a number of years. This is essential when planning investments for the

future.

3) Prices should reflect the prevailing conditions of supply and demand and should be discovered in an efficient and equitable way. This requires that prices be flexible enough to signal changes in market conditions but with minimal variation over time and region. It also requires that accurate and timely information be available to those making production decisions.

4) The system should be equitable so that those who carry the risks receive a comparable share of the benefits. In other words, rights and control should be distributed according to those who carry investments and risk.

Although not set as a specific criterion, the accessibility of market information merits consideration in all aspects of performance. The accuracy, adequacy and distribution of information is key to understanding the connection between market structure, participant behavior and subsector performance. The acquisition of information involves costs both in terms of transactions and uncertainty. Its accessibility is a function of market structure and the behavior of participants in the system.

While analysis of each performance dimension will emphasize primarily the grower-first handler level, linkages with other stages of the market become relevant in vertically coordinated systems and will be covered as needed.

1.6 RESEARCH OBJECTIVES

The purpose of this study is to explore how existing vertical organization and coordination patterns are related to subsector performance in selected processed vegetable subsectors. Case studies from the pickling cucumber and kraut cabbage subsectors will be used to analyze several major coordination mechanisms as they enhance performance.

The paper is divided into several sections. Chapter II describes the market structure and product characteristics of the pickle subsector. Trends in consumption and production are reviewed and the major market channels in the subsector described. Chapter III focuses on four aspects of market performance that are pertinent to the pickle subsector. Producer and processor decision making practices as they impact how markets are coordinated are analyzed. Chapter III also explores alternatives to current market coordination that offer potential for improved market performance. Specifically, the potential for a public market news service, a grower bargaining association and a federal marketing order are reviewed. Chapter IV focuses on the kraut cabbage subsector as it compares with the processed cucumber market system. The market structure and supply channels are described, and the subsector is evaluated based on the same criteria applied in chapter III. Finally, chapter V summarizes the major findings of the study and recommends areas for further research.

1.7 RESEARCH METHODOLOGY

Much of the information for this study was collected through personal and phone interviews with market participants. For each commodity key individuals involved in various levels of the marketing stages were interviewed. Interviews were conducted in a similar format although no formal questionaires were used. Rather, similar topics were introduced to various participants to ascertain how each viewed the system from their perspective. In this way information could be gathered on both what the subsector as a whole agreed upon, as well as on what areas opinions of various participants differed and why.

In addition to interviews, statistical analysis on quantities produced, prices, yields and grower returns was conducted to ascertain the amount of market instability at the grower level coming from each of these areas. These analyses were used to substantiate, where possible, much of the information acquired through interviews.

Chapter 2

THE PROCESSED CUCUMBER SUBSECTOR: MARKET STRUCTURE AND BASIC CONDITIONS

2.1 INTRODUCTION

To understand the operations of the processed cucumber market it is necessary to describe the conditions under which the market operates. The structural characteristics of the market, the participants and their roles as well as the vertical linkages between stages of the market system all contribute to how well or poorly a subsector is coordinated. The following sections describe trends in production and distribution as well as characteristics of consumption and the retail market. Attributes of the market structure that determine the boundaries within which market participants operate are outlined. These descriptive sections lay out the foundation for further analysis in chapter three.

2.2 CONSUMPTION TRENDS

Pickles comprise a relatively unimportant share of the total food basket consumed by the American population. Processed vegetables as a whole only account for a small share of total food consumption, a share that has declined over time as consumer preferences have switched to fresh and frozen vegetables. Of the total value for major processed vegetables, cucumbers for processing ranks among the top

five in value, accounting for 10 to 15 percent of the total dollar value.7

Cucumber production and consumption have been rising steadily over the past twenty years. In 1964 total annual tons produced was 425,790 compared to total tonnage in 1985 of 637,030, according to USDA figures.8 This increase in production of almost 40% over a twenty year period is unusual for a processed vegetable. Figure 2.1 shows the twenty year trend in production and retail consumption of pickles. The difference between the two is mostly accounted for by those cucumbers used for relish and other food items.

Like many other processed vegetables that have been hurt by a growing consumer preference for fresh produce, pickles has shown no increase over time in per capita demand. Industry estimates of per capita consumption for 1986 are slightly above those for past years, although this increase does not signify a large rise in overall consumer use. Expect in the 1960s, when the rapid expansion of hamburger restaurant chains opened up new retail market outlets for pickle slices, few new pickle products have been developed that have been able to expand retail markets for pickles. The food service industry presently accounts for approximately one-third of total pickle volume and represents the largest growing share of retail sales. The

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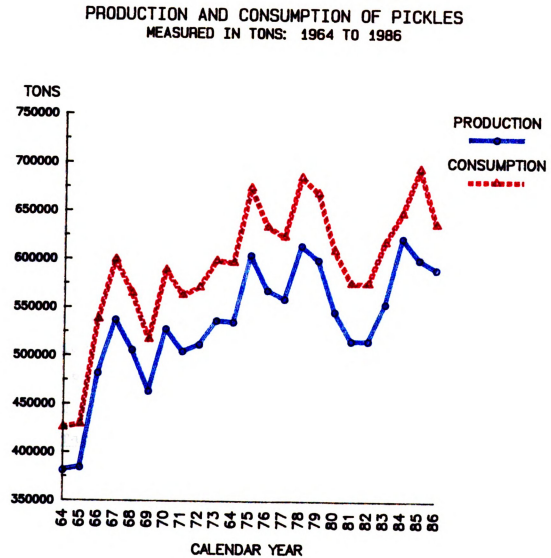
7 Processed Vegetables, National Agricultural Statistical Service: USDA, 1986.

8 ibid.

Figure 2.1 Total Annual Production and Consumption of Pickles



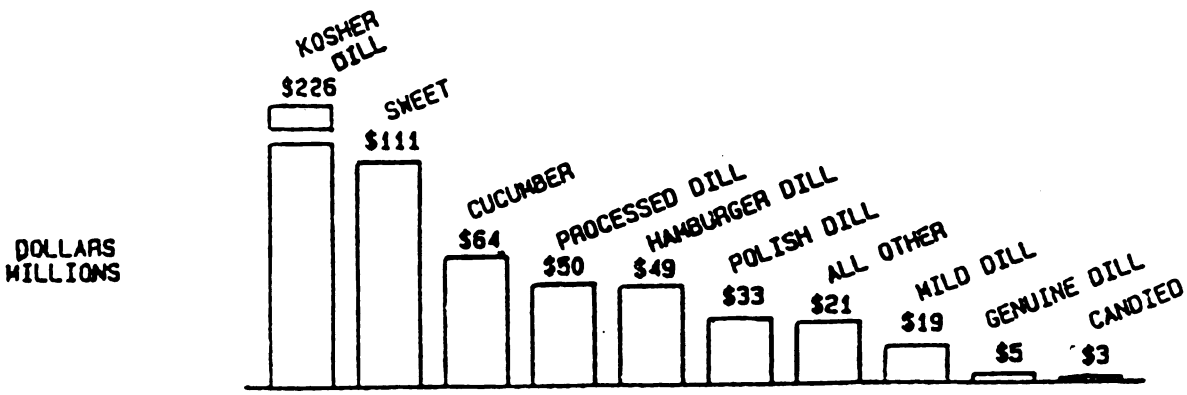
Source: Vegetables, USDA, National Agricultural Statistics Service, 1964-1986.

remaining share is sold primarily through supermarket outlets.

Approximately 80% of pickles sold in supermarkets are shelf stable, that is, either processed or fresh packed. Although both products are fermented, fresh packed pickles are not tanked but placed directly in jars where they are pickled. Both pickle types constitute processed products, but the fresh packed varieties remain firmer and crispier. The remaining 20% of pickles is composed of refrigerated varieties. Refrigerated pickles have grown in popularity rapidly in the last few years. Due to their relatively short shelf life of 6 weeks, they require a continuous source of fresh product as well as immediate retail market outlets.

Pickles are marketed under a wide assortment of varieties, with as many as 86 types on the market at any one time. Retail sales by class of pickle for 1986 are shown in Table 2.1.

Table 2.1 Pickle Sales by Product Class for 1986.



(Source: Selling Areas Marketing Inc., 1986)

By far the most popular pickle product remains the kosher dill, which in 1986 accounted for 39% of total dollar sales. Sweet pickles account for the next largest share of sales, with over 19% of total value.

Studies of pickle retail markets have found consumer demand to be fairly price and income inelastic.9 Pickles have no close substitutes or complements so that cross elasticities are unimportant. For this reason the industry remains stable but competitive at the retail level. A more extensive look at the retail market is provided in section one of the third chapter.

2.3 PROCESSING TRENDS

Compared to the number of retail outlets and grower firms, the pickling cucumber processing network is geographically concentrated. According to industry estimates, over 35% of total processing is done in Michigan. Cucumbers from Indiana and Ohio are shipped to large processing plants in the state during the summer harvesting season. Cucumbers from the Carolinas, Texas and Mexico also are shipped during the North's off-season to fill processing gaps.

North Carolina is also a major processing state with a number of plants in the mid-eastern section of the state.

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9 Cook, Stephen, Theory of Consumer Surplus and Economic Rent and Application for Measuring Benefits of Mechanical Cucumber Harvestors, Unpublished Ph.D Dissertation. Michigan State Univeristy, 1985.

The state processes cucumbers from both the northeastern and southern producing states.

Approximately half of all annual pickle processing, that put in fresh pack, takes place during the summer harvest period. Processors carefully time all aspects of manufacturing to coordinate product flow through the plant to retail outlets. The time of planting and harvesting are determined by processors in many cases to reduce gluts and shortages at receiving stations. The cucumbers are most commonly graded at the receiving station or the actual processing plant. Grading is usually done by machine where a representative sample from a grower's weighed delivery is seperated into the various grades. The percentage of each grade is then multiplied by the total tonnage to calculate the load's value. Depending on the sizes, the cucumbers are either fresh packed or placed in brining tanks for storage. Overflow may be shipped to other plants for processing.

During peak harvest time plants operate around the clock to process the fresh packed products. The fresh pack category comprises the largest share of final product. A much smaller share of final product is packed from salt stock where the pickle is held in brining tanks for a two to six month period. In the last thirty years the pickle industry has shifted away from salt stock pickle products towards more fresh packed types where the cucumber is pickled in the jar. The need to pack a large share of the annual pickle production in a two month period has reshaped

pickle processing into a more capital intensive industry, where much of the year this capital remains unused. Processsing firms must maintain a substantial scale to absorb the extra expenses incurred from offering fresh pack facilities. Because most small localized firms cannot afford the technology on a reduced scale, they have not expanded beyond tanked pickle varieties. The growing popularity of refrigerated dills, which requires large cold storage and specialized distribtuion faciliities will bring greater specialization within the industry. Claussen Pickles and Vlasic are currently the only major brands that have expanded into marketing refrigerated varieties nationally. Due to high start up costs, few other firms will be able to enter the market.

Almost all of the cucumbers for processing are provided by the domestic market. Imported raw product from Mexico is used for refrigerated pickles during the off-season, although these imports constitute a small share of total volume. With transportation costs, raw product prices from Mexico are substantially higher than those from domestic sources. Most shipments are arranged through brokers although at least one major processor is contracting with Mexican growers to guarantee a steady source of fresh stock.

2.4 PRODUCTION TRENDS

Cucumbers for processing are grown in several widely dispersed areas. Approximately one third of total

production is concentrated in Michigan, Ohio and Wisconsin. Michigan is the largest producer, averaging between 15 and 20 percent of total supply. The Southeast also produces a significant share of the market, with North Carolina growing the largest acreage in the country. Both Texas and California grow and process cucumbers but account for less than 20% of total production. Table 2.2 shows distribution of production by state for 1964 and 1986.

Table 2.2 Cucumbers for Processing: Production in Tons by State.

State	1964	% Total	1986	% Total
Michigan	119,680	28.1	139,200	21.9
No. Carolina	50,250	11.8	80,960	12.7
California	46,410	10.8	64,680	10.1
Ohio	10,820	2.5	55,620	8.7
Wisconsin	34,650	8.1	54,000	8.5
So. Carolina	n.a.	n.a.	45,750	7.2
Texas	24,200	5.7	42,640	6.7
Florida	n.a.	n.a.	24,200	3.8
Other States	139,780	32.9	129,980	20.4
U.S. Total	425,790	100.0	637,030	100.0

(Source: Vegetables, USDA, Agricultural Statistical Bulletin, 1974, 1986.)

As the figures suggest, production is widely dispersed across states and has shifted geographically over the past two decades. Both Ohio and South Carolina have grown in importance because of favorable climatic conditions and their proximity to major processing centers. Production in Florida and the Southwest has expanded to meet demands for off-season fresh stock supplies for refrigerated varieties.

In Michigan and other Northern states the crop is grown during the summer months, with harvesting usually running

from the end of July through mid-September. In Southern areas the harvesting usually begins and ends six weeks earlier than the North. Some southern states have two growing seasons, although the first is the most important.

2.4.1 Production Practices in Major Producing Regions.

Cucumber production practices vary by region. In Michigan the number of growers has been declining slightly while the average acreage per farm has been increasing. Pickle production is concentrated in the southwestern and eastern sides of Michigan. Almost all growers have diversified farm enterprises and, for many, sales from pickles constitute only a small share of total farm revenue. The average pickle producer is estimated to plant between 80 and 100 acres, although size varies widely. In the western region growers often engage in tree fruit production along with growing pickling cucmbers and other annual vegetables. These growers rely on hand labor for harvesting. Cucumbers are used as a filler crop to hold seasonal labor until fruit harvesting begins in the Fall.

In the eastern region growers more often use mechanical harvesting techniques that fit in with the production of grains and soybeans. Growers vary by the relative economic importance they place on cucumber production in total farm operations. Most growers see cucumbers as a fairly stable enterprise, one that complements well other farm activities but does not provide a major source of farm revenue.

Cucumber production and harvesting is a labor-intensive process with its demands for weeding and, in most areas, hand harvesting. Michigan is the only producing area in which mechanical harvesting is widely used, although its use has declined from a high in 1979 when 90 percent of total production was machine-harvested to today's 65 percent. The decline is largely due to imperfections in the harvesting and handling equipment which damage the fruit. The machines also are limited to a one time over picking that results in yields lower than those for hand-picked fields, with virtually no recovery of the small-sized cucumbers. Fruit recovery is estimated at most at only 60 percent of harvestable cucumbers, with some growers harvesting as little as 40 percent. Although the technical know-how exists, equipment that can harvest the smaller sized cucumbers is not yet available to growers.

Timing of harvest is a crucial determinant of the relative profitability of a cucumber crop. Because cucumbers grow rapidly and the larger sizes result in lower grades and prices received, the value of a harvest can change greatly over as short a period as 24 hours. Yields often vary considerably from year to year for individual growers because the crop is highly sensitive to rainfall and temperature changes.

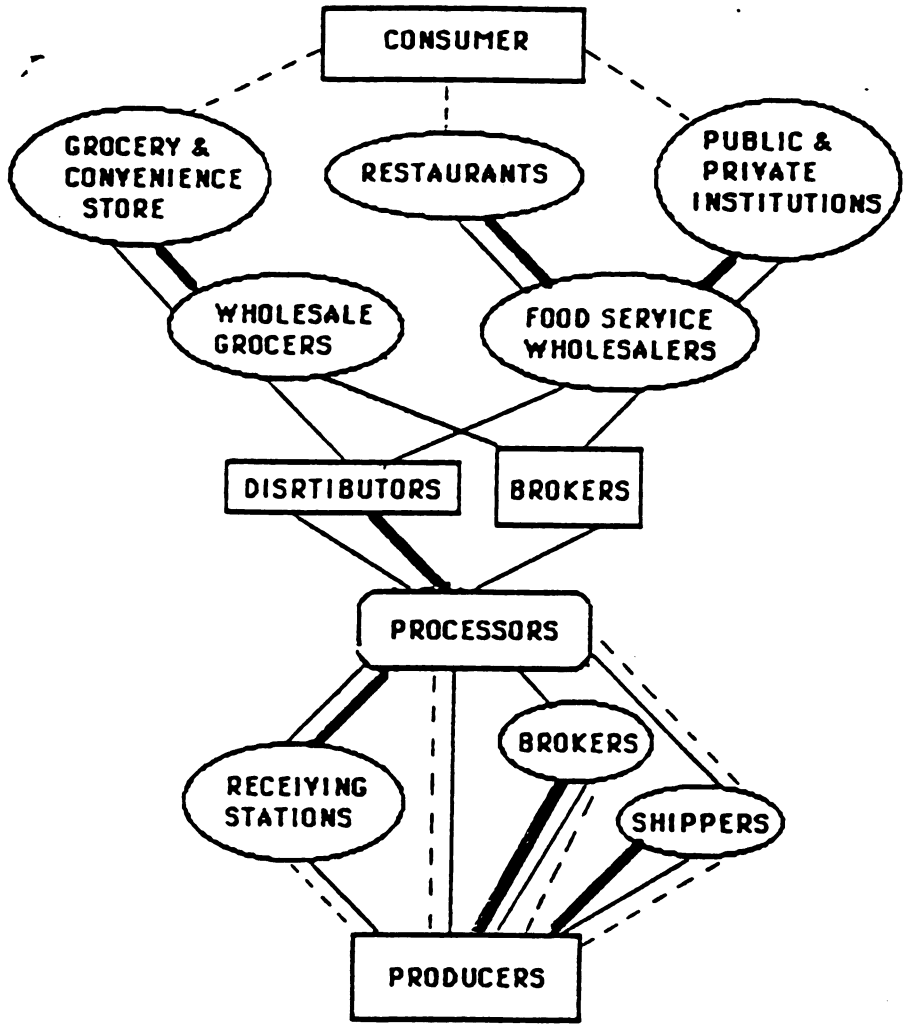
North Carolina rivals Michigan in total area harvested. Cucumber production in North Carolina differs from that in Michigan in several ways. Although North Carolina has

several producers with over 1000 acres, most growers operate fields of less than 10 acres. Labor for pickle operations is provided by the family. Tobacco is a major competing crop so that cucumber production, although profitable, is secondary in importance to growers. Because both crops have overlapping harvest periods, cucumber pickings are often cut short due to labor contstraints. As a result, yields in North Carolina are well below the national average. Mechanical harvesting has not yet been adopted due to high levels of rainfall that can increase the risk of delays at harvest time.

2.5 MAJOR CHANNELS IN THE PROCESSED CUCUMBER MARKETING SYSTEM

The organization of the processed cucumber subsector involves a complex and varied set of institutional arrangements between major stages in the marketing system. Figure 2.2 summarizes the market stages for processing cucumber product flow from producer to consumer. The diagram simplifies vertical linkages between stages to three types: solid bars represent integration by ownership between stages; lines indicate the use of contractual arrangemnts for the exchange of the commodity; and broken lines represent market exchange. In most cases, open market transactions account for only a small share of total transactions. The two major market stages in the flow of goods from producer to consumer are outlined below.

Figure 2.2: Major Market Channels for Pickling Cucumbers



Key:

- Vertical Integration
- Contractual Arrangement
- Open Market Transaction

2.5.1. The Grower-Processor Network

There is a definite distinction between the type of cucumber grown for processing and that grown for fresh market. The processing variety is usually smaller in size and has a thinner skin with spines. The varieties grown for fresh consumption have larger seeds and seed cavities which make them less resilient to processing stress. In some areas of the South and West processed varieties are being marketed for fresh consumption as a higher quality cucumber that caters to the fashionable consumer. However, for the most part, the fresh and processed markets can be considered separate.

In some fruit and vegetable markets where varietal differences are not great, processed sectors act as alternative outlets for low quality produce or when excess supplies cannot be sold in the fresh market. This marketing alternative is not available to growers of fresh and processed cucumbers. Growers of processing cucumbers have only one major market outlet: to sell to processors through private contracts. Over the past twenty years the percentage of processed cucumbers sold under forward contract has increased steadily to today's share of over 85 percent. Of processed vegetables, it is one of the more heavily contracted. Table 2.4 shows total and contracted acreage for the 1986 production year.

Table 2.3 Cucumbers for Processing: Contracted and Total Acres Planted by State.

State	1986 Contracted	Total	% Contracted
Michigan	19,300	25,000	77
No. Carolina	18,300	25,700	71
California	3,600	4,000	90
Ohio	4,600	4,600	100
Wisconsin	6,700	7,300	92
So. Carolina	13,300	13,400	99
Texas	7,900	8,200	96
Florida	4,700	600	13
Other States	14,210	23,950	60
U.S. Total	93,210	112,750	83

Source: Vegetables, Agicultural Statistics Board, NASS, USDA, 1987.

The widespread use of forward contractng has nearly eliminated use of spot markets for supply. Because processors forward contract for their expected raw product needs and avoid more costly open market purchases, few growers without a contract are willing to carry the risk associated with finding a future market outlet. The exception occurs in several states where most growers sell through brokers or shippers, such as Florida.

Contracting for cucumbers is usually done several weeks to several months before planting time. In Michigan contracts are usually signed by April, often by March. Terms of a contract are largely determined by the contracting company which sets general guidelines for price and quantity. These have been determined from decisions on desired pack for the coming year. The desired pack is then translated into planted acreage and, with the consultation of 'fieldmen', divided among the contracting growers. A

more detailed analysis of the contracting process is included in chapter three.

The growers of pickles overall tend to be a static group, with the numbers entering or leaving the market being fairly small. Increases and decreases in retail demand are most often absorbed by growers already under contract so that the number of contracting growers has not increased over time. Both improvements in yields and increasing farm size and specialization have kept pace with increased production needs. Most contractors are reluctant to engage inexperienced growers since the long term cost of training is quite high. Those who are in the business tend to stay in the business, and those who are not have difficulty gaining entry.

2.5.2 The Processor-Retailer Interface

The pickle industry processors can be divided into two groups. A handful of manufacturers are large and concentrated, often processing a variety of product lines. By 1986 the largest pickle processor was estimated to hold over 40 percent of the national market. Vlasic and other major national brand pickle companies are subsidiaries of larger food conglomerates who often market pickle products through their distribution systems.

In 1985 78.71% of total retail sales were sold under national brand, 16.89 were sold under private label and 4.4%

under generic label.10 Product differentiation is one means by which firms capture and secure market share. A greater selection of product types accompanied by advertising to gain brand identification is the main means employed. Pickles are not a heavily advertised food commodity. The ADS index in 1977 was only .58, meaning that only .58 percent of sales revenue was spent on advertising. Most advertising for pickles is done by brand manufacturers.

A measure of market concentration based on market share of the top four firms, the CR4 rating, shows the pickle industry to be moderately oligopsonistic. In 1967, the CR4 was estimated at 29 percent of total market share but by 1977 it had increased to 40 percent. Over the past decade, this number is likely to have climbed much higher.

In addition to a few national firms, a larger number of processors, representing a much smaller market share, sell pickles in local or regional markets. Some may only sell in a particular part of a state while others have retail outlets over several states. In recent years a number of these firms have been acquired by larger processors, making, the number of independents proportionally small.

Pickle processing and distribution is most often done on a regional basis. Although large companies operate in a number of areas, they often sell under strong regional brand names. Pickle packers are limited to regional distribution primarily by the cost of trucking heavy cartons of pickles

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10 (Source: SAMI Generic and Private Label Report, 1986)

packed in glass jars. They also face barriers to entry into new markets from the resistant nature of consumer taste preferences. Most individuals form expectations of how a pickle should taste and purchase brands which meet these expectations. The product is not homogeneous; that is, in the eye of the consumer, one pickle is not perfectly substitutable for another. Tastes tend to vary by region so that large national brands with standard flavor mixes have difficulty catering to specific market preferences. This is especially true in southern regions.

The introduction of new brand labels is also hampered by the proprietary marketing practices of regional distributors. Firms will compete fiercely to retain regional market share. Because pickle retail demand has been steady over recent years, most increases in sales are achieved through acquired market share. On the national level competition for shelf space is considerable. Most grocers cannot afford shelf space for more than one or two national brands, a regional brand and their own private label. Successful brand identification pressures retailers to stock the brand and to cooperate with promotion activities.

