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THE MICHIGAN PROCESSED POTATO INDUSTRY: AN INFORMATION
SYSTEM CASE STUDY

Michigan State University

PH.D.

1980

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**THE MICHIGAN PROCESSED POTATO INDUSTRY:
AN INFORMATION SYSTEM CASE STUDY**

By

Ralph Dean Christy

A DISSERTATION

**Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of**

DOCTOR OF PHILOSOPHY

Department of Agricultural Economics

1980

ABSTRACT

THE MICHIGAN PROCESSED POTATO INDUSTRY: AN INFORMATION SYSTEM CASE STUDY

By

Ralph Dean Christy

In recent years problems relating to public agricultural information systems have been a concern of market participants, economists, and government officials. This study identifies two fundamental problems that confront research on data and information systems: (1) various forms of statistical obsolescence, and (2) the lack of a proven theory and methodology.

The Michigan processed potato industry is used as a case study. Personal interviews were conducted with each plant manager. The interviews were designed to obtain information on structural characteristics of the industry and to evaluate the usefulness of various types and sources of price information in the firm's marketing decisions.

The research is based on an information system paradigm which asserts that information obtains its value in the context of a specific decision. The theoretical basis for the research was expanded by integrating this intellectual framework with the following bodies of theory: neoclassical economics, industrial organization (I/O) theory, the behavioral theory of firm decision making and a limited construct, the cost and benefits of information over various market structures. Taken together, the above frameworks formed a synthesis which cast this research in an inductive mold. Central questions included: What is the relationship between market structure and information? How

does firm procurement behavior impact the production, distribution and use of market information? What is the value (measured in terms of a scale of usefulness) of various types and sources of price information in the context of specific firm marketing decisions? What are the firm's risk management and standard operating procedures and how do they impact market information?

Market structure impacts information in the Michigan processed potato industry in three fundamental ways: (1) it contributes to statistical obsolescence; (2) it determines in part the value of price information, and (3) it distributes the public and private costs and benefits of information.

Statistical systems become obsolete when major changes occur in market structure, such as have been experienced in most vegetable markets over the past two decades. These structural changes make it more difficult for a public statistical agency to collect market information. Statistical obsolescence also occurs when there are changes in the decision agenda of the users of information. Decision related obsolescence does not appear to be a major source of difficulty in the Michigan processed potato industry.

This study illustrates how selected elements of market structure, firm size and firm type affect the value of information. For the most part, larger firms tend to realize the need for, and hence the value of, price information. With respect to firm type, freezers tended to value procurement types and sources of information higher than chippers. On the other hand, chippers rated information on the firm's product side higher.

The distribution of public and private costs and benefits of information in an oligopoly market is difficult to assign. This study argues that the cost of information for the firm is relatively low and the public cost of information is relatively high in such a structure. The public benefits of market information shift from returns to facilitation of market coordination to returns to public policy and regulatory programs as one moves from purely competitive markets toward monopoly. Within the Michigan processed potato industry, simply providing more information will not substantially improve market performance nor facilitate public policy in the sense that large benefits would result.

Elements of market procurement conduct, risk management practices and standard operating procedures impact market information. Generally, the firm attempts to reduce its risk by employing any number of the above elements of behavior. Whenever a marketing practice becomes "too risky," the firm avoids this activity by shifting it to another market participant.

This study concluded with implications to the following areas of concern: recommendations to public statistical agencies, the usefulness and limitations of the information system paradigm as a framework integrated with other bodies of theory, and the research agenda for agricultural economists.

I, don't, feel no, way, tired---
Come too far from where I started from.
Nobody told me, the road would be easy.
I don't believe, he brought me this far, to leave me.

ACKNOWLEDGEMENTS

In completing this study, I have benefited immensely from the experience and knowledge of many. Professors