Grocery stores receive most of their pickle products through wholesale warehouses. These warehouses assemble a large variety of grocery items and distribute them to retail outlets. Pickle products most often are sold through brokers who negotiate sales and coordinate advertising and

promotion packages with wholesale and retail outlets. In some markets larger processors have integrated forward to sell directly to retailers. Retail outfits have also integrated backwards to the wholesale markets to gain countervailing power against strong food manufacturers.

Procurement practices by food retailers for pickles will be discussed again in chapter three. A general description of retail procurement practices for fruit and vegetables is given by Larry Hamm.11

2.6 SUMMARY

The number of pickle processors has been falling over time as smaller firms either go out of business or are taken over by larger manuufacturers. Few new firms are venturing into the market. As a result, processors have become fewer and larger. At the processing level, strong barriers to entry exist from large firm cost advantages due to economies of scale and the high capital investment required for start up. The strong market hold from brand advertising and product differentiation as well as the strategic marketing practices of most firms have also set barriers to new firms.

At the grower level barriers to entry exist for producers who are unable to secure market outlets through production contracts. Open market trading has declined in importance

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11 Hamm, Larry Food Distributor Procurement Practices: Their Implications for Food System Structure and Organization, Ph.D dissertation, Michigan State University, 1981.

because this form of transaction involves more risk for both producers and processors.

Market structure for the processed cucumber subsector is shaped much as an hour glass: small atomistically competitive growers sell to firms in an oligopsonistic industry who in turn sell to a number of large retail outfits.

Chapter Three

AN ANALYSIS OF THE COORDINATION PROCESS IN THE PROCESSED CUCUMBER SUBSECTOR

3.1 INTRODUCTION

In the first chapter several criteria were identified to evaluate performance in the processed cucumber subsector. In chapter two the structure of the processed cucumber market was described and several implications were drawn. This chapter will analyze how well current institutional arrangements and standard operating procedures operate within the market structure to enhance subsector performance. Because many of the business practices and decision rules are not directly observable, this chapter will work backwards from performance objectives to trace how institutional arrangements shape performance outcomes.

It will use the description of the subsector outlined in chapter two as a base for identifying the major coordination functions in the subsector that are integral to achieving orderly marketing. Specifically, the subsector will be evaluated on how well it is able to meet the following objectives: 1) to provide the quantity, quality and type of product demanded by consumers; 2) to maintain an effective price discovery process that reduces uncertainty to participants and reflects supply and demand conditions; 3) to maintain long run returns to well-managed producers and processors that cover costs of production; and 4) to

distribute risk to those who are best able to manage it, but who are also able to reap the benefits that come from risk.

3.2 MATCHING QUALITY AND QUANTITY DEMANDED WITH THAT SUPPLIED AT EACH STAGE OF THE MARKET SYSTEM

Coordination between producer, processor and retailer is essential for guaranteeing that the quality and type of cucumber produced matches with that demanded by the retail market. Food processors and manufacturers are the central link between the producer and consumer. They control the flow of food products through the marketing system. Because of their position in markets, they control much of the market information on quality, quantity, prices, changes in retail markets and raw product procurement.

There are two components involved in matching supply and demand. One encompasses the quality of the product that reaches the retail market while the second deals with the quantity and type of pickle that is sold.

3.2.1 Quality Considerations from Producer to Consumer

Processors are the main coordinators for matching the quality of supply with that demanded. Industry personnel invest considerable energy and money into guaranteeing the consumer the most desirable pickle product. Consumer preferences for pickle varieties are closely monitored through market research programs by large processors. Processing firms estimate demand for product based on

information received from their retail buyers who transfer information on the volume and value of pickle products moving through their stores. Additional information on retail demand is received from private information services, with Selling Areas Market Information (SAMI) being a major source. Industry wide research is also conducted by Pickle Packers International, a pickle processor association which distributes information to members.

There are three important components in quality control of raw product that determine the industry's ablility to meet consumer preferences: grading; post-harvest handling; and processing.

A. Grading. Although a number of factors influence how well each stage is able to control quality, the most important revolve around standards for the raw product. Most processors grade cucumbers primarily on size requirements which is by far the most important criterion. In order to meet the specifications of a given pack, adequate quantities of a variety of cucumber sizes are needed.

Several size categories for cucumber diameter are standardized within the industry. These are based on, but not restricted to the voluntary federal grade standards listed below.

Grade 1A: less than 13/16 inches
Grade 1B: less than 1 1/16 inches
Grade 2A: less than 1 1/4 inches
Grade 2B: less than 1 1/2 inches
Grade 3A: less than 1 3/4 inches
Grade 3B: less than 2 1/8 inches
Grade 4: oversized or misshapen12

The exact diameter categories vary with each firm and sometimes from year to year, but generally follow these major divisions.

While grading categories are usually limited anywhere from three to eight types at the producer level, most processors break sizes into as many as thirteen categories. Grades are usually separated by as small a diameter difference as 1/16 inch and often specify ranges for length as well. These detailed specifications are needed to guarantee that raw product will meet packaging dimensions. In-house processor grading standards are often tailored to meet specific jar sizes. Sizing in the plant varies daily depending on the type of final product being packed. If plants are short on a specific size, raw product may be transferred from other plants or purchased from independent shippers to fill daily needs.

Pickling cucumber varieties must have characteristics desired by consumers as well those needed to withstand rigorous processing techniques. The industry has not yet been able to develop adequate means of grading cucumbers in

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12 A share of oversized or misshapen fruit is used in relish, although much is discarded. Some firms refuse to purchase any fruit falling in grade 4.

ways that measure quality characteristics other than size. Cucumbers must have high 'internal quality' where seeds and seed cavities are kept small and sturdy. While shelf life is not reduced by seed size, the attractiveness of the jarred product is diminished if seed cavities break open or seeds fall to the bottom.

More stringent grading standards are difficult to implement in the industry for several reasons. First, seed varieties have not yet been developed that can consistently put out high yielding plants that bear high quality fruit. Second, adequate testing and sampling techniques have not been developed that can efficiently measure for quality characteristics. Third, institutional arrangements have not been devised to handle the greater amount of risk placed on growers who face increased likelihood of having their produce rejected or accepted at an inferior quality. The industry has not yet deemed the benefits derived from tighter grading standards adequate to offset the higher costs. Because many of the quality improvements depend on varietal characteristics and the size of fruit when harvested, growers, who have little control over variety or weather, face greater uncertainty in having produce rejected or graded at substandard levels.

B. Post-harvest handling. Cucumbers are one of the most perishable vegetable products. As a result, harvest and post-harvest handling are large determinants of end product

quality. Because of cucumbers' rapid maturation process, harvest periods are often plagued by gluts at both receiving stations and processing plants. Backlogs of fresh produce often result in considerable fruit deterioration. Once picked, cucumbers have a fresh life of up to 36 hours, after which time they are unfit for processing. Both producers and processors suffer from gluts. Each faces a greater uncertainty of being left with a useless pile of raw product.

The responsibility for improving post-harvest handling is largely in the hands of processing firms who regulate the scheduling of equipment used for raw product deliveries and processing in the plant. Improved coordination largely involves improving intrafirm incentives to adopt more efficient practices.

C. Processing Technology.

Cucumbers, when properly stored, may be kept for over a year without significant deterioration in quality. They are stored in large brining vats that with today's technology require continuous salt water cleansing. The current usage of open-top brining tanks is a source of serious environmental and regulatory concern. Damage to both the pickles from exposure to the environment and environmental contamination from salt water residue has prompted considerable research in recent years. Efficient brining processes are essential to maintaining product quality since

they determine the relative bloatedness and crispiness of the finished product. While finished product quality is not highly variable, inconsistencies adversely affect consumer brand preferences. Most firms pack older stock or lower quality pickles under private label, when a deterioration in quality is detected. More often, though, the few damaged pickles that are processed along with the healthy are not easily separated, and often end up on the store shelf unmonitored.

Most processors report few problems with quality variation. Pack quality sold under brand name is closely monitored by the processor. Pickles sold under private label are usually tested for quality by retail and wholesale buyers. Although several major packers claimed that lower quality pickles are packed under private label, retail buyers regarded private label quality to be as good as, if not better than brand name products.

Consistency in quality is also essential to food service buyers. According to processors, the largest food service buyers often set narrow quality specifications for their pickle products. This at times requires that a specific type of pickle product be developed for each purchaser. Because of the high costs associated with this specialization, most transactions of this type are handled between the major processors and the major food buyers.

Summary

Of the three causes of poor quality, the most important by far is the condition of the fruit on the vine. Improvements in this area are largely based on technological advancements in disease and weather resistant seed varieties. Technology exists to greatly improve cucumber yields but at a cost in terms of fruit quality. The decision to not adopt these varieties indicates the importance of quality to the processor who regulates their use through the contract.

The previous descriptions show that much of the quality improvements are left to the responsibility of the processors. How well they are able to control quality to be consistently good, depends on the incentive structure they face both within the firm and from external pressures. This is especially true for post-harvest handling, processing and storage practices. For more stringent grading techniques incentives are not strong enough to compensate for the higher costs of more specialized grading. Because retail markets are competitive and quality aspects important to the retailer as well as brand distributor, quality is monitored by both the processors and retailers.

At the raw product stage much of the improvements in quality require that processors provide incentives to growers to deliver better quality produce. This will require more investments in research on seed development and improved cultural practices, or more detailed specifications

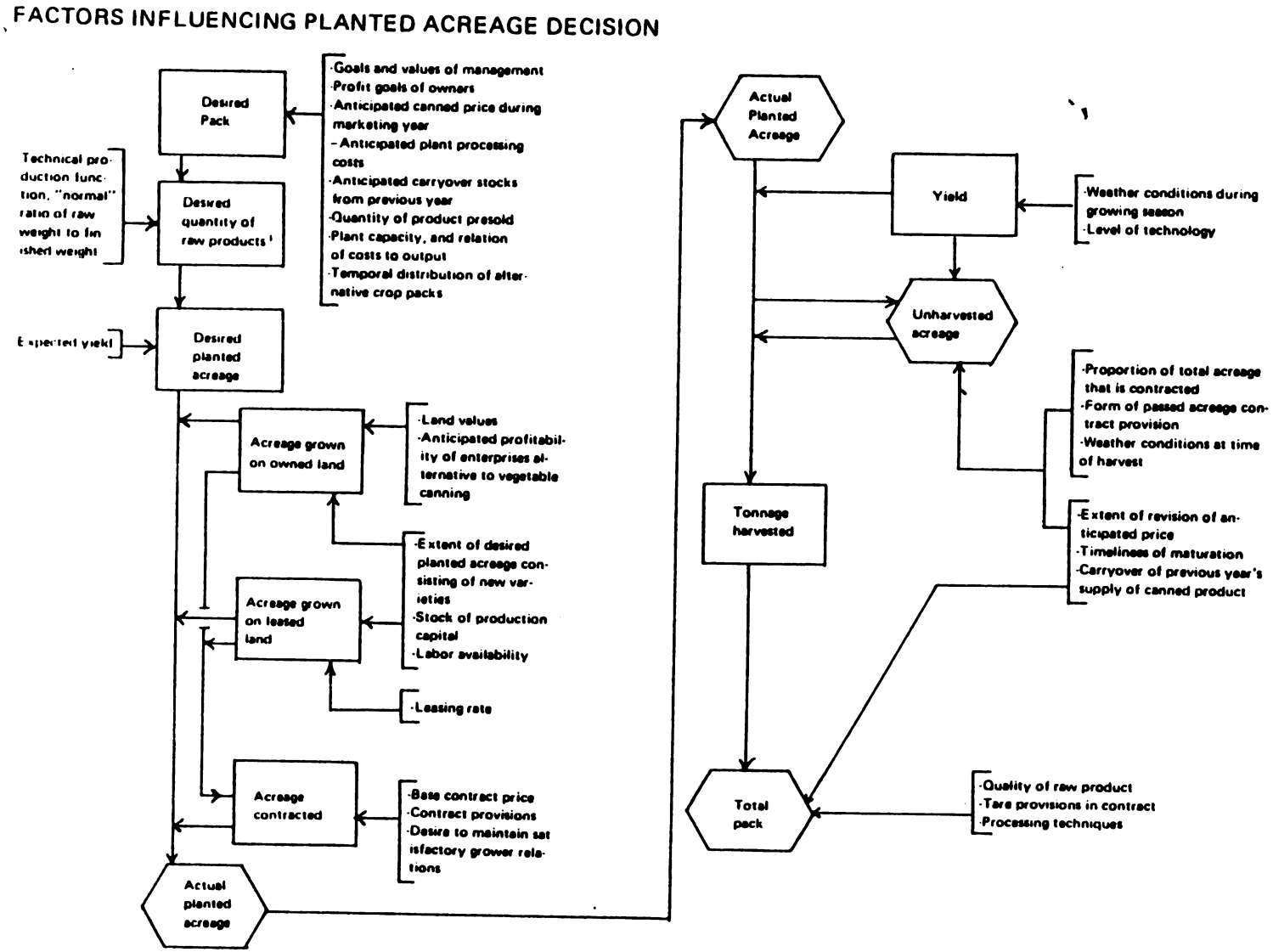
of grading standards accompanied by price premiums for deliveries of superior raw product.

3.2.2 Determining the Quantity and Type of Pack

In addition to delivering a consistently high quality pickle to consumers, suppliers have the difficult task of determining the appropriate quantity of each type pickle product demanded. The determination of future quantiites demanded is largely the responsibility of processors, who maintain adequate stocks, set raw prodcut flow and handle promotion and distribution for pickle products. Individual processors estimate demand for each variety of pickle for the upcoming year and use these estimates to design a pack. Figure 3.1 summarizes the major determinants of pack for processed vegetable canners.

The quantity of pack is usually based on the size of orders from the previous year, projected promotion activites with retail and food service outlets and the amount of pre-ordered or 'booked' shipments by retailers. Shipments for brand label sales are rarely booked far in advance. Most retail brokers process orders on a bi-monthly basis. They manage orders from retail buyers and often design and monitor promotion activities for brand processors. In contrast, private label shipments are often set a year in advance of actual sale. Private label bookings indicate the volume of sales and times of shipments throughout the coming year.

Figure 3.1 **FACTORS INFLUENCING PLANTED ACREAGE AND PACK DECISIONS**



Source: Jesse, Edward V., *An Analysis of the Supply Determination Process of Vegetable Canners With Special Emphasis on Raw Product Contracting*, unpublished Ph.D. thesis, University of Wisconsin, 1970.

Once the quantity to be packed is estimated from the projected volume of sales it is translated into estimates of total acreage and bushels needed from contracting growers. The processor also must decide how much of the pack will come from reserve stocks. Most processors rely on a number of sources of supply to fill pack specifications. These are broken into four groups and described below.

1. Contracted Acreage:

Tonnage contracted with growers is by far the major source of raw product. In Michigan processors usually contract acreage separately for hand and mechanical harvesting. Hand harvested acreage is the primary source for the smallest size cucumbers, the grades 1A, 1B and 2A. Larger sizes are more easily harvested mechanically. Most of Michigan's 2B, 3A and 3B are machine harvested. By balancing acreage between hand and machine harvesting, and by manipulating the relative prices of grades in such a way that growers can maximize returns by providing those sizes most needed for pack, the processors determine the type and quantity of fresh stock. Reliance on price variation between grades is a rather inprecise way of targeting supply needs from growers so that processors use alternative sources of supply to reduce the probability of shortages in raw product, especially of specific sizes.

2. Intra-firm Transportation and Coordination Across Regions.

Fresh stock is also supplied across regions to processing plants. Because most pickles are processed by national firms with a number of plant locations, oversupplies in one area are often shipped to plants in another part of the country where harvesting has not yet begun or supplies are short. In early summer Michigan plants are packing cucumbers grown as far away as North Carolina or Texas. To keep plants operating at full capacity, companies must carefully schedule the arrival of the amount and size of raw product to each plant.

3. Brokers, Shippers and Inter-Company Trading.

Regional cucumber gluts and shortages are also offset by purchasing either fresh or salt stock from other processors. Companies often sell excess stock to competitors who are short of specific sizes. In addition, brokers and shippers sell both fresh and brined stock to processing firms. In seasons of short supply brokers provide extra stocks at a higher cost than contracted supplies. These brokers may grow their own cucumbers or contract acreage with growers. They also purchase stock from growers who produce beyond their contracted tonnage. Shippers provide both fresh and brined stock. Fresh stock is most often used to fill daily processing plant shortages for fresh pack while the brined stock kept by shippers and brokers is sold year round. The

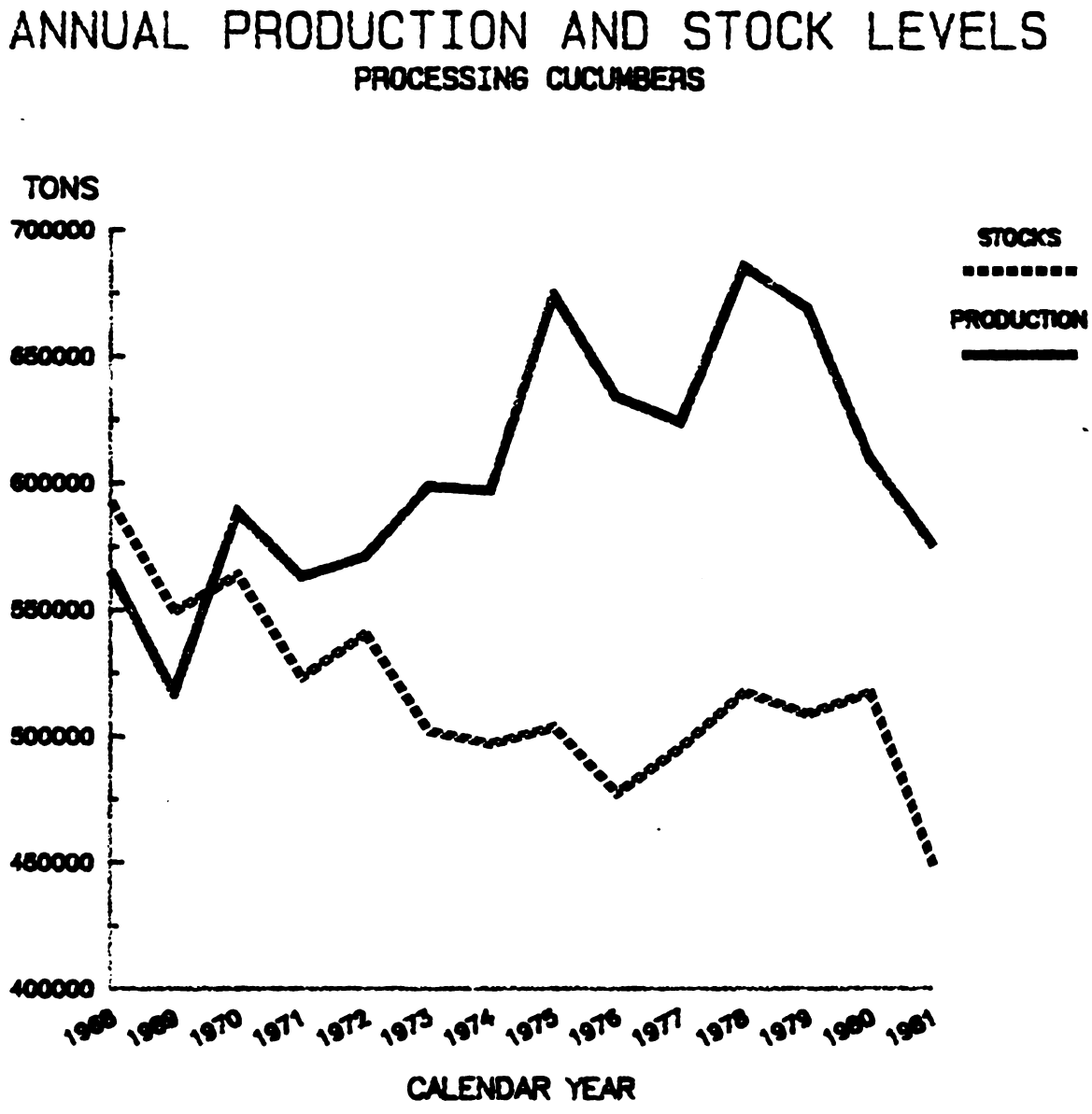
amount processors rely on brokers fluctuates yearly, although they provide an important function of alleviating supply shortages for specific sized cucumbers.

Over the last few years almost all brokers and shippers have adopted pre-ordering sale practices with their major buyers. These agreements specify before the harvesting season the quantity, grade and price of raw product to be purchased. The agreements are not binding for either party but are used instead to signal intended purchases. Either party is able to cancel their orders at any time during the year. In this sense, the agreements work much as the booking system used in the retail market. The introduction of a pre-ordering system has greatly reduced price instability for both parties and allows shippers to target cucumber sizes most in demand for the coming season.

4. Storage and Stocks.

Most processors store a large share of pickles in salt stock and jars. Figure 3.2 compares reported total end of year salt stock and fresh pack with total production. As the graph indicates, a large share of total production is kept in stocks for the coming year. As a percent of total production, the level of stocks has declined in recent years mostly because of rising inventory costs and improved estimates of projected consumer demand. Retail outlets handle only short term storage and place frequent orders so that processors carry most storage costs. Because processed

Figure 3.2 Total Annual Production and Stocks of Processing Cucumbers



Source: Vegetables, USDA, National Agricultural Statistics Service, 1964-1982.

pickles can be stored for as long as two years, processors usually contract acreage in excess of estimated demand to replenish reserves. Stocks serve several purposes for the processor: they provide a buffer against unanticipated shifts in consumer demand; and they reduce risk associated with periods of over and under production of green stock. Because of the high costs associated with large stocks, most processors attempt a complete stock turnover every 18 months. This helps to reduce storage costs and to guarantee better quality to the retail market. Distribution to the retail market is planned more than a year in advance. Stocks must be available to meet retail demands through the following harvest season.

3.2.3 The Vertical Coordination Process in Operation: Long and Short Harvest Years.

To better conceptualize the process by which pickle processors control supply to meet demand from year to year, two scenarios can be drawn. The test of how well a system can match supply and demand at each stage of the market is to analyze the process of adjustment used when either demand or supply experiences a shock. In this way the adaptability of the system can be ascertained. In the first case supplies of processing cucumbers are assumed to be well in excess of that expected. In the second case supplies from contracted acreage are assumed to be short, that is, well below what is demanded.

(1) Scenario One: An Overabundance of Pickling Cucumbers.

With a slow growing retail market for pickles, large oversupplies of cucumbers at the producer level are difficult to absorb into the market. To find out the practices of market participants during long years, growers, shippers, processors and retail buyers were interviewed.

As stated on almost all grower contracts, processors are obilgated to purchase only the specified amount of cucumber tonnage from each grower. If high yields result in excess tonnage for the specified acreage, processors can reject any amount above that contracted. Only in a couple of years was this used to control supply. In most cases processors purchased extra tonnage. Processors explained that these purchases were conducted partly because growers had no alternative market outlet, and partly because extra stock could be shipped to other regions or added to existing stock. In the case where stocks were expanded, processors said they were likely to adjust to the increase by decreasing contracted acreage with growers in the following year.

In the past some processors have broken contracts with growers with acreage by-passing. This is rarely practiced today, largely because processors find it difficult to sustain risk-averse growers over a long period of time. Processors are also likely to increase pickle sales by stepping up promotion through advertising and retailer deals. Processors will lower the price per case as well,

although the changes in prices are usually small.

During long years brokers and shippers of raw product usually lose their market outlets as processors cancel or reduce purchases. Shippers sell their fresh stock on spot markets, usually for low prices, or tank it in salt stock in hopes of specific size shortages occuring in future months. The year following the oversupply, contracted acreage and open market shipments are likely to be cut by shippers as well.

In summary, during long years, producers benefit from secure market outlets and prices for their contracted tonnage. Processors primarily carry the costs of either stocking or selling a larger pack. Retailers often receive more favorable purchase deals, either through reduced prices or increased promotion packages. Shippers and brokers who operate on spot markets often lose market outlets and carry costly stocks to the following year.

(2) Scenario Two: A Shortage of Pickling Cucumbers

The processed cucumber industry has on rare occasion experienced severe shortages of raw product. The few that have occurred have been due largely to poor yields from adverse weather conditions. A shortage in 1974 was caused by an exit of growers from cucumber production to more profitable field crop production.

During a year of short supply processors try to acquire as much stock from contracted acreage as possible. Because

prices are locked in by contract, this is likely to be the cheapest source of supply. Processors face a greater likelihood of growers breaking contracts to sell to shippers or brokers that offer higher prices. Growers may default on their contracts or reduce the tonnage delivered. This is no longer a common occurrence in the Michigan area, although several processors reported it a concern in the North Carolina region where the costs of monitoring contracted growers is high. Processors have adopted a practice of offering bonuses to growers for fulfilling contracts. This acts as a disincentive to growers to skim off tonnage from contracted acreage.

In short years shippers and brokers recover much of their losses from the long years. Because prices to processors are flexible and usually negotiated transaction by transaction, most shippers can charge prices above contracted rates. The amount that this is done is decreasing as more shippers recognize written agreements with long term buyers.

Retail market behavior changes during short years as well. Processors are more likely to slow the flow to retail outlets over the year by raising prices and by scaling down the number of promotions and deals. National processors who market under brand and private labels, will usually give priority to brand product orders, but both are likely to be scaled back. The scaling down is usually done across the board to all retail accounts. This is necessary to avoid

legal entanglements and to avoid slighted retailers cancelling their future purchases.

Many of the large retail buyers monitor crop projections for cucumbers before harvest time. If shortages are likely, they will speed up purchases of those varieties most likely to run short.

In summary, during short years, processors often are able to raise wholesale prices and cut back on promotion efforts. They also are forced to scale back retail sales or buy extra raw product at high open market prices.

Neither an extreme shortage nor oversupply is likely to occur for the larger processor. Temporary shortages of particular sizes are more likely, but these are rarely disruptive to any market stage and are usually ended within several weeks time. Surpluses in a particular size also occur, and may be cleared by offering specials or by selling under private label at a reduced price. Smaller firms are much more prone to swings in supply, since they do not have the horizontal or vertical linkages with which to manage fluctuating market conditions.

3.2.4 Coordination of Supply through Grower Contracts

At all market stages the institutional arrangements for controlling vertical product flow are instrumental in maintaining a well-operating system. However, because resources did not permit an indepth look into every existing institutional mechanism used to coordinate exchange in the

processed cucumber subsector, further analysis in this section will focus on the procuring of raw product through grower contracts. The contracting system for processed cucumbers is worth analysis since it appears to be an effective means of controlling supply and transmitting valuable market information.

Contracts reduce uncertainties for both producers and processors by providing a means of articulating preferences to the other party regarding production and marketing decisions. They provide a means of regulating highly volatile markets that would otherwise perform poorly under spot market coordination.

Production contracting is one form of vertical coordination where the various stages in the subsector are jointly controlled while each party retains separate ownership. Contracts vary by the extent to which production is brought under the control of the contractor. Mighell and Jones classify contracts according to the number of stages that are transferred from producers to the control of the contractor.13 According to their classifications, cucumber contracts fall between a marketing and production contract, since most but not all responsibility for production remains with the growers. Most of the responsibility for marketing is carried by processors.

From a comparative institutional approach contracts

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13 Mighell, Ronald and L.A. Jones, Vertical Coordination in Agriculture, USDA/ERS, Agricultural Economics Report No. 19, 1963.

represent a potential means of reducing transaction costs below those of alternative arrangements. They reduce uncertainty for processors in several major ways. First, processors are able to formulate a more reliable production plan based on expected available tonnage of raw product long before the actual product is available. This is particularly important for other planning needs such as securing an adequate labor supply and procuring other processing materials. The processor is also able to book future sales of product with greater assurance of supply. Second, processors are able to better estimate the costs involved in purchasing raw product. They have a means by which to lock in a buying price so that costs of production information can be used with assurance when deciding on the desired pickle pack. Third, contracts are often written in ways that specify the type of seeds and cultural practices which producers are to use. In this way processors are more readily able to control the quality characteristics of the cucumbers. This is particularly crucial when the desired pack includes specific quantities of a special size or variety. Fourth, contracts provide a means of coordinating the timing of harvest for cucumbers so that the processor can structure a continuous flow to the plant. Finally, contracts are a cost-efficient means of structuring infrequent transactions. Because processors purchase raw product from a limited number of producers at only one time during the year, both parties can afford the more

specialized governance of exchange if it reduces total transaction costs to both parties.

Contracts, then, reduce uncertainty for the processor by reducing the variance of expected value of procured tonnage. With price, quantity and type well specified, fluctuations in tonnage are largely reduced to those associated with yield variation.

Contracts also provide a means for reducing grower uncertainties. Most importantly, growers are guaranteed a secured market outlet for a specified tonnage of cucumbers. Due to the perishability of the raw product, immediate and reliable market outlets are essential to the grower. Growers are also able to form accurate price expectations on which to base production decisions. The grower has a means to estimate the relative profitability of the enterprise usually well before planting time. Finally, the grower faces less uncertainty associated with seed quality and cultural practices by having regular access to fieldmen's production and marketing expertise.

Contracting between grower and processor is a means for both to increase their knowledge of and control over uncertain situations. Sources of uncertainty which both parties want brought under control are reflected in the terms of contract. To appreciate the manner in which uncertainty is reduced, a review of contract provisions and standard operating procedures of both parties involved in the pickle contracting process is worth analyzing.

Contract Terms for Pickling Cucumbers

A number of contracts for cucumber production from the Michigan, Wisconsin and Ohio areas were studied. These covered the 1985 and 1986 growing years. In several cases, contracts over a number of years were analyzed to measure year to year changes in terms and prices. Because sample size was small and non-random, the description that follows should not be considered a thorough review but rather an introduction to cucumber contracting practices.

Although terms of contracts vary from firm to firm, several general practices were identified and are described below. Provisions of major interest are those that transferred information on quality and quantity. Terms likely to affect the profitability of production are also important since price differences alone do not determine grower profitability.

1. Grades. Grading standards vary from contract to contract. Diameter is the most common specification given, although many contracts state that the cucumbers must be of a given length, color, firmness and free of disease and damage. Contractors hold the option of either accepting or rejecting oversized or misshapen cucumbers. Fruit greater than two inches in diameter is often treated as waste or bought at very low prices for relish. Some contracts divide cucumbers into three grades, 1, 2 and 3, while others use more than six.

2. Price. Contracts specify the quality standards and prices for each grade. Pricing practices, like grading, vary from firm to firm. While some firms maintain large price differentials between the grade levels, others offer the same price, regardless of size for the top three grade levels. Price differences between grades also change from year to year, although fluctuations are not large. Prices are often more variable for hand-pick contracts where an incentive is needed to get the smallest-sized pickles harvested. Price levels also vary according to other provisions included in the contract. Some companies provide harvesting as part of the contract and adjust prices accordingly.14

3. Seeds. Contracts often specify the seed varieties to be used and restrict the use of pesticides and insecticides to those considered environmentally safe. Contracts may specify either that harvesting be carried out by the grower or, in some cases, left to the processor who provides either the labor or machines. The difference in who harvests is significant since grower responsibility for the crop ends much later in the marketing process in the former case, while in the latter one the value of production is not determined until the crop is weighed at a receiving station.

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14 An analysis of how price and variations in other terms are related was not attempted in this paper. A study of this is given in: Jesse, Edward and Aaron Johnson, "Analysis of Vegetable Contracts" American Journal of Agricultural Economics, November, 1970.

4. Acreage and Tonnage. Pickle contracts specify the maximum acreage and tonnage the company will guarantee to purchase. Estimated tonnage is most often based on a moving three year average of each grower's yield. The averaging is necessary due to the high variability in yields from season to season and from field to field. While companies will often purchase tonnage above that contracted, they are not obliged.

5. Bonus Payment. Many contracts offer post-harvest bonuses to growers. These act as incentive pay for fulfilling contract obligations or to cover increased costs of production and transportation. Payment is usually based on a percentage of total value of sale.

6. Penalties. Contracts often set guidelines for penalizing growers if an unacceptable percentage of the raw product is crooked, nubbed or diseased. The penalties are usually based on a percentage of total sale.

7. Payment Schedule. Load payments are often made at the receiving station either at the time of delivery or at regular intervals during harvest time. Contracts usually state a time limit before which final payment will be made.

8. Act of God Clause. Most contracts contained a no-fault clause where, in the event of natural catastrophe or

defective seeds, the grower will not be held responsible for a cancelled contract, and the processor will not be financially responsible for grower losses.

In summary, contract provisions were found to be similar across firms. Because grades are fairly standardized, price differences would be one means of comparing contracts. Pricing practices varied significantly between contracts for mechanical harvesting and those for hand harvest. Comparisons across contracts would need to take this into account.

3.2.5 Informal Terms of Contract

A description of contract provisions can only explain a portion of the contractual arrangements between buyer and seller. Informal business practices also transmit information and influence the distribution of control between the processor and grower.

In the pickle industry growers and processors operate on a personal level. Because processors alter acreage and tonnage contracted from year to year, the rules for allocating additions and subtractions are key to the coordination process. Acreage allotment decisions are influenced by a number of factors. Integral to the process, however, is the role taken by the fieldman who operates as liaison between the processing plant management and the grower. As a company employee, he or she negotiates

contracts and supervises planting, growing and harvesting of the raw product. Growers are often treated as quasi-employees where fieldmen act as their supervisors and evaluators. If a grower is not performing well, it is the fieldman who sets standards and makes comparisons with other growers. Some companies maintain a ranking system where records are kept of grower performance not only on yield and acreage information, but on the degree of cooperation the farmer volunteers. Fieldmen keep records of how well growers follow company advice and how flexible they are in adhering to company schedules for planting and harvesting. These reports are available to growers. The fieldmen also distribute end of season compensation to growers. Fieldmen are reluctant to cancel contracts with established growers. Although contracts cover only one growing season, growers can usually rely on renewal if they remain on good terms with the processing company.

Fieldmen first begin the contracting process in the winter when early indications of likely prices and tonnage requirements are given. It is at this time that growers are able to influence acreage and tonnage allotments, and to discuss any changes in costs of production and growing conditions with the fieldman. Grower concerns and preferences are then relayed through the fieldman to management who may or may not revise terms of contracts. According to growers interviewed, attempts at improving contract prices and terms are rarely successful because the

processing companies have standardized practices for all growers.

Fieldmen for most firms spread substantial acreage alterations across many growers. Growers have some input into the process but the final decision lies with the fieldmen and their supervisors. Both growers and fieldmen pointed out that changes in acreage are not made evenly across all contracting producers. Growers who experience the largest cuts in acreage are usually those who have the poorest production records and poor relations with processors.

Informal terms of contract add considerable control over production, and the exchange of timely information introduces flexibility into a fairly stable system.

3.2.6 Future Trends in Coordinating Supply and Demand

The previous discussion focused on the determinants of supply for meeting demand in the pickling cucumber industry. Major emphasis was given to the close coordination between the grower and processor and the processor and retailer to determine both quality and quantity. Over the past several decades this coordination process has evolved to expand and fine tune the vertical linkages between market stages. At each stage market participants attempt to reduce uncertainty associated with variation in quality and availibility of supply. This trend is likely to continue as the industry searches for additional means of improving quality. More

stringent guidelines for grades is one alternative the industry is currently exploring.

More extensive control over quantity is also being attempted by several large processors who are investing in joint ventures with the largest growers for grading and sorting stations. One large processor is also moving towards grower contracts for raw product imported from Mexico. These moves indicate the industry's attempts to capture economies of scale and reduce uncertainties through greater control over supply channels.

As in other processed food sectors, the retail and processing market stages are becoming more concentrated. National brand manufacturers are controlling a greater share of the retail sales as new regional markets are penetrated. The growing concentration of the retail market has several implications for market coordination. The trend towards private information linkages within the system has reduced market transparancy. This uneven distribution of market information may leave smaller firms at a considerable disadvantage because they lack the financial resources with which to generate and interpret market information.on quality and quantity. Local firms face greater uncertainty in future demand and supply conditions as market information becomes more propietary. The information made available may also be distorted to serve the interests of those disseminating it. The reporting of stocks is a clear cut example. It is alleged by several processors that most

firms report inaccurate estimates of in-house stocks and underestimate projected contracted acreage for the following planting season. According to these individuals, this is done in large part to mislead competitors into over or underinvesting.

The outcome of intentional withholding and distortion of market information may be detrimental to overall market coordination. Uncertainty associated with impacted or distorted information may have adverse impacts on subsector performance to the extent that it results in well-managed firms exiting the market only to be replaced by large conglomerates who perform marketing functions no better. This issue is again addressed in section 3.4.

Galbraith has argued that these large firms may in fact serve a needed role by risking large investments that bring technological improvements to the subsector. To compensate for the greater uncertainty associated with these investments, they seek institutional arrangements that reduce uncertainty through greater control over their buyers and suppliers through integration and strategic behavior.

3.3 GROWER RETURNS THAT COVER COSTS OF PRODUCTION

3.3.1 Introduction

Grower returns that cover total costs of production in the long run encourage improved subsector performance by adding stability to grower incomes and enhancing long run

planning. Well-managed grower firms that are able to operate at a profit from year to year enhance long run stability in the subsector beyond the farm level through the vertically linked system. Long run profitablility is maintained when revenues received cover both variable and fixed costs of production. Section 3.3.2 will analyze grower costs and prices received to determine if, in the long run, growers are operating at a profit.

Instability at the producer level, whether caused by unpredictable weather or by changes in buyer markets, can have a spiraling effect for growers who face future uncertainty from poor coordination in the present. If unstable markets are misinterpreted, inappropriate decisions will often lead to greater instability. Instability that is carried forward to other market stages can bring poor performance to the subsector as a whole. Section 3.3.3 will analyze market instability at the grower level from several angles. Fluctuations in net returns from price movements, changes in yield and planted acreage from year to year all act as sources of instability at the grower level that feed into the entire market system.

3.3.2 Costs of Production

Because the processing cucumber industry constitutes only a minute portion of the agricultural sector, accurate, detailed and continuous cost studies at a regional level are not available. Consequently, this section will rely on a

description of trends in production costs for cucumbers and summaries of selected annual cost studies from extension records.

Several studies have been conducted to determine the costs of production for pickling cucumbers in Michigan. Harsh15 compared cost structures for both machine-harvested and handpicked production for 1969. More recently Shapley conducted a similar cost study that compares the two harvest types. The studies are based on small group discussions with growers so that they do not represent average grower costs. They do, however, indicate major input costs and their relative share in total costs for growers.

The studies divide expenses into variable and fixed costs. The predominant variable cost item for pickle production is labor. In most parts of the country where handpicking is used, growers negotiate labor supply through independent contracting where each laborer is treated as an individual business. Under this arrangement payment to pickers is done on a profit-sharing basis where total revenues from crop sales are split on a percentage basis between the grower and contracted laborers. While the actual percentage used varies among growers, it usually has as a minimum 50 percent of total gross revenues. Additional

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15 Harsh, Stephen, "Economics of Pickling Cucumber Production in Western Michigan", Agricultural Economics Report No. 125, Michigan State University, 1970.

labor costs are incurred for machinery operation and transportation. Fertilizer, herbicides and, if used, irrigation are the other major costs of variable inputs.

Major fixed costs for production are more difficult to measure when other farm enterprises use the same investments. In this study fixed costs are estimated by assigning a percentage of total investment costs to the share used for cucumber production.

A breakdown of variable and fixed costs for handpicked cucumbers in Michigan for 1985 is included in Table 3.1. All figures are given on a per acre basis where overall area planted is assumed to be 80 acres. The variable costs of growing for hand harvest are assumed to vary directly with changes in acreage. Fixed costs per acre, however, depend on overall size of acreage. Fixed cost estimates vary in importance depending on the proportion of total farm investments used in pickle production. If pickle production is a minor enterprise and has little or no effect upon the line of equipment the farmer owns and maintains, the fixed costs can be negligible in forming production decisions.

The estimates for total receipts is figured by multiplying the average share of each size harvested by the price offered for that grade. The combination of prices and breakdown of size for harvest will be different for each grower. The amounts used in the table are only rough estimates.

Table 3.1 Pickling Cucumber Production Budget for Hand-Harvest Estimated for 1985 Growing Season

Item	Explanation	$ Amount
RECEIPTS	10% #1 @ 14.00	$280.00
	45% #2 @ 8.00	720.00
	45% #3 @ 5.70	513.00
Total Receipts		$1513.00
Less 50% for Contract Harvest		756.00
CASH EXPENSES		
Non-harvest labor		$96.15
Irrigation labor		31.50
Harvest labor (boxes)		20.25
Fringe benefits for labor		22.50
Repairs and Maintenance		30.00
Seeds and Plants		25.00
Fertilizer		63.75
Fungicide		40.00
Fuel		50.00
Utilities		10.00
Trucking		42.00
Other Expenses		32.00
TOTAL CASH EXPENSES		$462.85
OTHER EXPENSES		
Interest on operating capital		$27.77
Land rent		50.00
Depreciation on Buildings and Equip.		87.00
Insurance		31.00
Interest on Investment		96.00
TOTAL OTHER EXPENSES		$291.77
TOTAL EXPENSES		$754.62

Source: Shapley, Allen, Unpublished cost of production estmate,1986

According to this cost study cucumber growers using hand harvesting techniques were able to cover total costs of production during the 1985 season. The figures also indicate a tight profit margin for growers, with per acre revenues only $1.38 above costs.

Similar studies conducted for Ohio and North Carolina

resulted in the same conclusion. Table 3.2 breaks down costs of production in Ohio for hand-harvested pickles for the same year. This table also shows the impact of variable yield on grower returns. Of the three yield levels considered, all covered variable costs but only the higher two estimates covered fixed costs as well.

Estimates for costs of production in North Carolina during 1985 also show farmers realizing positive net returns. Past estimates for the years 1970, 1974 and 1982 all indicate that receipts exceeded total costs for those years. A summary of these studies is given in Table 3.3.

Table 3.3 North Carolina cucumbers for processing: A summary of estimated costs and returns for 1970, 1974, 1982 and 1985.

Item	1970	1974	1982	1985
Total Receipts	$437.50	$687.50	$1000.00	$1150.00
Variable Costs	334.82	505.11	789.02	892.00
Fixed Costs	57.25	106.27	88.38	129.23
Total Costs	392.07	611.38	886.40	1121.23
Net Returns to Management*	45.43 (39.16)	76.12 (51.78)	122.60 (42.42)	128.78 (40.24)

* Values in parentheses are returns per acre, deflated by CPI, 1967=100.

Source: Estes, E. A., Assorted Extension Bulletins. North Carolina State University.

Because over half of Michigan's acreage is harvested by machine, the profitability of mechanically harvested processed cucumber crops needs to be analyzed. A partial

Table 3.2: Ohio Production Costs for Hand-Harvested Pickles for 1985.

1985 PICKLING CUCUMBER PRODUCTION BUDGET
HAND HARVEST

ITEM	EXPLANATION	PRICE PER UNIT	YIELD/ACRE 360 Bu 9 T	530 Bu 13.25 T	700 17.5
RECEIPTS 1/	20% #1 @$15.00 /cwt 40% #2 @$ 8.50 /c	$ 8.20 /cwt.	$ 1476	$ 2173	$ 2870
	40% #3 @$ 4.50 /cwt				
VARIABLE COSTS					
Seed	2.5 lbs.	$10.00 /lb.	$ 25	$ 25	$ 25
Fertilizer 2/					
Starter(8-25-3)	225 lb/A.	0.11 /lb.	25	25	25
N	100 lb/A.	0.20 /lb.	20	20	20
P2O5	125 lb/A.	0.22 /lb.	28	28	28
K2O	225 lb/A.	0.11 /lb.	25	25	25
Lime	1000 lb.	15.00 /T.	8	8	8
Chemicals 2/					
Lindane	1 pt.	31.00 /gal.	4	4	4
Sevin	6 lbs.	2.90 /lb.	17	17	17
Fixed Copper	3 gal.	6.50 /gal.	20	20	20
Prefar	1 gal.	27.00 /gal.	27	27	27
Alanap	1 gal.	12.50 /gal.	13	13	13
Custom Spraying	5 sprays	5.50 /A.	28	28	28
Bee Rental	1 hive/2 A.	29.00 /hive	15	15	15
Pickers Share 3/	60% of Gross Income		886	1304	1722
Crop Insurance		16.00 /A.	16	16	16
Hampers 4/	75 /A.	0.20 /hamper	15	15	15
Fuel, Oil, Grease			22	22	22
Repairs			21	21	21
Transportation for labor 5/	25%		3	3	3
Miscellaneous 6/			6	6	6
Interest on Oper. Cap. 7/ (6 Months)	13%		20	20	20
TOTAL VARIABLE COSTS - Per Acre			$ 1241	$ 1659	$ 2077
- Per Ton			$ 138	$ 125	$ 119
- Per Bushel			$ 3.45	$ 3.13	$ 2.97
FIXED COSTS					
Housing Charge 8/			$ 70	$ 70	$ 70
Labor Charge	7 hrs.	$ 4.50 /hr.	32	32	32
Mach. & Equip. Charge			43	43	43
Land Charge			100	150	200
Management Charge	5% of Gross		74	109	144
TOTAL FIXED COSTS			$ 318	$ 403	$ 488
TOTAL COSTS - Per Acre			$ 1559	$ 2062	$ 2565
- Per Ton			$ 173	$ 156	$ 147
RETURN ABOVE VARIABLE COSTS/A			$ 235	$ 514	$ 793
RETURN ABOVE TOTAL COSTS/A			$ -83	$ 111	$ 305

Source: Ohio Cooperative Extension Service, 1986.

budget study of mechanical harvesting for cucumber production by Shapley is given in Table 3.4. The variable costs of growing pickles for mechanical harvest are similar to the costs of growing for hand harvest, although labor costs are substantially less. Much of this reduced cost is offset by significantly reduced yields and higher costs for planting and cultivation. Costs for mechanical harvesting can be altered if harvestors are rented rather than owned. This has not been included in the study.

Table 3.4 Partial budget change from hand harvested to mechanically harvested pickles.

ADVANTAGES		DISADVANTAGES	
Increased Returns		Increased Costs	
		Harvestor deprec.	$25.00
		Interest on harvestor	25.00
		Repairs & Maintenance	10.00
Decreased Costs		Fuel	10.00
Contract Labor	$756.00	Machinery Labor	20.00
Moving Boxes	20.25	Additional Seed	10.00
Housing	30.00	Herbicide	40.00
Irrigation labor	31.50		
		Decreased Returns	
		Differ. in gross returns	
		Michigan yield: 100 cwt.	
		30cwt #2 @ 8.00	$255.00
		70cwt #3 @ 5.00	350.00
Total Advantages	$837.75	Total Disadvantages	$ 745.00

Source: Shapley, 1986

Most subsector participants agree that well-managed producers in the past have been able to cover most if not all costs of production. Given adequate growing conditions

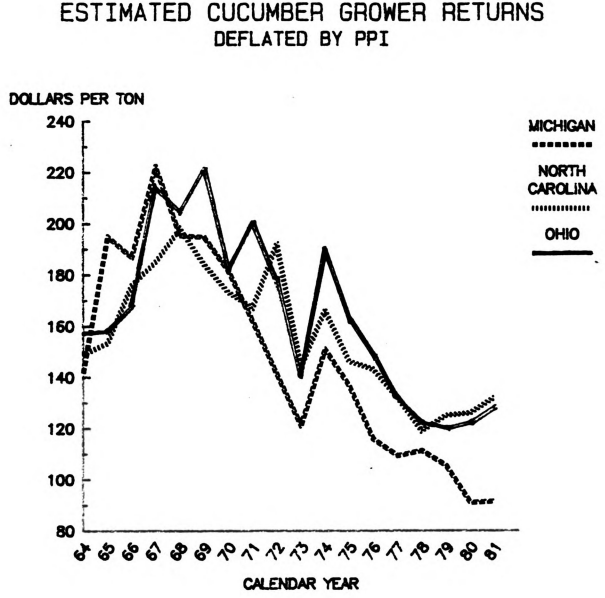
and average to better yields, profits can be realized at the grower level for both hand and mechanically harvested crops. Pickle growers have some control over their costs of production through improvements in cultural practices, in labor efficiency and in yields per acre.

Growers point to the declining profitability of processed cucumber production. The subsector has adjusted to a changing national agricultural climate over the past several years. As with other commodities, there is a general consensus among growers and processors that cucumber prices are no longer keeping pace with production costs.

Because annual costs of production estimates do not capture trends over time in production costs and grower returns, changes in profitablity can only be roughly approximated. One method to approximate changes in grower profitability for processing cucumbers is to calculate real returns per acre from year to year. Figure 3.3 graphs relative changes in profitability by dividing total annual value per ton of processing cucumbers by an agricultural index for prices paid by farmers for inputs.

The downward slope in real returns corroborates grower claims; the profitability of the enterprise has been declining. Whether returns have fallen below total costs of production is indeterminable. Most farmers interviewed did not know if their revenues were adequate to cover total costs, although most believed variable costs were covered.

Figure 3.3 Estimated Grower Profitability for Pickling Cucumbers by Major Producing Regions



Source: Vegetables. USDA, National Agricultural Statistics Service, 1964-1982.

Summary.

Evidence presented in this section so far indicates that total revenues are on average sufficient to cover variable costs of production and may cover total costs as well. Total revenues in real terms have been decreasing, suggesting a decline in profitability. This pattern coincides with a national trend of declining returns in agricultural sectors. If growers face greater uncertainty from future negative returns that raise the risk of carrying large specialized investments, then the adoption of technological and institutional improvements are likely to be inhibited.

3.3.3 Major Sources of Variability of Grower Returns

Grower revenues that cover costs of production over the long run are only one aspect of good coordination at the grower level. The amount of variability in grower returns also must be considered in determining long run stability at the producer-first handler level. Because instability filters through the vertical system, overall subsector performance is likely to be impaired if annual variations in production and prices are prevalent at the grower level.

A second area of concern is over how well current market structure and mechanisms of exchange encourage or inhibit production efficiency and stability at the farm level. Analysis here focuses on the role of institutional arrangements in building incentives towards desirable

production practices by stabilizing grower returns. The degree to which institutional arrangements are able to control instability is critical to the well-being of the subsector.

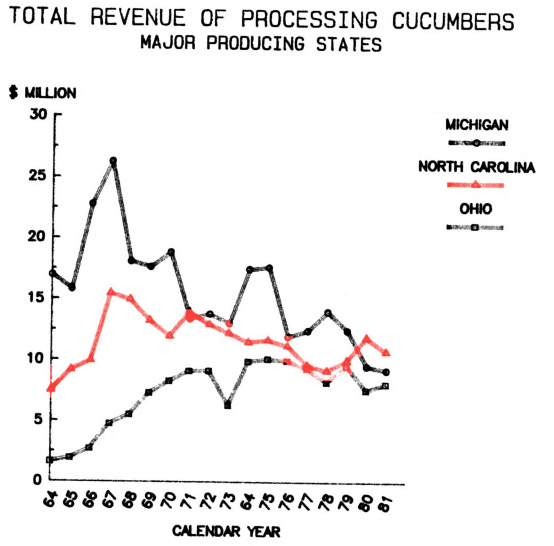
Variability in grower returns comes from four main sources: a) variability in yields; b) variability in acreage planted and harvested; c) variability in prices; and d) variability in production costs. A graphical illustration of variability in total revenue for major producing regions is given in Figure 3.4. As the graph indicates, variability in total revenues has been declining since the mid-seventies. The following sections explore the first three sources of variability to determine how each impacts grower returns.

A. Yield as a source of instability.

Grower returns are partially determined by annual variation in cucumber production. Production can be broken down into two components: variation in yields and variation in acres planted.

Variation in yield can have dramatic effects on grower profitability. While a producer recovering 500 bushels per acre of cucumbers can make a profit using hand labor, another harvesting half that amount will operate at a loss. When yields are highly variable both from year to year and from field to field, grower expertise is no guarantee of regular yields. Cucumbers are extremely sensitive to their

Figure 3.4 Grower Returns for Major Producing States Deflated by PPI



Source: Vegetables, USDA, National Agricultural Statistics Service, 1964-1982.

environment. Slight variations in temperature and rainfall can have radical effects on fruit quality and yield.

Figure 3.5 shows the 20 year trend in cucumber yields for Michigan, Ohio and North Carolina. As the graph indicates, yields have been rising slowly over the past two decades. Ohio has especially shown rapid improvements in yields.

Yield comparisons for pickling cucumbers need to be made with caution. Large differences in yields between regions may be accounted for by differences in production techniques. Hand harvesting results in almost double the yields of those obtained with machine harvest. The size at which cucumbers are picked also determine yield, which is recorded in weight units. While yields may be lower for some regions, the value of production can make up for differences if smaller sizes bring higher prices.

To capture the magnitude of variability in cucumber yields from year to year, a measure of instability developed by Ian Dalziell can be used.16 It calculates the variance of percentage changes between years, or the INS, using the following formula:

$$dY/Y = [(Yt - Yt\text{-}1)/(Yt - Yt\text{-}1)/2] * 100$$

where Y is the annual data type being measured, in this case yield. The measure is particularly useful because it exponentially detrends the data to discount constant annual

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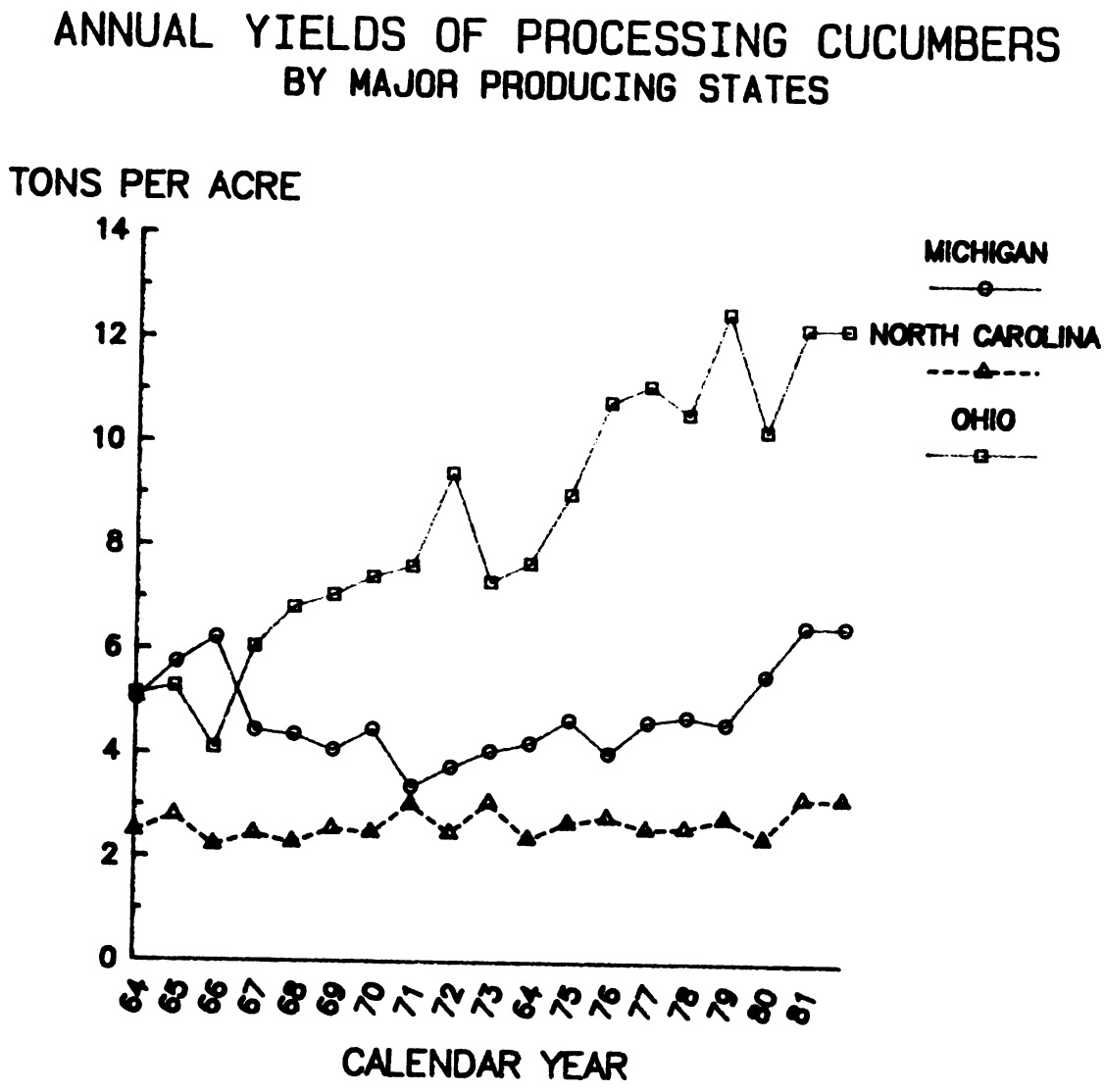
16 Dalziell, Ian, Sources of Agricultural Market Instability. Michigan State University, unpublished Ph.D dissertation, 1985.

Figure 3.5 Cucumber Yields for Major Producing States



Source: Vegetables, USDA, National Agricultural Statistics Service, 1964-1982.

percentage changes. The variation of dY/Y gives the INS index for yield per acre.

Similar indexes constructed for acres planted and total production variability are included in Table 3.5.

Table 3.5 Variability in Pickling Cucumber Production, Yield, Planted Acreage by Region, measured by INS.

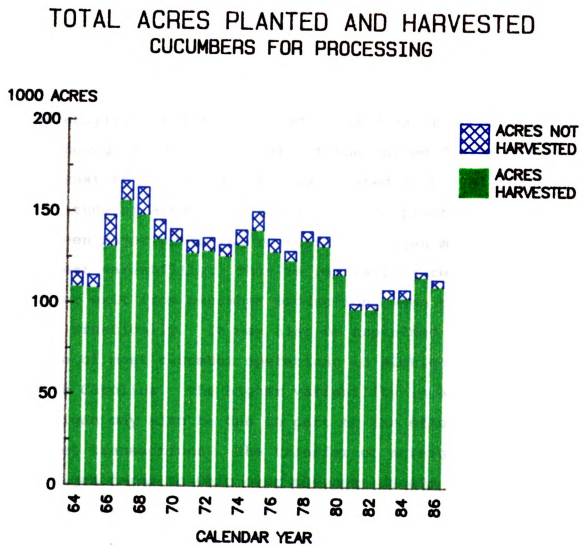
Region	Production	Yield	Acreage	Returns
Michigan	343	207	311	454
North Carolina	237	234	148	209
Ohio	216	266	147	417
United States	76	26	101	133

When broken down by state, the similarity between INS figures indicates that annual variability of yields is fairly consistent across all major producing areas. Total annual variability for all states combined is low. This significant decrease in variability, compared to individual state estimates is partially explained by the averaging effect that comes from aggregating data. The aggregated low variability also suggests that over time yield can be easily predicted.

B. Variability in Acres Planted and Acres Harvested.

A second source of variability in production involves annual changes in area planted and harvested. Figure 3.6 shows the national trend for acres planted compared to acres

Figure 3.6 Total Acres Planted and Harvested for Processing Cucumbers



Source: Vegetables, USDA, National Agricultural Statistics Service, 1964-1982.

harvested over the past 20 years. As the graph indicates, in recent years a high percentage of the crop planted is eventually harvested. This close relation exists when similar comparisons are made for major producing states. Over the past five years approximately 90 percent of total plantings have been harvested.

The graph also indicates that acres planted and harvested vary over time. Table 3.5 lists the INS measures of variability for acres planted in each major cucumber producing region and for all of the United States. In contrast to the variability associated with yield, the magnitude of annual changes in acreage planted differs between major producing regions. Michigan measures the highest variability. This is partially a result of 1974's grower exit from cucumber production, when planted acreage fell drastically. It may also be explained by the larger scale of most cucumber operations in Michigan compared to North Carolina. The higher variability in acres planted in Michigan may also be due in part to the effect of open market transactions. The transfer of acreage contracts from Michigan farms to Ohio over the past decade may also explain the higher annual variability.

The indexes of processed cucumber variability in Table 3.5 can be compared to variablility found in competing crops for cucumbers. INS indexes for corn, soybeans and navy beans are listed in Table 3.6. When compared to other annual crops, cucumbers for processing have lower

variability in yield but greater variability associated with changes in acreage planted. The competing crops all show a higher variability in yield than acres planted.

Table 3.6 Variability in production, yield and acres planted for cucumbers compared with those of major field crops in U.S., measured by INS.

Commodity	Production	Yield	Acres Planted	Cross Correlation
Cucumbers	76	26	101	9
Corn	132	108	41	-17
Soybeans	179	76	46	58
Navy beans	560	201	242	97

The cross correlation term measures the amount of interaction between variability in yield and acres planted. A high interaction would suggest that with high variation in yield producers have more difficulty in making appropriate decisions of how much acreage to plant. The low interaction term for cucumbers suggests that variation in yield does not account for the larger variation in acres planted.

The low interaction term for cucumbers may be a direct result of the institutional mechanisms used in determining annual acres to be planted. If the amount of acres planted is determined by the contracting processor who uses estimates of future demand and averaged yield estimates to set acreages, then annual yield would not be highly correlated with acreage planted. When broken down by state, interaction terms are also quite low, suggesting that little

correlation exists in any of the major producing areas.

The large amount of variability in acreage planted compared to variability in yields indicates that non-biological conditions cause much of the variability in production. As the previous section described, decisions on acres planted are made in most part by the processors through contracts with growers. Instability in acres planted could then be considered an outcome of processors' decisions for annual changes in contracted acreage. This phenomenon points to a possible coordination problem: although growers carry large investment costs and production risk, they have very little input into how changes in acreage allotments are distributed across contracts. The uncertainty associated with this is compounded if the brunt of changes in acreage fall on only a small share of growers.

C. Price Variability.

Pricing practices under contracting for processed vegetables are often credited for reducing large price fluctuations that would otherwise be associated with highly perishable commodities. The degree of annual price variability in the pickling cucumber subsector may be indicative of the stablility and orderliness of the market. Low variability is desirable for several reasons. While high variability may bring large returns to some market participants, these gains may be insufficient to compensate for the losses of others. In addition, large fluctuations

from season to season may indicate unnecessary instability where growers face unpredictable profit and loss situations. The degree to which prices are predictable helps to determine how well planning can be structured in the subsector. Growers will have a greater incentive to invest in improvements if prices and returns are predictable.

The desirable amount of variablity is difficult to determine because prices must be somewhat flexible to signal changes in market conditions for either supply or demand. A high measure of variability in annual prices could indicate excessive instablity at the subsector's grower level. The INS measure developed by Ian Dalziell as outlined in the previous section can be applied to measure the amount of price fluctuation from year to year. It calculates percentage changes in prices between years using the formula:

$$dP/P = [(Pt - Pt\text{-}1)/(Pt - Pt\text{-}1)/2] * 100$$

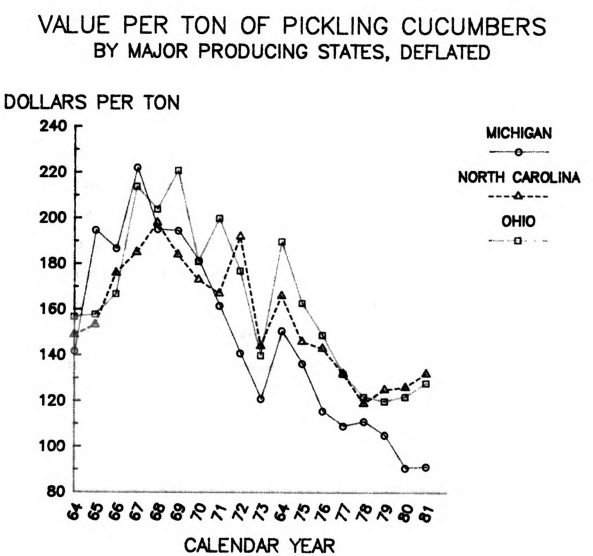
The variation of dP/P gives the INS index. Table 3.7 lists the INS values for the major cucumber producing regions and that for all of the United States. The price information used in these measures are average prices reported from the National Agricultural Statistics Service. Because they are gathered from processors on a voluntary basis and then averaged, they may not represent variation at the individual producer-processor level. To the extent that similar compilation techniques are used each year, they do, however, indicate directions of change in prices.

Table 3.7 INS Price Variability Estimates for 1965 to 1980 by Region.

Region	Cucumber Price	Corn Price	Soybean Price	Acreage Inter.
Michigan	180	--	--	.06
North Carolina	105	--	--	.28
Ohio	197	--	--	.11
United States	57	229	231	.19

Based on INS estimates, North Carolina has the least amount of year to year price variation of the three states studied, although none of the regions is seen to experience large variability in price. On a national scale, when compared to price variability of competing crops, cucumber prices show considerably less variability. Cucumbers for processing are the only crop listed that relies on contracts, although this can only partially explain differences in price stability. Contracting price mechanisms tend to act as price stabilizers by eliminating price variability associated with large gluts and shortages in supply. The consistent levels of price variation across regions also support the general conception that the subsector is closely integrated across regions. The largest processors procure in all of the areas measured and probably standardize their pricing practices. Figure 3.7 traces average prices, deflated by the Consumer Price Index for the

Figure 3.7 Value per Ton of Processing Cucumbers Deflated by CPI



Source: Vegetables, USDA, National Agricultural Statistics Service, 1964-1982.

largest producing areas. The graph indicates that, although prices vary over time, between regions they follow a similar pattern. The graph also suggests that a major reason for declining grower returns is the fall in real grower prices for cucumbers.

3.3.4 Processor Supply Management as a Source of Variability

In the previous sections several hypotheses were presented to explain sources of variability in production and price. This section summarizes attempts to substantiate these through regression analysis.

In section 3.3.3 variability in acres planted was assumed partially a function of processor inventory levels. To approximate the relation between the level of inventories and contracted acreage a linear regression model can be used. In the planning scheme for most firms, estimates of contracted acreage are made in the late Fall. These estimates are based in part on existing inventory at that time. Planted acreage for the spring of year t is hypothesized to be a function of inventory levels earlier that year. To remove the impact of decreases in acreage due to changes in consumer demand a trend variable is included as well. The model is defined as follows:

Acreage Planted = f(Inventory, Trend)

Data on inventory levels for end of year stock were available from the National Agricultural Statistical Service for the years 1968 to 1981. Inventory values are for both

salt stock and fresh pack. Although the number of observations are quite low for a regression analysis, the following fitted equation was obtained:

Acreage Planted = 283367 -.21Stock - 3219Trend

t values (3.91) (-1.8) (-3.24)

R-squared: .53

As was expected, acreage planted in year t is inversely related to changes in inventory levels reported at the end of the previous harvest season. All of the explanatory variables are significant at a 5 percent level. However, a low R-squared value and Durbin-Watson statistic indicate that other variables are needed to fully explain variation in acreage planted.

While the model suggests that acreage is altered to offset changes in inventory, it does not consider how price changes affect acreage planted. Some processors stated that contract prices are manipulated to encourage or discourage production. However, when added to the model, price proved a poor explanatory variable. Other attempts to measure a correlation between price and production showed no statistically significant relationship. This evidence suggests that processors adjust for changes in stocks by altering acreage planted rather than through manipulation of contract prices.

Summary

In this section an analysis of estimates of production costs and grower returns indicated that a well-managed grower firm could cover variable and might cover fixed costs of production. An analysis of per ton grower returns suggested that there has been a steady decline in profitability for processed cucumber production at the grower level. This coincides with a trend throughout most agricultural commodity sectors.

Consistent, positive grower returns are reduced if the amount of variablity in acreage planted, yield and price is quite high. Of the three sources of variability, only the variability associated with acreage planted seems excessive when compared to other crops. Because decisions on acreage plantings are largely dictated by processors, they are most able to control this source of production variability. Some variability in acreage plantings in year t will be a result of variability in yields if yields are above or below what processors projected, or variability may be a result of unforeseen shifts in demand. If, however, variability is introduced from inappropriate supply management techniques of processing firms that allow the buildup or depletion of inventories over several years, then the coordination system is in need of improvement. Where there is potential for mechanisms to be developed to reduce this source of instability, overall coordination at the grower-first handler level could be improved.

3.4 THE PRICE FORMATION PROCESS AND MARKET TRANSPARENCY AT THE GROWER-FIRST HANDLER LEVEL

The previous section focused on grower returns and costs of production to determine if, given existing price and cost structures, growers were able to operate at a profit for a well managed firm on average. Price patterns were analyzed and resulted in two general observations. First, a measurement of price variability indicated that annual contracted prices in major producing states do not fluctuate radically, but seem fairly stable over time. Second, the analysis showed that prices have been declining in real terms in recent years from a high in the early seventies.

The process through which prices are formed at different market stages has not been analyzed, nor has the influence of pricing practices on market participants' decision making been considered. This section describes the price formation process at the first handler level for processors and producers. It then considers the impact of the existing pricing system on market performance. Particularly, the way in which grower price expectations are formed and how these influence their production decisions will be analyzed. The flow of market information will be analyzed as it shapes grower decisions.

The criterion set for this study regarding the price formation process is that prices should be a reflection of prevailing conditions of supply and demand and should be discovered by participants in an efficient and equitable

way. The basic premise behind this criterion is that market transactions need to be transparent, that is, the information associated with them needs to be made accessible to all groups who can use that information to make decisions. The pricing mechanism's primary purpose is to assemble accurate market information and to offer incentives for an efficient allocation of resources. Integral to a well-performing pricing system is a well-operating network for market information. The key question is how well prices generated communicate information to market participants. Prices may reflect aggregate conditions of supply and demand or they may be a reflection of relative bargaining power. Market participants should have information readily available during the price formation process. The timeliness of information is crucial. If made available, there is a greater likelihood that prices generated will reflect market conditions.

3.4.1 Processor Price Formation.

Prices at the first handler level should reflect changes in demand and desired changes in supply to meet demand at any given time to fill its theoretical function as a signal to market participants. In heavily contracted industries price cannot be assumed to automatically respond to changing market conditions. Instead prices reflect preferences of market participants for future demand and supply. In the pickling cucumber industry contract prices are set by the

processor well before the start of production. Because these prices do not adjust automatically to current market conditions, they tend to be 'sticky'. Adjustments upwards and downwards are less than what would be found under a market exchange, and often involve lags. Evidence of this trend is seen in product price adjustments in the mid-seventies. A sharp rise in price in 1974 was a direct response to processors' attempts to curb grower exits from the processed cucumber market. Yet, annual price adjustments after 1974 were small in comparison to price changes in many other agricultural commodities. Although it may be argued that sticky price adjustments cause market inefficiency, the low price variability found in the processed cucumber subsector suggests that less price flexibility can add stability and predictability to market transactions.

Little is known of the process by which contract prices are formulated within the industry, although several factors can be postulated as influencing price formation by processors. Given the structural concentration of major buyers in most growing areas, price leadership practices are a likely means of determining price. Under oligopsonist conditions, as are found with large pickle processors, prices offered by leading firms act as a guide to others in the industry. Key informants at the processor level have substantiated this hypothesis. Most processors operating in a given area discover through informal information channels

the prices offered by competing firms early in the contracting process. These prices are incorporated into their contract provisions and offered to the producer.

A second factor considered in forming contract prices is changes in cucumber production costs. At the end of each harvest season some processing companies calculate costs of production for their growers and make cost estimates for the following season. These estimates incorporate updated information on yields and input costs. Costs associated with mechanical harvesting are estimated seperately from those for hand harvesting. Processors also stated that production costs in competing crops influence cucumber pricing. Several industry contacts cited price movements in the corn and soybean markets as guides when determining cucumber prices. In 1974 prices for pickling cucumbers rose sharply as growers bargained for returns that would compare with those in grain markets.

A third factor influencing contract prices is processor demand expectations for specific cucumber sizes. A company will manipulate price differences between grades to encourage increased production of one size over another. To the extent that individual firms have different size requirements, price movements will not be uniform across firms.

Finally, firms set contract prices in light of other terms included in the contract. The costs of seeds and herbicides required by the company, the specifications for

quality and size and annual bonuses offered all influence contract price levels offered.

Pricing practices are not uniform across firms. Comparisons between contracts showed significant differences in prices offered within a given season. In addition, pricing policies over time also vary by processor. One Michigan grower contracting with a major processor was offered a price increase only once over a five year period, and this was an increase of only 5% for the top three grades included in the contract. Another processor increased or decreased prices for all grades by as much as 30% between consecutive years for the same time period.

There are several explanations for the existence of large price differences between firms. First, if only one firm is operating in a particular geographic area, then that firm is not necessarily obliged to offer prices comparable to its major competitors. Interviews with processors revealed that most firms concentrate contracting in specific geographical regions. These areas may overlap but usually there are only a few firms operating at any given time. The declining number of plants contracting in Michigan and improvements in transportation and post harvest handling have led to a greater meshing of growing regions for processors. Second, most contract information is considered propietary so that contract terms offered by different firms are not available to the public. A number of processors reported having difficulty discovering contract prices

offered by competing firms, because informal exchanges of information between processors and information gathered from growers are the main means of transmitting price information at the first handler level. Third, prices differ because contracts in the pickle industry are not standardized. Although most include similar terms, price and other terms are not easily compared.

In summary, price formation at the processor level remains somewhat a mystery. A more thorough sampling of contract prices by grades over time and geographic area would shed considerable light on the process.
The evidence presented in this paper suggests that processors adjust prices to perceived changes in market conditions, but that this process involves lags and leads to sticky prices at the producer level. Yet, it is this tendency towards sticky prices and adjustment lags that works to reduce price variability and leads to greater stability in the subsector. Processors maintain enough flexibility in the system to adjust to changing market conditions and cost structures.

3.4.2 Grower Price Expectations and Production Decisions

As our analysis of contracting in chapter three highlighted, the price component is only one means of coordinating supply with demand at the grower level. Non-price considerations also strongly determine grower production decisions. How growers use price information and

other market information to form expectations of changing market conditions is important for coordinating supply channels of raw product.

The most notable characteristic of the process for identifying expected prices of alternative crops and offers of potential buyers is the degree of information impactedness related to market prices. Of the growers interviewed for this study almost all named the company fieldman as their primary source of information on changing market conditions and price. Other sources of price information came from the previous year's contract prices, changes in other commodity prices and information from other growers who contract with competing companies. As with processors, informal exchanges of information between growers is widespread and this remains the primary channel for growers to compare contract prices and terms. This practice is problematic because information is usually unevenly distributed, incomplete, localized and often not timely.

When asked what factors other than price were considered in making production decisions, the growers interviewed named changes in costs of production, changes in prices of alternative crops, overall farm operations and relations with the pickle contractor as major considerations. The acreage offered by the contractor most often determined how much would be planted, since few farmers plant more than that specified on their contracts.

A few farmers will plant extra in hopes that processors will take this as well, or that it can be sold on the open market.

The growers interviewed in Michigan said they have on average only one or two firms with which to contract in a given area. Because many processors maintain a standard practice of discouraging or denying multi-firm contracting by growers, competition at the grower level is considerably reduced. Processors are interested in renewing contracts with good growers over a number of years. Growers, carrying large specialized investment costs, are reluctant to jeopardize this relationship. For this reason, price competition can only be of limited importance in shaping grower production decisions.

Summary.

In pickle processing markets where products are exchanged through contracts, price is usually set well before the actual physical delivery of goods. These prices are not based on current market conditions, but largely determined by the price formation process of major processors contracting with growers.

Market transactions at both the grower-first handler and processor-wholesaler level are rarely made public. Both processors and wholesalers consider this information proprietary and, if reported, threatening to their market position. The lack of accessibility to accurate and timely

market information for growers exacerbates grower dependence on contractors. The potential for abuse exists if processing firms, acting in self-interest, withhold or distort market information. The lack of market transparency in the subsector is likely to have adverse affects on subsector coordination, where it leads to inappropriate decisions being made by market participants.

If the existing price mechanism is inefficient in allocating resources for production, policies are needed which can work to improve it. In this section it was argued that improved information flows are needed to better coordinate decision making. How to institute a pricing mechanism that places incentives for firms to divulge relevant information is a key policy issue. Alternatives will be explored in section 3.6.

3.5 THE DISTRIBUTION OF RISK: CONTRACTS, MECHANIZATION AND THE LABOR ISSUE

Previous sections of this study have summarized the market structure and contracting process by which raw product is exchanged between growers and major processors. In this section issues related to the sharing of risk between market participants will be analyzed. Our criterion for evaluating the distribution of risk will be that it be placed with those who are most able to control it and who reap the benefits associated with it. Two issues related to risk will be explored in this section. First, the role of

contracts in distributing risk at the producer level will be analyzed. The dynamics of risk redistribution will then be examined as it is currently being handled in settling the recent migrant labor dispute.

3.5.1 Contracts and the Sharing of Risk.

Contracts reduce uncertainties for both buyers and sellers by providing a means of articulating preferences to each party regarding production and marketing decisions. Because both groups have incentives to obtain the most accurate and up to date information, it is in their interest to enhance mutual exchange. When each party has large investments representing costs over a multi-year period, they seek protective contractual arrangements that increase the certainty of long-term markets. For this reason the actual terms of contracts can be seen as balances between the needs of each party and the relative influence each has in shifting risk to the other.

Because contracts involve bilateral exchange relationships, the relative power of each party can greatly impact the distribution of benefits resulting from the contract terms. In the pickle industry, where the buyer market is highly concentrated, producers face the uncertainty of contractors acting opportunistically by shifting the risk of investment to the producer through a gradual deterioration in terms.

Producers face large investment costs that must be

recovered over a period of years. These include specialized equipment such as planters and harvestors. Before producers are willing to make these investments, they must be assured of long term market outlets for their produce and prices that can cover both variable and specialized fixed production costs. Contracts in the cucumber subsector are binding for only one production period and no formal assurance of renewal is given to producers. Because alternative market outlets are not available to producers, they are vulnerable, once investments are made, to the companies who provide future contracts. These companies then have the potential to pass on to the producer prices that do not cover those costs representing specialized long term investments.

The processors face constraints, however, in achieving extensive deterioration in terms. Because quality cucumber production involves a considerable grower expertise, it is in the processors' interest to keep better growers in the business. There is also some competition among processors to contract with the most productive growers so that a deterioration in one firm's terms may result in a grower switching to another contractor. If quality of product requires large investments in either mechanical harvestors or improved migrant labor facilities, the company must convince the grower that these investment costs can be recovered through adequate prices. A company's reputation among growers is a large determinant of the producer's

perceptions and decisions. Processors need to provide contract terms that are competitive with other commodities. These are not necessarily interpreted to mean higher prices but may take alternative forms.

Management of Risk at the Grower Level

In the processed cucumber subsector producers carry a large share of the risk involved in the growing and harvesting of raw product. However, because of the processor's need to guaranteee that the right type and quality of cucumber is grown and harvested to meet plant needs, there is a close interaction between the grower and fieldman that, while not eliminating the burden of risk associated with adverse weather and disease factors, can considerably reduce its magnitude by providing valuable information on production inputs and cultivation techniques.

As specified in contract terms, growers are often required to use company-tested and approved seed varieties for all contracted acreage. This seed is provided to the producer for purchase and often delivered by company fieldmen shortly before the planting season. Processing companies bear the costs of researching and developing high quality and high yielding varieties. They at times specify restrictions on types of herbicides, pesticides and fertilizers that can be used. While often not spelled out in the actual contracts, fieldmen closely monitor the timing of applications. Fieldmen also survey the quality of

the developing vine to predict future yields for coordinating future supply needs. They provide information on weeding and set harvesting schedules for producers.

Processors carry nearly all of the price risk during the production period. They in turn reap benefits in years of short supply where, in the absence of contracts, prices would rise above those agreed upon. Likewise, they bear the costs from locked in prices when excess supply would otherwise push prices to lower levels. Producers carry only up-side risk, where they lose potential high earnings during years of short supply.

Few processors, however, accept responsibility for crop failures, whether the cause originates from adverse weather conditions or from poor inputs or cultural practices. While companies set the seed varieties to be planted, they do not accept responsibility for poor seed quality. Most contracts also specify that any crop failure brought by adverse weather conditions is the sole responsibility of the grower. While exceptions have been made, as a standard practice, processors avoid this risk.

Risk associated with harvesting is also carried by the producer who is usually responsible for picking and transporting the raw product to receiving stations for grading. Delays at the grading station that result in raw product deterioration are the responsibility of the grower, even if the delay is caused by the processor.

In some areas producers carry the risk of insecure

market outlets. Receiving stations may reject delivered raw product exceeding that contracted, or may break contracts when handling capacity is reached. Because the burden of proof rests with the growers, they have little legal recourse for contesting these practices.

Contracting processors face risk related to contract breakage on the part of growers. This is particularly a problem in North Carolina where monitoring individual growers is a costly endeavor. Processors can insulate themselves against this risk by over-contracting acreage. The consequence would be supply gluts at receiving stations or unharvested crops that have no market for sale. While this was reported as a problem in the past, in recent years the processors have moved away from over-contracting practices.

Delayed payment has historically been a problem in the pickle subsector. Processors usually set the payment schedule for produce. In North Carolina, it was reported that these schedules are often not adhered to so that producers may wait months for payment. Before bonding became mandatory, producers at times were not paid at all.

While forward contractual arrangements can reduce uncertainty associated with price instability, and over and under supply in a given growing season, they do not eliminate the uncertainty associated with future demand and supply conditions. The decision for contract renewal is made by the processor who has the power to deny market

outlet to any grower at any time. In a close-knit industry like that for pickles, information on individual growers travels quickly so that some find it difficult to get contracts with competing processing firms. On the other hand processors who establish poor reputations in grower relations risk the loss of quality growers who elect to produce alternative crops or seek out other processing firms. In situations where transactions are repeated between the same parties, cooperation is likely to emerge as each party pursues their own self-interest. The degree to which cooperation is established depends on how each party perceives the likelihood of reciprocity.17

In summary, processors define the conditions under which contracts will be renewed, but their influence is checked by the threat of reciprocity in future years in the form of grower exits. The lack of available means by which producers can articulate needs or negotiate on improved conditions may inhibit increased scale or specialization that could lead to improved coordination and subsector performance. The present system may discourage the most efficient producers who will choose alternative commodities to produce. However, the need of processors to maintain high quality standards acts to reduce opportunism and enhance cooperative behavior. With nearly half a century's experience in contracting supply, many of the problems

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17 This concept is expanded further along a game theory approach in Robert Axelrod, The Evolution of Cooperation, New York: Basic Books, Inc., 1984.

initially experienced by growers and contractors have been worked through.

3.5.2 Labor Unionization and Collective Bargaining

One of the greatest concerns facing the pickle industry today is the uncertainty of a stable labor supply for production. As the analysis of cost of production studies indicated, labor constitutes the single largest cost to growers. The recent changes in immigration laws have jeopardized many fruit and vegetable growers' access to seasonal labor in Michigan. The processed cucumber subsector has had these uncertainties compounded by the recent formation and formal recognition of unionized labor in Ohio and Michigan. The changes made in the coordination process provide an interesting case study of how the relative distribution of power between contracting parties in the negotiation process strongly shape the distribution of risks and benefits.

Origins of Collective Bargaining for Laborers and Growers

The responsibility for harvesting labor was at one time with the pickle processors. A number of processors leased land and handled a significant share of production internally. As negative publicity on migrant labor living conditions heightened, processors in the Michigan area moved to contracting for production. Under the contracting system all labor responsibilities were left to the growers. This

reversal of vertical integration to reliance on exchange left growers responsible for all labor recruitment and payment, record keeping, housing and management.

The labor situation has remained controversial throughout the past decade. Pressures for change, however, have intensified in the last several years due to the formation of an organized farm labor union. The farm labor union is an outgrowth of concerted interests to develop a forum through which to negotiate farm labor issues. A summary of recent developments is provided next.

The Farm Labor Organizing Committee (FLOC), representing the interests of farm laborers in the processed tomatoe and pickle industries in Ohio and Southeastern Michigan, reached agreements with the Campbell Soup Company and its subsidiary, Vlasic Foods, Inc. in 1986, and H.J. Heinz Company in 1987. These agreements guaranteed recognition of FLOC as sole and exclusive bargaining agent for all independent contractors and employees who wish to be represented by FLOC.18 The agreement was negotiated under the guidance of the Dunlop Commission, a privately created, nongovernmental commission that has regulatory authority over tomato and pickle growers contracted to Campbell and Heinz, and farm workers employed by those growers.

Under the guidelines of the agreements growers for both companies are to form voluntary associations through which

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18 As stated in the Agreement between FLOC and Vlasic Foods, Inc. February 18,1986.

to engage in collective bargaining with FLOC-organized farm workers.

HIGHLIGHTS OF THE AGREEMENTS

1) Under the agreements all cucumber growers affiliated with the Fremont Pickle and Tomatoe Growers Association recognize FLOC as the sole and exclusive bargaining agent for all independent contractors working in the growers' cucumber operations.

2) Guidelines for growers to pay incentive compensation to independent contractors for above average value harvest were set by the Agreement. Each independent contractor will receive a base compensation of 50 percent of the gross value of his or her cucumber crop and, in addition, will receive additional percentages of gross profit for highly productive acreage yields.19

3) Study Committees will be established to study and adopt procedures and policies relating to pesticide safety, housing conditions and day-care facilities, and alternatives for the replacement of the independent contractor system.

4) Guidelines for grievance resolution between grower and independent contractor were set.

5) Independent contractors will not strike or cause work stoppages, and no grower may lock out any idependent contractor.

6) All independent contractors will have 2 1/2% deducted from their compensation and paid bi-weekly to FLOC.

The Agreement constitutes a unique development in grower- processor relations. Vlassic, pressured by a FLOC-backed boycott, encouraged their contracting producers to

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19 In the pickle industry growers negotiate labor supply through independent contracting where payment to pickers is done on a profit sharing basis, most often a 50-50 split of total revenues from the crop's sale.

form grower associations through which to negotiate labor improvements.

The 1987 pickle harvest represented the first year under the guidance of the three-party agreements. Although the likely impact of the agreements on parties involved is difficult to foresee, several implications are worth discussion.

The independent contractors represented by FLOC have achieved several potential gains. Most notably, the bargaining group is formally recognized by the cooperating processors and grower associations. In addition, the agreement sets guidelines for contractor payment and opens forums through which to discuss improved working conditions. The agreement is restrictive to independent laborers because all working arrangements previously handled directly with individual growers must now pass through the auspices of FLOC.

The growers also may gain from the agreement. Where before no organized representative body of growers existed, associations whose primary responsibility is to negotiate with contractors and processors, may now provide a means of extending grower interests. Unlike most efforts to organize, these farmers have received the support and encouragement of processors to form collective bargaining units. It is through this forum that growers will negotiate for higher prices and improved terms of contracts as they pertain to labor demands. To the extent that growers are

unable to increase produce prices enough to compensate for increased costs from labor, the agreement may constitute potential for loss in growers' position.

The outcome for processors is the most difficult to predict. Although processors have shed the negative publicity associated with the labor dispute, they have opened themselves to added costs in product procurement. In addition, they have condoned the formation of two separate collective bargaining units, each of which looks to these firms for improved financial support. Processors will have less flexibility in contracting with growers and a greater chance of contracting issues being made public, including pricing and other terms of contract.

3.5.3 Implications for Coordination in the Cucumber Subsector

Several potential outcomes of the agreement could seriously jeopardize the standing of subsector participants and have adverse effects on the overall performance of the system's operation.

1) Grower Returns. Under the guidelines of the agreement, growers retain responsibility for negotiating improved labor conditions. The cost of improvements, however, is intended to be borne in large part by the processor who agrees to adjust procurement prices in line with increased grower labor costs for production. Although

all parties have agreed to work towards improved labor conditions, the criterion for deciding how much of the burden is to be carried by processors is left to the negotiation process. Under existing arrangements these negotiations are worked out by representatives for growers, processors, FLOC and the Dunlop Commission. However, after 1989, the Commission will no longer monitor the negotiation process.

Members of the grower association, which includes only a small share of the state's growers, face considerable obstacles in obtaining improved procurement prices. Processors, faced with shrinking margins and alternative production areas, have little incentive to raise prices for these producers. If labor succeeds in achieving their goals in ways that raise grower costs of production, growers stand to have their already tight profit margins squeezed even tighter.

2) Increased Mechanization for Harvesting.

Growers have two strong incentives to move towards greater reliance on mechanical harvesting. First, efforts by the Department of Labor to outlaw independent contracting and make mandatory hourly wages for migrant labor, pose a serious threat to the grower's profitability. Under existing practices labor costs are tied to grower returns since labor is paid as a percentage of total cucumber sales revenue. With an hourly wage for labor, farmers will carry

the added uncertainty of total costs of labor rising well above grower returns. Where previously it was in the interest of both growers and pickers to maximize cucumber revenues, under wage rates, contracted labor will no longer have a strong incentive to harvest cucumbers in ways that are the most profitable. Price differentials between grades will have less influence over the size of pickle harvested.

Growers also face greater uncertainty related to securing adequate labor supplies for their field work. Recent restrictions placed on the employing of illegal aliens have reduced the flow of migrants to Michigan, so that machine harvesting has become less risky in relation to hand harvesting. Because many hand harvested farms relied on labor for other crops as well, the high investment costs of cucumber machine harvestors may force these growers to produce alternative crops.

Increased reliance on mechanical harvesting requires elimination of certain obstacles. First, before mechanical harvesting can become widespread, machines must be marketed that can harvest the smallest grades of cucumbers, those presently only retrievable with hand picking. Although the technological know-how exists, financial for marketing the machine has not been forthcoming. Much of the research has been funded by individual processors who do not currently have incentives to commit financial resources to harvestor technology or to share this technology with others in the industry. Second, producers must be able to cover through

adequate returns, the large investment costs of these state of the art harvestors. Under current institutional arrangements, growers cannot guarantee these returns.

These obstacles could be removed if processors were willing to carry a greater share of the risk associated with labor. Added provisions in the contract terms could distribute the risk of high labor costs or shortages of labor between the grower and processor.

The expansion of grower associations to manage shared harvestors could also reduce the risk of these large investments. Company-financed harvestors is another alternative for reducing investment risk on the part of producers.

3) Subsector-wide Adjustment. Although agreements between the two largest processors of pickles have been reached with area growers, other smaller firms have yet to negotiate FLOC agreements. The lack of a market-wide agreement in the Michigan and Ohio regions is likely to severely limit FLOC's ability to negotiate improved labor conditions with participating processors. In addition, because similar labor constraints do not exist in other major producing regions, these areas are likely to become more attractive to processors. North and South Carolina are the most plausible candidates for expanding production, but other areas with processing facilities could be developed as well.

3.6 ALTERNATIVE COORDINATION MECHANISMS FOR THE PROCESSED CUCUMBER SUBSECTOR

In the previous chapters a description and analysis of the cucumber subsector was developed. Several projections were made of sources of poor performance. Most important were the equity implications for uneven access to market information and market power. This was shown to be partly a consequence of as well as cause of the structural characteristics of the market. Market information was found to be largely under the control of large processors who have considerable influence over terms of exchange with producers. In markets where sellers are atomistic and buyers oligopsonistic, as many would argue in the processed cucumber market, price determination is not an impersonal process, but is open to manipulation. Where production and marketing decisions are made with impacted market information that result in inappropriate allocation of resources, systemic changes need to be introduced.

A second important consideration is the effect of asset specificity on contractual exchange relationships. As described in the last chapter, parties who make specialized investments are "locked in" to certain production decisions. Moving out of one commodity to produce another involves high costs. Physical investments are not the only immobile resource. Production expertise developed over years of experience constitutes a major investment, and when coupled

with a shortage of accurate information, leaves producers in a weaker market position. Due to the unequal distribution of power between producers and processors, contracts are not able to guarantee the protection of each party's rights over a period greater than one year. Highly specific assets and annual contracts at least create the possibility for unilaterally redistributing part of the value of the assets and any rent in favor of the processor. To the extent that this interferes with achieving improvements in performance, institutional innovations are called for that can increase these aspects of performance. The following sections review three potential marketing alternatives at the grower-first handler level.

3.6.1 Market Reporting Service.

The Federal Government has for years reported price and production information for many commodity markets. For fresh vegetable and fruit markets, these systems are still in place. However, most processing vegetables have been excluded from market reporting services, especially for commodities of lesser economic significance and where prices are determined through private contracting systems.

The National Agricultural Statistics Service publishes limited information for public use on processed cucumbers. Projections of planted acreage and summaries of production, yield and price are provided annually. The prices reported are averages of the different grades and prices across

processors. Information is compiled from processors on a voluntary and confidential basis.

Large processors generate their own information systems which are usually well-developed and proprietary. These are often not available to smaller processors and producers. Individual growers have the most difficulty gaining access to accurate and timely market information.

Existing contract reporting systems for processed vegetable commodities are mostly provided by large grower associations which report on contract prices and terms for their membership. A 1981 study of the potential for contract price reporting for fruits and vegetables was one of a very few studies to consider the feasibility of a AMS Federal-State market news program for selected vegetable commodities.20 Cucumbers for processing was found to be a serious candidate for reporting based on several structural characteristics: 1)the lack of alternative market outlets for growers; 2)the absence of grower bargaining associations; and 3) the existence of several major production areas across the country.

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20. Armbruster, W. and Helmuth, J., "Contract Price Reporting for Fruits and Vegetables" April, 1981. Agricultural Marketing Service, USDA.

Feasibility of a Market Reporting Service

Price reporting in the cucumber subsector faces several formidable obstacles. Without statutory authority making reporting mandatory, accurate and dependable market information depends on widespread voluntary cooperation from processors and growers. Yet in an industry where the predominant share of processing is done by a very few firms, price and contract information constitutes a threat to each firm's relative market advantage. Large processors who control a major share of contracted acreage, may not willingly provide accurate and timely information, so that data gathered would carry little significance. Because market information is a source of bargaining power for both retail buyers and growers, processors have a strong incentive to withhold it.

The alternative of reliance on growers who are not already organized to compile information could be a costly endeavor. However, the results of a pilot market reporting project conducted by the University of Wisconsin on processed vegetable markets showed that grower-financed market reporting could be done cheaply and timely, and that growers for these commodities would be willing to bear the costs of such a program.21 A voluntary reporting network was also set up for processors, although the program was supported by a state law requiring mandatory compliance from

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21 Campbell, Gerald, "The Wisconsin Processed Vegetable Contract Market News Project: Evaluation Report", University of Wisconsin, Madison, Staff Paper No. 226, 1984.

companies.

Contract reporting also must contend with the variability in contract terms between companies and regions. Contract information of most concern to cucumber growers is often specific to a given region or company. Because growers often exchange this information through informal channels, many may not appreciate the added cost of a reporting service.

While a federally funded market news service for the processed cucumber subsector would greatly increase market transparency, the prospects for its development are quite slim. Federal funding cuts for market reporting have already slashed existing programs, and have virtually eliminated the adoption of new services.

3.6.2 Collective Bargaining.

The cucumber industry was found to have neither highly variable nor unpredictable prices and yields. Instead growers suffered from deteriorating terms of trade in relation to their costs of production, and variable returns from annual fluctuations in acreages planted. The retail market for pickles seldom experiences significant demand shocks, so that prices are stable over time. Further, short run supply shocks are not common and do not appear to affect the price on contracted acreage. What is needed in the subsector is a mechanism through which growers can gain countervailing power and a means to articulate their needs.

Collective bargaining efforts have the potential to improve equity imbalances between grower and processor in several ways. By joining together to negotiate terms, individual producers would be able to increase their bargaining strength against buyers. Buyers no longer could play one producer off against another by implicit threats of contract termination. Collective bargaining associations would also provide a means to reduce costs associated with the acquisition and dissemination of valuable market information. If both parties are provided with accurate information, terms of exchange are more likely to be based on conditions of demand and supply. Bargaining associations allow members to reduce uncertainty by jointly acquiring information and implementing a more sophisticated means of interpreting it. By increasing the frequency of its use, collective action can capture the benefits of economies of scale that greatly reduce individual cost burdens. In addition, both parties have an additional avenue through which to articulate preferences that can result in increased coordination in controlling the flow of product to market.

Inpediments to Collective Bargaining for Cucumber Growers.

Grower efforts to organize collectively in Michigan have largely been unsuccessful. In 1972 and 1973 a number of cucumber growers took steps towards forming a bargaining group through the auspices of Michigan Agricultural Cooperative Marketing Association (MACMA). The effort

failed largely because of grower apathy and an unwillingness to act collectively. In 1972, there was a larger number of processing firms, each of which required individually negotiated contracts. The fragmented buying market and lack of standardization in contract terms made the idea of a single bargaining association unpopular. The inability of growers to arrive at a means of funding the association brought the movement to a standstill.

A number of the growers interviewed for this study expressed interest in forming a collective bargaining unit for cucumbers. These farmers rely on cucumbers as a major source of farm income. Because the number of processors in Michigan and Ohio has declined, a bargaining association may be more feasibly organized. The formation of grower associations under FLOC agreements has further increased the potential for collective bargaining. At present these associations exist only for resolving labor disputes but could be expanded to negotiate other grower concerns as well. Most growers interviewed, however, felt the formation of bargaining associations highly unlikely. They cited as major obstacles strong grower attitudes against collective action, the fear among most growers of jeopardizing relations with processors that could eventually lead to contract cancellation, and the decentralization of processors that would fragment group interests.

The fear of contract cancellation seemed the greatest barrier, since most processors would have little difficulty

finding new growers with whom to contract. In recent years when many commodities show little promise for covering costs of production, the security of processed vegetable contracts remains attractive. Without a high share of growers participating in bargaining associations, the threat of supply being withheld by growers would carry little weight with processors. Successful collective bargaining depends upon producers incorporating a large enough share of production so that alternative market outlets are not available to buyers. A free rider problem, where some growers achieve benefits of collective bargaining without incurring the costs, could also undermine collective efforts. In Michigan where contracts are standardized within one company and similar terms offered across companies, negotiated improvements from a bargaining association would likely benefit all growers. Each grower, then, would have an incentive to not join.

When asked if a bargaining association could improve coordination in the cucumber subsector, processors were unanimously pessimistic. They opposed collective action for several reasons. Foremost was the feeling that interference in the grower-fieldman relationship would reduce marketing efficiency through delays and unnecessary restrictions. They argued that bargaining would bring added expense to both growers and processors with little hope for overall improvement. Processors pointed to declining profits in the industry as a whole as a major barrier to grower

improvements. They argued that increased competition at the retail level has kept industry profits low and competion at the grower level has already pushed contract terms to the limit of what can be offered. Increased procurement costs could also cause processors to focus on alternative growing and processing regions where collective bargaining has not yet developed or where production costs are lower.

Growers claimed that processors do exert coercive pressure to prevent producers from organizing collectively. Growers perceive an implicit threat of contract termination for those who are active in promoting collective bargaining. An incident in Michigan in the early seventies involving a group of growers collectively boycotting a major processor, ended with all the growers losing their contracts and the processor discontinuing all contracting in the area. Although such actions are illegal under the Agricultural Fair Practices Act of 1967, the burden of proof lies with the grower. The high costs and difficulty in establishing proof have undermined the law's effectiveness. Many growers support stronger legislation to protect producers from unfair practices. An attempt in 1981 to introduce more stringent restrictions on processors was shot down by Congress. The Michigan statute, P.A. 344, calling for exclusive agency bargaining status and provisions to protect and support growers rights to organize, represents one attempt to improve grower positions. Although the provisions for exclusive agency bargaining were found

unconstitutional, other provisions including protection from discrimination remain in effect.

3.6.3 Marketing Orders.

Marketing orders are a means for producers to target problems and coordinate solutions with minimum expense carried by the government. Supply control management mechanisms in marketing orders have the potential to alleviate gluts and shortages in the subsector and to help smooth prices from month to month and year to year. Because the processed cucumber subsector is not plagued with problems of overproduction, a supply control program would most likely be geared towards managing inventories. Inventory costs are currently being handled by processors. The introduction of a marketing order could place more of the cost on growers where it might not be best managed. It could, however, give growers a voice in how inventories should be managed and a means to monitor those inventories. Because cucumbers are an annual rather than perennial crop, there is less expense involved in changing production output from year to year so that a supply program may not be profitable.

A more likely use for a marketing order would be to monitor minimum quality standards at the producer level. Such provisions would standardize grades for all firms. In the processed cucumber sector, though, variation in grading across firms is not extensive, and when significant, is

largely due to packing constraints of the processor. Federal grading standards for pickles are currently being revised to more closely meet industry needs. Improvements from a more standardized grading system may not compensate for the added expense of a marketing order of this type.

The market facilitating provisions included in most marketing orders set guidelines for funding promotion and research and may be beneficial to the pickle industry. Currently the Pickle Packers International is responsible for promotion and research directives. PPI has not adequately dealt with industry needs for harvest technology. Instead research has been conducted by individual processing companies so that access to technological advances is controlled. Since it is in the producers' interest to develop an affordable and efficient harvestor, a marketing order would be one means for growers to have more direct influence over its development and distribution.

In the absence of mandatory reporting of sales and prices, marketing orders could also assemble and disseminate information to growers and processors with little public cost.

CHAPTER 4

THE KRAUT CABBAGE SUBSECTOR

4.1 INTRODUCTION

A primary objective of this study is to gain insight into the origin and functioning of market coordination processes and how these impact subsector performance. Chapters two and three described and analyzed market organization in the processing cucumber subsector to unravel the network of institutional relationships responsible for coordinating market activity. At each market stage firms were found to have adopted practices that enhanced their chances of reducing uncertainties and improving profitability. This chapter focuses on the existing organization of the kraut cabbage subsector to determine how its coordination processes influence subsector performance. Because the subsector shares many similar organizational and structural characteristics with the cucumber subsector, it will be useful for drawing comparisons and contrasts.

4.2 MARKET STRUCTURE AND BASIC CONDITIONS

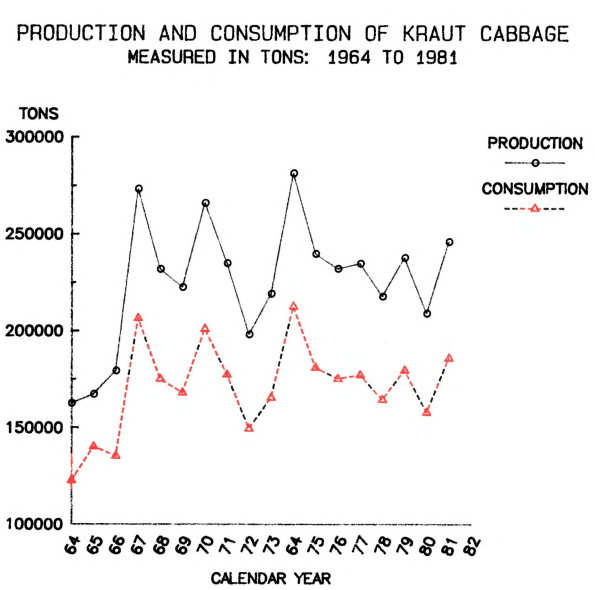
4.2.1 Consumption Trends: the Retail Market for Sauerkraut

U.S. consumption of sauerkraut has been on a slight decline over the past twenty years. Per captia consumption in 1964 was 1.4 pounds, but by 1985 it had dropped to 1.2 pounds. For the most part, the retail market for sauerkraut has historically been very stable, although in recent years

it has followed a downward trend. Figure 4.1 traces total consumption and production of sauerkraut over the past 20 years. Because the table measures only retail consumption, it does not account for all of production, explaining the gap between the two levels. The constant level of sauerkraut consumption is partially explained by the demographics of demand. The typical consumer of sauerkraut is over the age of forty and more often has middle European ethnic origins. Younger generations, being more prone to fresh vegetable consumption, purchase little kraut. Attempts to introduce new kraut variations have had little impact on consumption patterns. A crispier kraut product and changes in packaging away from cans to glass and polybags have been the main means of new product promotion. In the past 12 years, the increase in consumption of refrigerated polybagged kraut has been steady. When kept refrigerated, polybagged kraut has a shelf life of three to six months. Today nearly one fourth of retail sales are sold in bags. A similar amount is sold in glass jars and the remaining share is sold in cans.

Like pickles, demand for sauerkraut is estimated to be relatively price inelastic. Kraut cabbage has no single close substitute or complement, so that small changes in price have little impact on the amount consumed. The amount consumed is somewhat impacted by prices of other processed vegetables, which as a whole act as substitutes.

Figure 4.1 Total Annual U.S. Production and Consumption of Kraut Cabbage



Source: Vegetables, USDA, National Agricultural Statistics Service, 1964-1982.

4.2.2 Processing Trends

Most kraut is packed in northern climates where the growing seasons are cool. Almost all kraut is packed during the late summer and early fall. Kraut received in early August can be cored, sorted and put through the fermentation process before the bulk of harvesting begins. Once plants are in operation processors need to maintain a steady flow of raw product to plant. Cabbage is planted over a staggered period of time to ensure that the supply of fresh product available matches with the processing plant's capacity. Plant capacity is usually limited by the amount of fermentation space at any given time. Because temperature largely determines the speed of fermentation, flow to plant must continually be rescheduled. Processors often place a premium on early kraut and specify the seed varieties to be used. This allows firms to process over a greater period of time from fresh stock. A number of firms also produce their own fresh kraut, in part to maintain control over harvest times. This kraut is usually the earliest to be harvested.

Kraut can be kept in fermentation tanks for upwards of a year's time. End of harvest kraut is often stored in tanks and placed in pack only as inventories are depleted. Once jarred, kraut has a shelf life of up to two years.

4.2.3 Production Trends

Cabbage is grown throughout the United States due in most

part to its adaptability to different soil and climatic conditions. The predominant share of kraut for processing is grown in Wisconsin, with New York and several midwestern states growing a smaller share. Table 4.1 breaks down the distribution of production by major states.

Table 4.1 Distribution of Production for Kraut Cabbage.

State	1964	% of total	1981	% of total
Wisconsin	44,600	27	91,700	37
New York	60,500	37	89,600	36
Ohio	16,600	10	30,600	12
Other States	41,150	26	34,190	15
U.S.	162,850	100	246,090	100

(Source: Agricultural Statistics Bulletin, USDA, NASS)

Due to the weight of processed cabbage, the relative ease of production and the semi-storability of the crop, most processing is done near to the source of production. While cabbage on occasion may be shipped from one region to another for processing, overall, very little of this is done on a regular basis. Instead, during short years raw product is pulled from the open market, or fresh market cabbage is purchased.

Most cabbage producers in all major producing areas grow a diversified crop mixture. In New York and the midwestern states other farm enterprises include fresh and processed vegetable crops, dairy and grain. The size of contracted cabbage acreage for each farm varies considerably within each production region. The majority of growers average between 40-80 acres, although in both regions

several large scale producers grow nearly 1000 acres. These larger growers usually contract the bulk of their acreage but also grow to sell on the open market or act as shippers for major processors.

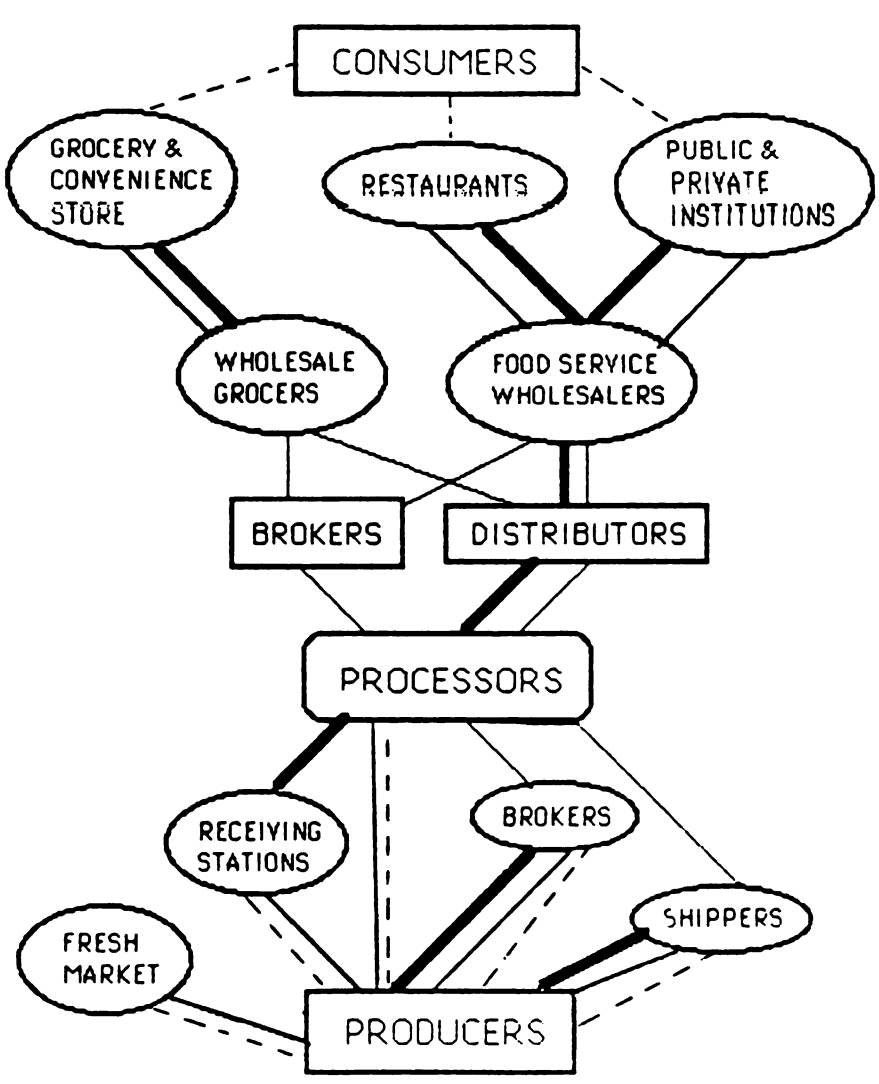
Cabbage production and harvesting is a labor-intensive endeavor, with labor requirements for planting, weeding and harvesting. In many areas transplants are used to improve yields and to shorten the growing period. This extra step involves considerable costs to growers who must purchase seedlings and transplant them. In some areas direct seeding is done to reduce variable production costs.

Most cabbage for processing is machine harvested. Hand-harvesting is still relied upon in hilly regions where harvestors cannot be operated. For large scale operations mechanical harvesting is more cost-efficient. Cabbage can be kept in the field for several weeks without any significant deterioration in quality.

4.3 MARKET CHANNELS FOR THE KRAUT CABBAGE SUBSECTOR

The system of organization in the kraut cabbage subsector is regionally decentralized, with each area relying on a mixture of institutional structures between market stages to coordinate the vertical system. Figure 4.2 traces the flow of product through the market system. Vertical exchange relationships are represented as follows:

Figure 4.2: Major Marketing Channels for Kraut Cabbage



Key:

- Vertical Integration
- Contractual Arrangement
- Open Market Transaction

bars indicate integration through ownership; solid lines indicate the use of contracts or other written agreements; and broken lines indicate open market transactions.

The major market stages in the processed kraut subsector are similar to those found for processed cucumbers. The primary coordinators of market activity are the processing firms which maintain formal and informal vertical linkages with producers and retailers. Producers are large in number and atomistic, while processors are few in number and often large in scale. Processors in turn sell to relatively concentrated retail markets. The major market stages where product is exchanged are described briefly below.

4.3.1 The Grower-Processor Network.

The predominant share of cabbage produced domestically is designated for the fresh market, where it is sold in whole heads or as coleslaw. While in most cases market outlets for fresh and processed markets are different, each year some crossover takes place. For this reason it is worth summarizing the marketing system for fresh cabbage.

A. The Fresh Market.

Cabbage for fresh and processed markets are separated by varietal differences and size. In general varieties for the fresh market are greener and smaller sized than those grown for processing. The average sized head of cabbage for processing is well over twice that for the fresh market.

Kraut processed from fresh market cabbage varieties is more likely to produce a lower quality sauerkraut with a shorter shelf life.

Unlike the processed market, almost all fresh cabbage is sold without written contracts. Rather, transactions are negotiated through verbal agreements. Contracts are avoided primarily because buyers are not willing to carry the higher amount of risk associated with locked in prices that otherwise vary significantly with changes in supply. Most growers sell through brokers who arrange retail outlets. These brokers often charge a percentage fee for produce handled. The brokers in turn sell to supermarkets and food service outlets. Due to its perishability, fresh cabbage can only be stored for several weeks before quality deteriorates.

The fresh market is most often used by growers as an alternative market outlet for processing kraut. If harvested early, kraut varieties can pass for fresh consumption. Growers plant acreage above that contracted and use excess acreage as a speculative venture on spot markets. Small heads go for fresh markets while larger heads can be sold spot to area processors. If processors do not seem interested in purchasing extra tonnage, then the heads are harvested early and sold on the fresh market.

Fresh markets are also relied on by processors who in years of poor harvest purchase to fill out pack requirements. The degree to which fresh market purchases

are relied upon varies by processor. Some processors will only rarely from the spot market, while others will use it to fill a part of pack specifications in most years.

B. The processed market

As in the cucumber subsector, most cabbage for processing is sold under written contract. It is estimated that 70 percent of all cabbage for processing is exchanged under contract.22 As with cucumbers, contracts are negotiated before planting time and, in most cases, specify acreage and price. In Wisconsin and Ohio contract terms are set by processors and offered to growers on a 'dump and run' basis before planting time. In Wisconsin kraut is grown in a fairly concentrated area so that a dominant regional firm has strong influence over contracting practices. In New York a large share of kraut is packed by grower-owned processing cooperatives, which use production agreements to coordinate raw product supply. The small amount of cabbage grown for the open market has no contractual sales arrangements. Sales are usually negotiated very near to time of delivery. Most growers who act as shippers for area processors, rely on verbal agreements with buyers. Because the industry is fairly stable, fluctuations from year to year are not great so that nonformal linkages are felt adequate to tie together these market transactions.

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22 Vegetables, Agricultural Statistics Bulletin, USDA, 1982.

4.3.2 The Processor-Retailer Network.

The predominant retail outlet for kraut is through large supermarket chains, with a small share--estimated at 10% , going to the food service sector. According to industry estimates, approximately 72% of total retail sales is under brand name, 26% is sold under private label and the remainder under generic label. Several large vegetable processors control the major share of national markets. While no one has control of more than 15 to 20% of the total market, at a regional level one company may control a significantly higher percentage of market share for both brand and private label sales.

Because the kraut cabbage industry faces declining consumer demand, increases in sales for individual firms must come from competitors' market shares. At the retail level competition for new accounts is considerable, since on a regional basis most major firms tightly monitor and control their retail market outlets. Branded processors, seeking to expand market outlets, face severe price competition from established regional firms with strong brand followings. Regionally recognized brand names encourage consumer taste preferences that create greater product heterogeneity.

Summary

Several characteristics of the market structure for kraut cabbage are likely to influence market coordination and

performance for the future. The entry of new firms into the market is nonexistent. The industry faces declining market sales. Large start up costs and strategic retail marketing practices cause considerable barriers to entry. Barriers to entry at the grower level exist where farm firms have difficulty obtaining production contracts, and production requires large start up costs.

4.4 AN ANALYSIS OF MARKET COORDINATION MECHANISMS USED IN THE KRAUT CABBAGE SUBSECTOR

The analysis of market coordination in the kraut cabbage subsector is approached in the same manner set for processing cucumbers in chapter III. This section will analyze how well current institutional arrangements and standard operating practices work to enhance subsector performance. The subsector will be evaluated on the degree to which it is able to meet the following objectives: how well various stages of the market match the quality, quantity and type of kraut supplied with that being demanded; if grower returns are able to cover costs of production over the long run for a well managed farm firm, and how well market stability at the grower-first handler level is managed; and finally if the distribution of risk between grower and processor is such that those who carry risk are the best able to manage it, and gain any benefits that are associated with that risk.

4.4.1 Quality and Quantity: Matching Supply with Demand Throughout the Market System.

A. Quality Considerations for Kraut Cabbage.

As in the cucumber subsector, processors of kraut are largely responsible for coordinating quality between producer and consumer.

Quality control is handled at the retail level by most processors. The exception is for private label merchandise, which is monitored by retail buyers. According to one industry person, the quality standards for kraut have changed very little over the past 15 to 20 years. Quality differences between brand and private label kraut are usually negligible.

At the producer level, quality is monitored through a grading system, which is usually specified on grower contracts. The grading categories for kraut are fairly standardized and follow closely those set by the USDA. Cabbage is graded on weight and size; the larger and heavier the head, the higher the quality. Unlike cucumbers, larger heads are preferred since the coring and de-leaving costs can be reduced for any given volume.

Varietal characteristics that lighten the color, sweeten the flavor and reduce water content also improve kraut quality. Since these are not as prevalent in fresh market varieties, most processors avoid their use. Substandard kraut cabbage is usually plagued by split heads, where the

heads burst open from too much moisture too quickly, or from tip burn, where leaves inside the head are discolored. Fields with excessive amounts of either condition may be by-passed by the contracting processor.

There are two ways in which the quality of kraut can be improved. First, at the retail level, research is needed to increase the types of kraut offered to consumers so that overall demand can be expanded. The industry has been slow in responding to declining demand. Individual processors carry out market research on new products and shifts in consumer demand. The National Kraut Processors Association also provides information to members on changes affecting the industry, however, neither has curbed the downward trend in consumption.

Second, most contracts do not specify incentives for improving kraut quality at the individual grower level. Instead, contracts usually include standardized penalties for diseased or damaged heads where a flat percentage is deducted from the total sales for all growers regardless of quality of individual loads.

B. Determination of Quantity and Type of Pack.

Processors for kraut cabbage have several means with which to fill projected pack requirements. The type of pack is largely determined by demand movements in the retail market. Most firms rely on verbal agreements with retail outlets or nonbinding written agreements to project the

coming year's expected sales. This represents a movement away from more formal written contracts used in previous years. Most firms interviewed claimed that retail volume varied little from year to year so that major shifts in pack decisions were uncommon. However, when shifts have occurred, as annual variation in consumption indicates has happened, processing firms use several methods for clearing the market.

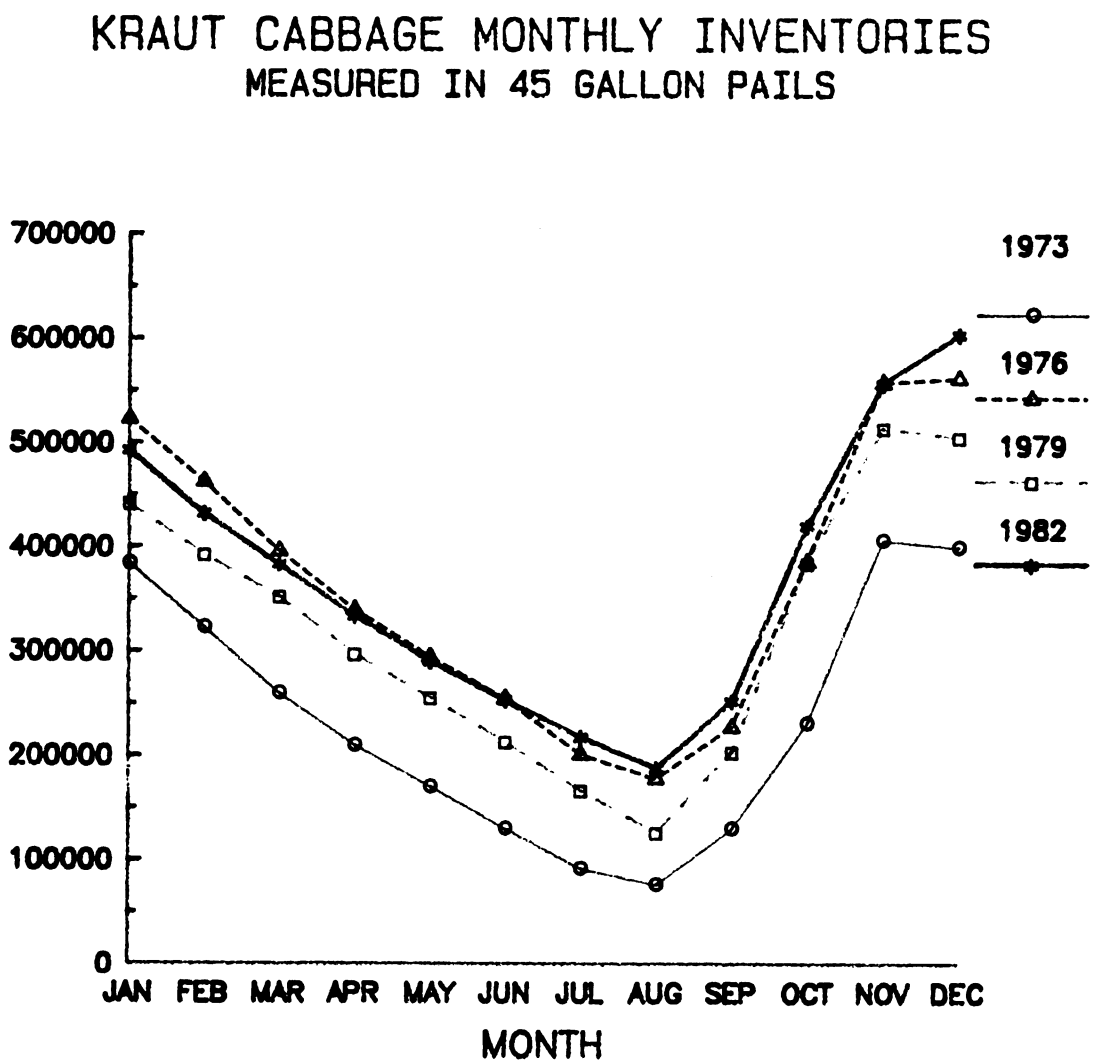
1. Wholesale Price Manipulation for Brand and Private Label Sales. Most processing firms attempt to clear inventory of kraut completely each year. Kraut stored in glass and cans tends to discolor so that finished product stored for periods over one year must often be sold at a lower quality, usually under private label. If inventories are large as the harvest season approaches, firms often reduce wholesale prices to clear stocks. In 1985, when most processors carried large carryover inventories, retail prices dropped significantly, where a number of firms offered prices below costs of production. During years when stocks are low, firms raise prices to slow sales. Brand label commitments are usually given priority and filled first.

2. Carryover Stocks. Because of the high costs of storage and the deterioration in quality over time, firms prefer reducing prices to move stock and avoid carryover.

Excess stock carried into the following year is the first to be sold. Figure 4.3 traces monthly inventory levels of kraut during four different years. As the diagram suggests, inventories can vary somewhat from year to year but follow similar patterns from month to month. On an individual firm level, inventories can fluctuate considerably. Several processors reported that many kraut processing firms have difficulty predicting the coming year's market conditions, and resort to a certain amount of guesswork in planning their pack. The reporting of aggregated monthly inventory levels by the National Kraut Packers Association considerably alleviates this problem.

3. Changes in Contracted Acreage. Most of the processors interviewed pointed to changes in the amount of acreage contracted as the major mechanism for controlling supply. These firms distribute cuts or increases in acreage across many of their growers. In Wisconsin, changes in acreage contracted is not always evenly distributed across all growers. Fieldmen interviewed said it was unusual to cancel all acreage of any single grower, unless the grower has performed poorly. Because the grower may be needed again for the following year, some acreage must be offered. Several processors said they preferred to add new growers when extra tonnage is needed since they would then have a broader base on which to distribute production risk. Growers, on the other hand, have the capacity to increase

Figure 4.3 Kraut Cabbage Inventory Levels by Month



Source: National Kraut Packers Association

acreage, and would prefer their contracted acreage expanded. In New York, as a standard practice, the two kraut farmer cooperatives distribute acreage changes evenly among growers on a percentage basis to distribute risk more evenly and to improve individual grower's future market expectations. The processors' reliance on acreage changes is analyzed further in section 4.6.

4. Acreage Grown by Processor. Several processors supply portions of their fresh stock from owned or leased land. These firms argue that in-house production saves on costs and increases flexibility over planting and harvesting.

Contracting as a Vertical Coordination Mechanism for the Kraut Cabbage Subsector

Because of the perishability and quality specifications of kraut, most processors and growers rely on contracts to coordinate exchange. The use of contracting for procuring raw product has increased steadily over the past 20 years. In 1964 23 percent of total production was sold under open market but by 1970 this had decreased to 7 percent. Much of this reduction was due to increased contracting and some was due to processors integrating backwards into production.

Contracts are used in the kraut cabbage subsector as a means of specifying quality needs and to secure the quantity, timing and costs of raw product supplies for both growers and processors. Uncertainties that both growers and

processors want brought under their control are specified in the contract provisions. A summary of contracting terms and practices is provided next. Contract information for kraut cabbage processors was obtained from the Wisconsin Department of Agriculture. Both 1985 and 1986 contracts were reviewed for 12 area firms, all of which are located in Wisconsin and contract with Wisconsin growers. The companies contracting vary in size significantly. They are also located in various parts of the state, clustered mainly around Madison and in the northeastern region of the state.

1. Grading. Most contracts specify grades based on U.S. voluntary standards for processing cabbage. Grade differences are in terms of weight, where grade #1 sets four pounds as a minimum standard. Most buyers expect heads to be far above minimum standards. Some firms purchase only the largest size grade while others will purchase smaller heads at a reduced price. The reduced price in most cases is not stated but falls under a tare deduction rate and is treated as a type of defect in quality. Several of the contracts stated a minimum percentage of tonnage that must fall in the first grade category. Grade requirements specified that all frozen or bursted heads as well as all green or spongy heads could be rejected by buyers. In addition, most firms required that heads be trimmed of loose leaves.

2. Price. Separate prices were set for the first and second grades. These prices were consistent across most contracts. Premium prices for delivery before the second week in September were specified on almost all contracts. The amount of the premium, usually several dollars above that for grade #1, was the same for all firms. Most prices were f.o.b. although two companies provided transportation from the farm to the company plant.

3. Acreage and Tonnage. All contracts specified the acreage and tonnage that each company would purchase from the grower. Firms may purchase tonnage above the specified amount but are not obliged. Tonnage is estimated by setting an average yield for growers, and then dividing total proposed production by this to give acreage. In several contracts yields were automatically set at 20 tons per acre. The tonnage specification is important to the buyer who must discourage growers from diverting contracted cabbage to the fresh market when open market prices are above those contracted or the reverse when fresh market prices are lower.

4. Payment Schedule. Approximately half of the contracts studied specified dates of payment for cabbage shipments. Two payment deadlines were usually given; the first before the end of the year and the second in early spring of the following year. Several contracts set closing dates for

delivery of cabbage. These ranged from early November to early December.

5. Planting and Harvesting. The amount of control contractors retained in setting planting and harvesting schedules varied from contract to contract. Companies often reserved the right to set planting dates and intervals between plantings, to specify the spacing and plant population and to limit the type of herbicides and pesticides used. Most contracts specified that either company-provided or company-approved seed be used for planting. Several contracts specified the use of transplants in production. In most cases, companies maintained control over the scheduling of harvest and delivery.

6. Act of God Clause. Most contracts stipulate under what situations contracts may be broken. Crop failure due to adverse growing conditions is an acceptable reason for contract termination. Contracts delegate to the grower responsibility for crop failure due to poor seeds or herbicides.

Summary.

The most interesting aspect of the above analysis was the similarity in contract prices and terms between competing processors. Many of the terms included in the

contracts are set by processors and standardized across firms. This finding may add credibility to several industry participants' claim that grower-first handler practices are heavily influenced by the area's largest firm. Although contracts were not studied in other producing regions, interviews with Ohio extension personnel showed that similar procedures are employed by processors in contracting acreage.

Several alternative arrangements for coordinating raw product procurement are practiced by the processing cooperatives in New York and a bargaining association in Michigan. They are described briefly below.

Coordination Mechanisms in New York.

The majority of cabbage processed in New York is handled by grower-owned processing cooperatives. Seneca Foods and Comstock, a division of Pro-Fac Curtiss Burns, together account for nearly 80% of the state's kraut. Several independent firms operate in New York as well, although these firms control a significantly smaller share of the market.

The processing cooperatives procure raw product through member agreements which state the contracted acreage and tonnage each member is allotted. Acreage allotments are based on projected sales and existing inventories. Changes in acreage contracts are distributed across all members evenly. In recent years acreage has been declining, so that

only rarely have new growers been granted contracts. Acreage from growers exiting the cooperative is usually absorbed by other member growers.

Cabbage grading is not standard across all area processors. Comstock uses a graduated scale for determining quality and prices, while other firms follow closely the guidelines set by the USDA.

Coordination Mechanisms in the Michigan Market

Michigan produces only a small share of the nation's cabbage. Of this, cabbage destined for the processed market is a small portion.

The marketing of kraut cabbage in Michigan has been under the auspices of a grower collective bargaining association since 1974. Before its inception cabbage was contracted with area processors under dump and run contracts where acceptance of the raw product was left to the discretion of the buyer. Cabbage grading was limited, with most loads either accepted at a fixed price or rejected. This left no distinction for varying quality of acceptable produce so that producers had little incentive to improve their cabbage quality beyond the minimum standard. The processors were responsible for the sorting and handling of cabbage which was often delivered in a poor quality.

Because grading standards were not spelled out clearly in contracts, acceptable quality standards varied from year to year depending on the relative shortage or abundance of

cabbage. In this case growers carried risk beyond that of poor quality harvest; they faced the uncertainty of being by-passed if processors over-contracted supply.

Since 1975 cabbage grown for processing has been covered under Public Act No. 344, the Agricultural Marketing and Bargaining Act of 1972. The Act, which only applies to perishable fruits and vegetables, sets up procedures to allow producers who have organized into an accredited association to bargain in "good faith" with first handlers of these commodities.23 Most importantly, the Act called for collective bargaining that allowed exclusive agency status to the accredited association. Under this guideline, any producer in the bargaining unit was obligated to sell the designated product through the accredited association. The Act also calls for binding arbitration where the two bargaining parties must agree to a third party's terms of agreement. Since its inception, parts of the Act have been challenged as unconstitutional and in 1985 exclusive agency bargaining was no longer mandatory.

The Michigan Kraut Cabbage Growers Association is one of five accredited commodity groups in Michigan that operates under the advisorship of Michigan Agricultural Cooperative Marketing Association (MACMA). Bargaining for kraut cabbage occurs with one processor, Vlassic Foods, who is the sole purchaser of Michigan grown kraut. There are presently only

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23 Farm Bureau Research Report (83-1).

seven cabbage growers in the state, six of whom are active members of the association. The seventh has remained independent but pays association fees.

The group bargains on a number of terms of trade with the processor. Most predominant has been increased specification regarding quality of the raw product. The addition of a split-head clause to restrict the number of split heads delivered by growers has resulted in less wasted product at receiving stations and overall improved quality. While contract negotiations are handled through a representative, growers still sign contracts directly with the processor. Contracts are drawn annually and usually signed in March or April, prior to planting time.

Membership does not protect growers against cancelled contracts. If a grower does not perform up to the standards set by the processor, his or her contract may be cancelled. Poor performance may involve producing low quality cabbage, breaking delivery schedules, or defaulting on a contract all together. If default is due to weather or other biological constraints, then cancellation of future contracts is not likely. However, if contracts are terminated by growers who choose to sell on the fresh market for higher prices, contract renewal is doubtful.

The grading system for cabbage has also been respecified. Besides requiring USDA inspectors, the Association negotiated on a larger sample size for determining grade. The contracts now call for a staggered grading system where

an average annual grade standard is set based on the previous three year's deliveries. Any produce measuring above this standard is given a premium and any below is penalized. In this way growers were able to eliminate a standard percentage tare penalty which they claimed had previously been applied to raw product.

Summary

Three alternative institutional mechanisms are relied on for coordinating market quality and quantity of supply. All regions rely on production contracting which reduces uncertainty and improves coordination for all stages in the market. The existence of grower-owned processing cooperatives in New York has improved market transparency and expanded grower control beyond the farm gate. In Michigan, the formation of a grower bargaining association has brought about improved specification for quality terms in contracts that are more favorable to growers. In Wisconsin, the standardization of contract pricing has brought price stability at the farm level that enhances future planning. Both Wisconsin and Ohio, however, may have less market transparency and growers less means for counterbalancing processor control.

4.4.2 Grower Returns that Cover Costs of Production

One indication of a well-coordinated market is the stability in production and price found at the grower-first

handler level. Stability can be evaluated in two ways. First, if grower returns cover costs of production for a well managed firm, long run planning and investment will be enhanced. Second, stability in interannual grower returns will reduce uncertainty for growers and first handlers, and will bring predictability to the market that also improves long run planning.

Costs of Production

Cost of production estimates for kraut cabbage vary somewhat with planting techniques. Whether direct seeding or transplants are used will change the planting and cultivation requirements. In both methods labor is the primary cost of production, with seed or transplants constituting the next major expense. A 1982 study conducted by Cornell University has itemized major costs by planting method.24 The study surveyed 17 cabbage growers in the New York area. It found that on average both direct seeded and transplanted kraut cabbage enterprises yielded profit for growers. Table 4.2 shows the average profits for each type enterprise for the 1982 year.

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24 Snyder, Darwin, "Cost of Production Update", A.E. Res. 83-30, Cornell University, 1983.

Table 4.2 Kraut Cabbage Costs and Returns: New York, 1982

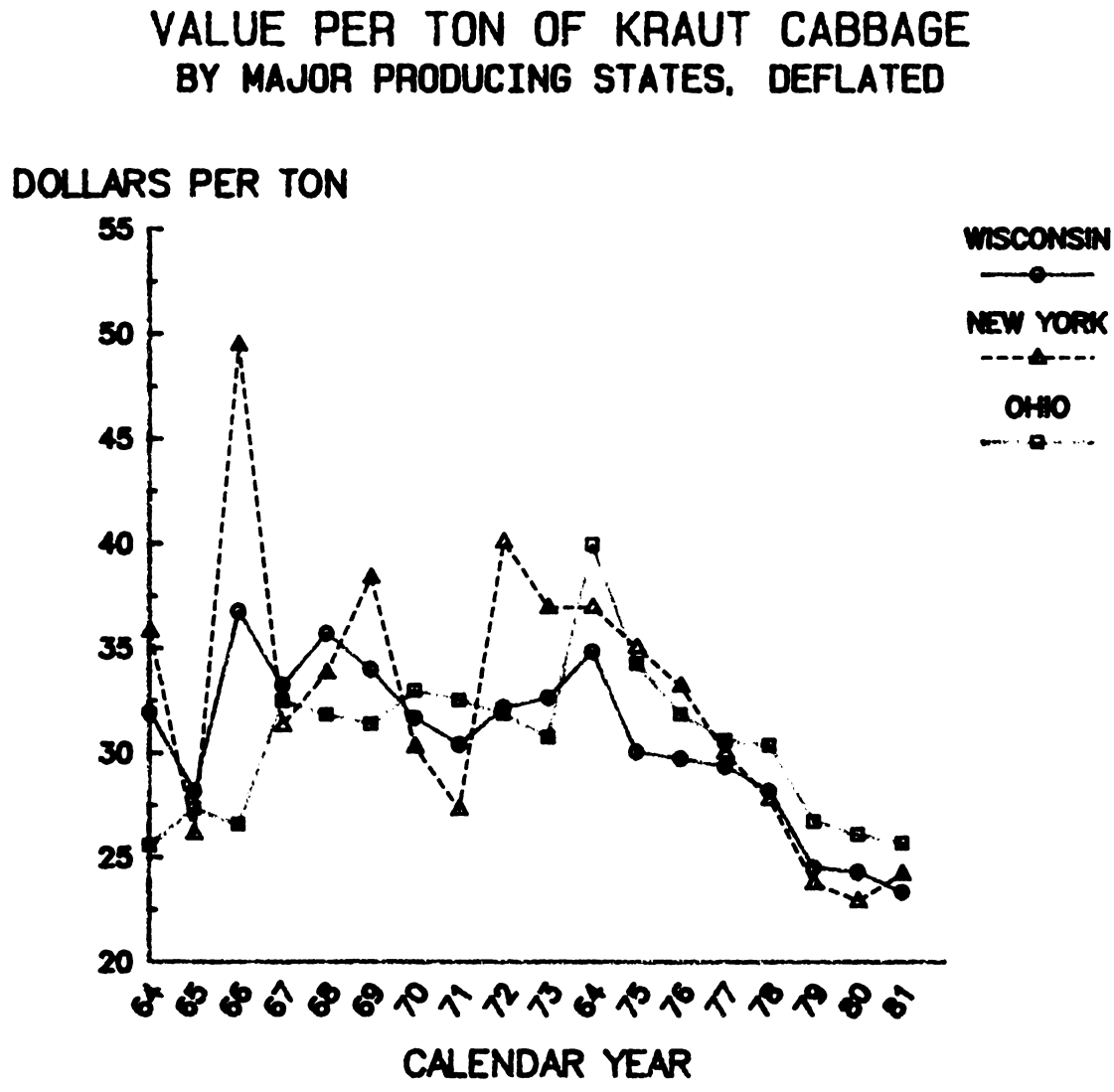
Item		Direct seeded	Transplanted
Number of enterprises		13	11
Acres per enterprise		56	40
Yield per acre planted, paid tons		25.7	24.4
Costs to:	Grow	$516	$549
	Harvest	142	130
	Sell	93	94
Total Costs		$751	$773
Total returns		$909	$859
Profit		$158	$86
Net Return per dollar of cost		$1.21	$1.11

Source: Cornell University Agricultural Experiment Station, A.E. Res. 83-30.

As the figures show, total costs for direct seeded cabbage were somewhat lower than transplanted cabbage, but not significantly. This difference is partially explained by the slightly higher yields obtained through direct seeding. Of most interest, however, is that positive net returns had been reported for the averate kraut cabbage enterprise for the New York area in 1982. Although annual studies were not available to compare over time, trends in costs of production for vegetable crops indicate no major shifts in variable expenses. Interviews with growers in the major producing areas supported the study's findings. Most reported that kraut cabbage production has been a profitable venture.

An alternative means to estimate long run trends in returns to growers involves a comparison of average price to a production cost index. Figure 4.3 traces value per ton of kraut cabbage deflated by a production cost index for the major producing states. While the value per ton seems less

Figure 4.4 Estimated Grower Profitability for Kraut Cabbage by Major Producing Regions



Source: Vegetables, USDA, National Agricultural Statistics Service, 1964-1982.

variable in the past 12 years, it also shows a strong trend downwards over the same period. Price trends also seem to be more closely tied between regions over the last decade.

Variability of Production and Returns

Excess variability in grower returns from year to year can also inhibit the coordination process at the producer-first handler level. High instability in production and price leads to poor planning of future supply and demand at the grower level. Table 4.3 lists instability estimates for kraut cabbage for total production, acres harvested, yield and returns. Variability in production is calculated in the same manner used for cucumbers in chapter three. The variance of percentage changes between years is calculated using the following formula:

$$dQ/Q = [(Qt - Qt\text{-}1)/(Qt + Qt\text{-}1)/2] * 100$$

where Q is the total annual production for a given region.

Table 4.3 Instability measures for production, acres harvested, yield and returns for kraut cabbage, 1964-1981.

Region	Production	Area	Yield	Returns
New York	407	141	234	336
Ohio	710	1316	338	1022
Wisconsin	466	227	197	298
U. S.	252	168	134	272

All estimates of variability are broken down into major producing regions. Ohio, which has the smallest share of total production, shows the highest amount of variability for all categories listed. These results should be interpreted with care since the smaller production area will usually show greater instability when using this statistical procedure. However, the high variability in annual acreage harvested in Ohio may also be partially explained by the exit of a major processing firm which after several years absence, re-entered the Ohio market.

Variabilities in yields for New York and Wisconsin do not seem particularly high. During interviews, processors stated that predicting yields is fairly easy since on average there is little change from year to year.

The other major source of variability in grower returns comes from fluctuations in price. Table 4.4 summarizes price variability for each major producing area. New York showed over five times the variability in price of other regions. This variability may be a result of pricing practices for the two large processing cooperatives in the state. Both use formula pricing and dividend sharing to pay growers. Wisconsin, as a study of its contract pricing practices indicated, has a high level of price stability.

Table 4.4 Instability measures for prices and grower returns for kraut cabbage, 1964-1981.

Region	Price	Returns
New York	577	336
Ohio	104	1022
Wisconsin	103	298
U. S.	164	272

The low price instability also supports several industry participants conjecture that pricing practices in Ohio are heavily influenced by what is done in Wisconsin. Figure 4.4 traces grower returns deflated by an index for prices paid by producers from 1964 to 1981.

Because of the low variability in price, most of the annual change in earnings can be attributed to production variability. Yield variability measurements do not appear excessively high so that most instability appears to be associated with changes in acreage planted. The high instability may be a result of grower planting decisions, or of the contracting processor's changes in acreage contracts. To test if there is a relationship between changes in acreage planted and processor inventories, a linear regression can be used.

In the planning scheme for most firms, estimates of contracted acreage are made in the month of January. These estimates are partially based on existing inventory at that time. Planted acreage for the spring of year t is hypothesized to be a function of inventory levels during the month of January. To remove the impact of decreases in acreage due to declining consumer demand a trend variable is included as well. The model is defined as follows:

Acreage Planted = f(Inventory, Trend)

Data on inventory levels during the month of January were obtained from the National Kraut Cabbage Association for the years 1968 to 1981. Inventory values are in numbers

of 45 gallon pails of kraut. When regressed, the following fitted equation was obtained:

Acreage Planted = 23663 - 0.0159STOCK - 285.4TREND

t values (10.7) (-3.8) (-5.7)

R-squared: .78

F-statistic: 19.9

As was expected, the regression results indicate that acreage planted in year t is inversely related to changes in inventory levels during the first month of that same year. All of the explanatory variables are significant at a 1 percent level. In other words, if processors have higher than expected levels of kraut inventories during the first of the year, then the acreage contracted for the coming year will be reduced. The opposite case holds in years when inventories are low.

The model indicates that acreage is altered to offset changes in inventory, but it does not consider how changes in prices to producers are related to changes in inventories. Prices are expected to be inversely related to annual changes in inventories. When modeled, however, no significant relationship was indicated. This lends support to the argument presented for cucumber contracts. Processors adjust supply to meet expected demand by altering contracted acreage rather than by changing price.

Summary

The analysis of grower returns and cost of production for kraut cabbage did not indicate that well managed grower firms are unable to cover variable and fixed costs of production. However, the analysis did indicate that grower returns per ton of kraut in real terms have been declining.

Annual variability in grower returns was not found to be excessive, except in the Ohio region where percentage changes in annual acreage planted appeared quite high. Prices in New York also fluctuated considerably when compared to other regions. This will be explored further in the following section.

Variability in acreage planted was assumed to be partially a result of processor annual inventory management. When regressed, changes in inventories were inversely related to changes in acreage planted.

4.4.3 PRICE FORMATION AND MARKET TRANSPARENCY

A criterion set for a well performing market system is that prices should be a reflection of prevailing conditions of supply and demand, and that market participants should have ready access to price and other market information. Because information on prices and other market conditions is used by growers to make production decisions, it is essential that information be accurate, timely and well distributed horizontally and vertically through the system.

The price formation process for kraut cabbage producers

and processors varies between regions, although pricing is strongly linked between regions as well. Horizontal linkages exist between regions where processors operate a number of plants, and where firms use regional contract prices to set their own contracted price.

An analysis of contract prices in the Wisconsin region showed prices and contract terms to be consistent across processors. When asked about pricing practices, processors in the area cited price as having only a small role in determining pack decisions. Prices vary little from year to year and the similarity in pricing indicates the presence of horizontal linkages between firms. These linkages are assumed to be informal and dominated by the actions of the area's largest firm.

Ohio kraut firms use pricing practices similar to those employed in Wisconsin. Price arbitrage is not a primary reason for price similarity in the two regions, since transport between regions is quite costly. Rather, price information is exchanged between firms through informal channels. In addition, several major processors operate plants in both regions, further linking the markets.

Price linkages also exist between New York and midwestern regions. In the New York processing cooperative, Comstock Foods, a division of ProFac-Curtiss Burns, member growers receive raw product prices equivalent to 'commercial market value'(CMV). This price is formulated by averaging quoted contract prices from several other private processing

firms in New York, Ohio and Wisconsin. Price information is gathered immediately after contract prices are set with growers in these areas. Comstock averages these prices to form a buying price for cabbage tonnage. Pricing formulas are used to account for differences in grade prices and preferential pricing for early deliveries. The cooperative does not distinguish between grades but instead sets a minimum size specification for purchases, and uses a scaled quality guide.

Comstock does not use cost of production information in the price formulation process. Instead, the company uses market prices to maintain its competitiveness at the retail level. The company divides profits under a 'one pull system' where profits from all processing operations are blended and divided between Pro-Fac members. In this way growers hold the potential to receive payment above CMV in profitable years and less in case of losses.

Seneca Foods also uses CMV to calculate contract prices, although information on how it is used was not available. Private firms in New York set contract prices based on management decisions. There is no formal linkage with other regional markets.

Unlike the Wisconsin and Ohio regions, New York has no standardized price regime. Because no one firm dominates price practices, there appears to be greater fluctuations in prices within the region.

In Michigan grower prices are negotiated through a

bargainig association. Although the association has not significantly improved grower prices, it has improved other terms of contract and has increased the availability of timely market information to member growers. Prices are formed based on the three year average quality standards.

The formation of a bargaining association has enhanced market transparency in Michigan. Linkages with other states are not strong, since most growers in neighboring regions are not organized.

Price Trends

Kraut prices in real terms have declined sharply in the last several years. Contract price patterns follow patterns similar to those found in other vegetable industries. These price falls are often sighted as a consequence of prices for corn and wheat on the futures market in the Midwest. Kraut prices from the Midwest have a strong influence on Eastern prices. However, between 1985 and 1986 New York contract prices dropped sharply. This was partly a response of industry-wide excess supplies that were reflected in lower producer prices. Because of heavy inventories, processors opted to contract supply at lower prices to producers. In New York the over supply situation was induced by an increase in field yields due to 'high dry varieties' and to a continued decline in national consumption. Key industry informants have pointed to a delay in acreage planning where firms do not readily alter contracted acreage to coincide

with changes in inventory. Consequently, a pile up of inventories after several years may bring a drastic change in prices and acreage at the producer level.

4.4.4 The Distribution of Risk between Grower and Processor for Kraut Cabbage

Under a well coordinated commodity market system, risk in production and price should be distributed to those most able to manage it. Likewise, any benefits accruing from risk should be controlled by those who carry it.

The mechanisms for distributing risk between growers and processors are similar to those employed in the processed cucumber subsector. Contracting is the primary mechanism for reducing uncertainty at the grower level. In the kraut cabbage subsector, contracts allocate most of the risk of production to the grower. However, production is also monitored by company fieldmen who provide production expertise and coordinate relations between the farm and processing plant. Risk associated with harvesting is also carried by growers since most kraut is exchanged at receiving stations or processing plants. Risk associated with price and processing are carried by processors.

The management of risk associated with changes in tonnage demanded is handled differently between New York cooperative processing firms, Michigan growers and the private processors in the Midwest. Growers for the New York cooperatives and members of the Michigan bargaining

association have much greater influence over how risk associated with changes in tonnage contracted is distributed across growers. They have some assurance of a market outlet that goes beyond a one year contract. In Wisconsin, growers have no assurance that contracts will be renewed for the following season. This source of risk is reduced if growers and processors enter into long term standard cooperative business practices that encourages annual contract renewal.

4.5 SUMMARY

The kraut cabbage subsector at the processors level can be characterized as moderately concentrated on a national scale, but highly concentrated on a regional level. Product differentiation is poorly developed in the industry so that consumer demand continues to decline. Price remains an important form of competition.

The kraut subsector maintains a consistently high quality consumer product. In the past it has yielded positive returns to contracting growers, and appears to control annual variability in price and production. Although all regions rely on contracting to coordinate supply, differences exist in the practices adopted by each region that result in different performance outcomes. This chapter only briefly explored these contrasts. A more indepth study would be useful for understanding how alternative coordination processes for the same commodity can influence market performance.

CHAPTER FIVE

IMPLICATIONS OF MARKET COORDINATION AND PERFORMANCE FOR THE KRAUT CABBAGE AND PROCESSED CUCUMBER SUBSECTORS.

5.1 INTRODUCTION

A major problem facing the agricultural sector today is disorderly marketing. Disorderly marketing occurs when the linkages between the horizontal and vertical market system are not well coordinated. This study is an attempt to break down broad characteristics of what constitutes an orderly market into parts that are observable and can be evaluated.

The objective of this study was to gain insight into the ways in which the structural characteristics and coordination mechanisms within the processed cucumber and kraut cabbage subsectors impact the orderly marketing process for these commodities. Because the future organization of the subsector is to a large degree being shaped by current vertical coordination behavior, analysis focused on identifying possibly poorly coordinated stages in the marketing process as well as identifying aspects of the market system that exhibited desirable characteristics. The basic premise of the study was that markets, plagued by uncertainty, high transaction costs and unevenly distributed and incomplete market information, need to be evaluated on how well existing market practices work to achieve orderly marketing in efficient and equitable ways at various stages of the marketing system. They must be evaluated not by

comparing existing performance to a market ideal but by considering if present market performance could be improved, and if so, under what alternative coordination mechanisms.

Four dimensions of performance were considered for evaluating how well coordinated each market is:

1) The degree to which each subsector is able to match the quantity and type demanded with that being supplied at various market stages was reviewed.

2) Market stability at the grower-first handler level was studied to determine if grower returns are adequate to cover costs of production over the long run, and if grower prices and changes in production introduced unnecessary instability into the production stage.

3) The transparency of each market was evaluated in terms of information flows and pricing practices.

4) Finally, the distribution of risk between grower and processor was analyzed and the implications of the contracting process discussed.

5.2 LIMITATIONS TO THE RESEARCH APPROACH

The results of this research work provide some pertinent insights into market coordination in processed vegetable sectors. There are, however, several limitations to drawing strong conclusions or making meaningful comparisons of subsector performance across commodities. First, much of the information in this study is qualitative, and not conducive to empirical testing. Interviews were not

standardized, and their interpretation often based on the ideas of the author. Analysis also needed to be scaled down to focus on only those influences on performance considered most important and where analysis seemed feasible.

Second, normative judgements about performance of different subsectors are difficult to make. Where markets involve different market stages or exchange mechanisms, it is not easy to rank one better than another. If one subsector performs more favorably in reducing instability or improving quality, it can be misleading to assume it an outcome of the organization or coordination process when it may be because of the characteristics of the raw product, climatic constraints, or the structure of demand patterns. Regional comparisons where coordination mechanisms differ for the same commodity are also difficult to draw. Different biological conditions, weather and soil types, different structures to farming, historical development and legal environments all influence how markets operate.

Despite these differences, several general comparisons of the two subsectors are worth considering where they can add insight into the coordination process. This is especially the case for kraut and pickle commodity subsectors since both perform well the task of matching supply and demand. Understanding how and why the systems work so well can aid in analyzing other market systems and in forming effective policy.

5.3 MAJOR FINDINGS OF THE STUDY.

5.3.1 Basic Conditions and Market Structure

The kraut cabbage and pickling cucumber subsectors share many similarities in the way their marketing systems are structured and in the methods used to coordinate these markets. The processing stage is a central link in the market chain and therefore the most crucial in shaping subsector performance. The business practices of processors in relation to retail markets, competing firms and supply markets all influence how well the system is coordinated.

With declining consumption, markets at the retail level are likely to become more concentrated. Major kraut processors number less than a dozen, while major pickle processors number as few as four. The number of firms within regions is slowly decreasing and market concentration is rising as the largest firms increase their market share. Barriers to new firms entering the market exist from high startup costs, from declining retail markets and from territorial marketing.

For both products, diversified food conglomerates control a major share of finished product sales. Due to advantages of scale, dominant firms in the subsectors will play an increasingly important role. Advantages of scale reduce uncertainty not only through improved technology and specialization in processing and distribution, but also through control of information lines which gives large firms

a market advantage.

In both subsectors brand advertising is the main means of establishing product differentiation. As new products are introduced in the market, brand identification will become an even greater way of controlling retail market share. The pickle subsector has had much greater success in expanding product types and supermarket shelf space. Neither product relies heavily on advertising, when compared with food products as a whole. Both subsectors engage in generic advertising, but the bulk is for brand promotion. Most processors maintain control over retail markets for brand name products, where firms compete through services, price discounts and promotion packages with retailers. Private label goods are more price competitive, since most of the advertising and merchandising is handled by retailers.

In the processed cucumber sector food service chains are a major market outlet for large processing firms. Sales to restaurants are also price competitive and often involve highly specific quality standards.

The kraut subsector has a much smaller amount of product differentiation since retail varieties of kraut are fairly consistent across firms. Research into developing new products has only recently been funded, and has yet to develop new forms of finished products. Private label sales account for one quarter of the market.

Finished products are primarily sold in local and

regional markets, in part due to the perishability, territorial franchising and high transport costs. As dominant firms establish stronger retail market holds, competition between firms is likely to be reduced. Large firms in both commodities work to penetrate neutral markets. Localized marketing is likely to be taken over by nationals marketing under regional brand names.

Interfirm relations are loosely coordinated within regions through informal exchanges of information. News of changing market conditions are relayed through phone conversations, trade meetings and other informal information channels. The processed cucumber subsector is dominated by one large firm that controls almost half of retail market share. This and several other large national firms have tight control over the subsector and much of the information that is passed through the system. The practices set by the largest firms shape those adopted by other competing firms at the retail and producer level.

In contrast, the kraut cabbage subsector has no one firm that dominates the national market. In New York the market is dominated by large grower-owned processing firms and in Wisconsin by privately-owned firms. Interfirm coordination across regions exists but no one firm operates in all regions.

An analysis of procurement practices at the producer level showed that the high perishability of both commodities caused growers and processors to move towards practices that

better manage uncertainty. Because contracts enhance the exchange of information and planning of future supply, it is likely that contracted exchange will become even more widespread and refined to remove supply uncertainties. For both commodities market alternatives beyond contracted tonnage sales are limited to spot markets. Because these markets are thinly traded and volatile, they involve greater uncertainty to buyers and sellers. Spot markets are not likely to grow in importance. Their form may change as traders move towards practices that reduce uncertainties for both buyers and sellers. The trend over the past twenty years has been away from spot sales. In cucumbers this trend is indicated in the adoption of pre-orderings between brokers and processors that add predictability to future exchange. Because of the longer storability of kraut cabbage in fresh form and the accessibility of selling in fresh market channels, growers have greater flexibility in selling on open markets. This may explain why a number of independently operated processing firms rely on spot sales of kraut to fill a portion of their pack requirements.

5.3.2 Performance Dimensions and Market Coordination

The two subsectors share common patterns and trends in coordinating market stages. Both perform the same basic functions, but accomplish them in slightly different ways. A summary of how each sector performs in meeting the four criteria set for orderly marketing is provided next.

(1) Matching Quality and Quantity Supplied with that Demanded.

Based on the findings of this analysis, the kraut cabbage and processed cucumber subsectors have in place well coordinated quality control mechanisms. For the most part, finished products in both commodities are of a uniform and consistently high quality. This is due in large part to the strong linkages between market stages and to kraut and pickle packers investments in research to improve plant varieties and processing techniques.

To ensure good quality product, close cooperation between producers and processors is essential. Grade specifications on cucumber sizes are usually well defined although greater monitoring is needed of the internal quality of the fruit. Kraut grade specification is quite broad, since almost all kraut product falls under the highest grade. Most kraut contracts in Wisconsin and Ohio do not include incentives for improved quality, causing greater waste for processors. The graduated grading scale used in Michigan could increase quality specifications and act as an incentive to growers to improve their quality.

Neither commodity has been able to develop new product types that capture the younger, more health-conscious consumer. Polybagged kraut and refrigerated pickles are the fastest growing new products that have helped to expand the markets. Both subsectors need to place greater emphasis on improved consumer information on nutritional aspects of the

products.

Quantity and Type of Pack

The quantity and type of pack for pickles and kraut are determined by similar procurement practices. Contracted acreage is the main source of raw product. Grower contracting in both sectors adds stability and encourages long-run planning for both growers and processors. By reducing uncertainty through increased information flows on product quality and quantity, supply fluctuations at the grower level are kept low.

Both commodities are storable in the processed form. The management of stocks at the processor level assists vertical coordination by planning and regulating the flow of product from the grower level to the retail level. In both subsectors processors rely on changes in the amount of acreage contracted to regulate supply. This adjustment process works well because producers have little difficulty altering their plantings from year to year, and because yields on average are stable and predictable. Contract provisions also introduce flexibility into production by providing incentives to produce only that type of raw product demanded. Seed types, planting schedules, price and tonnage are all clearly specified before planting begins.

Regression analysis suggested that for both commodities, alterations in annual acreages planted is the main mechanism for balancing variation in inventories. Processors are able to adjust to supply and demand shocks by building or

depleting inventory levels. Interviews with several processors indicated, that on an individual level, firms often have difficulty projecting future demand accurately or controlling supply well so that annual variability in stocks can be high. Where this results in wasted product, or added instability at the grower level, performance is likely to suffer.

In the processed cucumber subsector, regional fluctuations in yields can be compensated for by transferring stock from alternative production areas within or across firms. The trading of stock between area processors is done in both sectors, although it appears more widespread for cucumbers where size shortages occur and where inter-regional transfers are more feasible. Because of the size and weight of kraut cabbage, less reliance is placed on inter-regional transfers, and more on local procurement through spot markets. A number of kraut processors rely on in-house production to reduce uncertainties in supply, to provide early stocks and to conduct research on new varieties and cultivation practices.

(2) Grower Returns that Cover Costs of Production

Both subsectors up until the 1980s appear to have been profitable enterprises for well-managed farm firms. Since 1981 it is less clear whether grower returns have been adequate to cover both variable and fixed costs. Commodity prices have not kept pace with rising production costs, but

whether these have dropped below total costs of production, was not determined. The decline in profitability at the grower level may not be a result of poor coordination as much as it is the subsectors' response to changing external conditions. It may instead be an indication of the adaptability of the system at the grower level. The continued interest of many farmers in obtaining vegetable contracts would suggest that the subsectors remain relatively profitable.

Variability in grower returns in real terms have not been excessive when compared to other commodity subsectors. Neither of the commodities' prices showed large annual variablity. Stable prices enhance more ordered long-term planning by reducing uncertainty in grower returns and by aiding producers in forming accurate price expectations. Compared to other field crops, contract prices for both commodities are stable, which may explain the reasons for widespread grower interest in producing these crops. Contract prices are slow to adjust to changing market conditions. However, this study argues that these lags may enhance subsector performance by increasing price stability and the predictability of future prices.

Contracting provided reliable one year price predictions. However, reliable, longer term price prediction that is needed to guide investment decisions, is not provided under the current contracting system. In both subsectors there was little interaction between annual price

and the amount of production, suggesting that price is not a primary means of directing change in supply to adjust for an imbalance between supply and demand. The implication here is that growers do not rely on relative changes in contracted prices to signal production decisions. It suggests that processors do not rely on changes in prices to alter production. Instead, they alter the amount of acreage allotted to individual growers.

Production variability was low in most geographic regions for the processed cucumber and kraut cabbage subsectors. Annual fluctuations in yield were not excessive compared to other commodities, suggesting that yield is somewhat predictable. Fluctuations in acreage planted was the other large contributor to production variability. Based on statistical analysis, this did not seem excessive when compared to other commodity subsectors.

Variability measures for annual production, price and grower returns were highest in the cabbage subsector. This difference was partially explained by the greater reliance on fresh and spot markets for cabbage supply than was found in the processed cucumber markets. Cucumber production is more heavily contracted, with a smaller share traded in spot market outlets.

In the pickle subsector there exists a centrally coordinated and well planned market system, which is maintained by a closely knit group of processors. In the kraut subsector, where markets are not so tightly

coordinated between regions, fluctuations in supply and prices are of a greater magnitude. In New York, higher price variability was assumed partially a result of the variety of pricing practices adopted by area firms.

(3) Price Formation and Market Transparency

In both markets price mechanisms at the producer-first handler level work to enhance price stability for growers and processors but reduce market transparency. Price formation is controlled by processors who set prices on contracted production. The means used for forming contract prices is not well known but evidence from a survey of contracts suggests it is not standardized across firms. An analysis of pickle contracts found that pricing practices between firms can vary significantly. Pricing practices by the largest firms were also reported to strongly influence those adopted for the subsector as a whole. Pricing practices of kraut processors vary between regions. In Wisconsin price formation is fairly standard across firms. In New York, prices are strongly influenced by processing cooperative practices. These, in turn, are linked to other areas by inter-regional exchanges of price, production and inventory information.

Large scale vertically and horizontally integrated firms control a significant share of market sales. These firms engage in strategic marketing practices that can bring control over retail and supply markets. Information is

considered propietary where it can influence the distribution of market power. Firms have incentives to withhold and even distort market information to serve their own interests. The degree to which each firm is able to do so, however, is checked by the long term personal relationship maintained between processing firms and between growers and processors. Because the yearly planning cycle is repeated between the same parties, relations move towards more conciliatory practices, where it is in the interest of each party to keep the other operating well.

In the future, as markets grow more concentrated, processing firms may have greater difficulty exchanging market information in a timely manner in ways that do not raise fears of price fixing and other forms of collusion. Without impartial sources of timely and accurate market information, growers may also find themselves in more vulnerable positions.

(4) Distribution of Risk

Growers are moving towards larger acreages and more specialized capital investments. Mechanical harvestors are becoming more prevalent for both commodities. Because these investments are highly specific to cucumbers and kraut, movement out of production is quite costly and many times irreversible. As modes of production become more specialized, and firms more integrated both forward and backward, institutional arrangements are evolving to manage

new forms of uncertainty. However, where market power is predominately controlled by processors, the potential for exchange relationships to develop that place an undue balance of risk on producers is magnified. Contracting practices may evolve that place a disproportional amount of risk onto the growers, without designating them as the recipients of benefits for that risk. An analysis of the contracting process in Michigan for processed cucumbers showed that risk associated with production and marketing is well distributed between producers and processors. Under existing contracting practices, much of the production risk is carried by growers who have the greatest control over biological factors. Much of the risk associated with processing, storage, and price is borne by processors. However, a major source of uncertainty to growers in the form of variable returns is due in part to annual fluctuations in inventories. The costs of this risk are carried by growers while processors are those most able to approximate future demand and manage inventories such that this risk is reduced. Contract provisions that improve market information to better predict fluctuations and distribute acreage changes evenly between growers could improve stability.

The kraut cabbage subsector relies on several alternative coordination mechanisms that manage risk between growers and processors. Grower-owned processing cooperatives have provided a means for growers to determine

at what market stage the costs associated with changes in demand will be incurred. Changes in contracted acreage are distributed evenly across member growers and costs of inventory are borne by growers through a reduction in profits in the form of lower dividend payments.

A bargaining association, as is found in Michigan, can also improve grower-first handler coordination by giving growers countervailing power and an institutional structure through which to voice their needs.

5.3.3 Alternative Coordination Mechanisms for Enhancing Market Performance.

Vertical integration and cooperation are basic ingredients for coordination in kraut and pickle subsectors. The organization of these markets and the standard practices of their participants have evolved in ways that have enhanced market performance. Most notable is the way in which processors have been able to reduce uncertainty by controlling their sources of supply. In contrast to more market coordinated commodity subsectors, in the pickle and kraut subsectors the widespread practice of contracting has improved coordination of quality and quantity at the producer level. It not only appears to reduce instability associated with production and price, but also allows for flexibility in adjusting to changing market conditions.

Another important relationship found in this study is the

domination of the markets by large processing firms coinciding with well-performing markets at all stages. Contrary to neo-classical assumptions of competition, the pickle and kraut subsectors appear to operate well because of, rather than in spite of, large firms controlling the vertically linked stages of the market systems. Economies of scale in planning, distribution and market information have removed much of the instability found earlier when these markets were less concentrated.

A major obstacle to improvements in both subsectors' performance lies in the lack of market transparency at the grower and processor level. Public information services such as a market news program could considerably alleviate problems associated with low market transparency. A study of both commodity contracting practices showed that enough standardization existed across contracts to make comparisons possible. Information services are not only needed at the grower level. Retail buyers use projected planting information to estimate future pickle and sauerkraut supply and prices. Monthly reporting of inventories is also needed by processors to better estimate the actions of competitors and to keep growers abreast of inventory fluctuations.

Because the predominant share of market power is in the hands of processing firms, growers have limited means for altering coordination practices to improve their market conditions. Processors, on the other hand, have no strong incentive to change existing practices that do not bring to

themselves extra hardship. Bargaining associations that bring countervailing power to growers acting collectively, could provide an avenue through which to orchestrate changes in the coordination process. Improved quality specifications and more stability in price and acreage were both achieved by Michigan growers after forming an association. Where similar improvements could be achieved in other growing areas, collective bargaining efforts should be supported. The processed cucumber subsector in Michigan also could potentially benefit from collective bargaining. The formation of grower associations under the FLOC agreement is a step in this direction.

5.4 FUTURE RESEARCH

As the primary link in market systems, processing firms are the main determinants of how well a subsector is coordinated. However, little research into the types of linkages between processing firms has been conducted. This study found that most horizontal ties are informal and unstructured. More insight is needed into how firms discover changing market conditions and transmit this information between themselves, since these practices largely shape subsector performance. The high market concentration at the processor level for the pickle subsector makes these relationships particularly crucial because the potential for market control is magnified. Research is also needed into the intrafirm coordination practices of large processing

firms. The existence of x-inefficiency, where large firms operating in monopolistically competitive markets operate at less than efficient levels, may bring added burdens to others in the market system where markets are more competitive. Likewise, a more thorough understanding is needed of the reasons and implications of processed vegetable subsectors being dominated by large conglomerates. The structural characteristics of the markets largely shape the types of strategic behavior adopted. Knowledge of marketing and procurement goals and practices could add insight into how policy needs to be designed to better control how large, horizontally and vertically integrated firms impact subsector performance.

This study did not develop well the contrasts in market structure and practices between regions in the kraut cabbage subsector. The differences in market organization distribute costs and benefits between market participants in different ways. Comparing coordination mechanisms between these regions could add insight into how and why one system works better or worse than another.

In this study the analysis of how processing firms adjust to changes in demand for raw product indicated that determining contracted acreage was the main mechanism used. No strong relationship between quantity demanded and price was found to exist. A more indepth look is needed into the role of prices for controlling contracted supplies. Particularly, a more detailed analysis of contracting

practices within and between regions would add insight into the price formation process of major processors. The implications of prices that no longer indicate changing conditions in demand and supply need to be explored.

Processed vegetable sectors have long been passed over by government programs geared towards improving market information. In recent years, funding cuts have resulted in fewer sources of accurate information at the producer level. This study found that a lack of market transparency was a limiting factor to improved market performance. Research is needed into the feasibility of introducing programs that could offset this trend towards greater impacted information. Cost benefit studies are needed of alternative market news services that can increase market transparency.

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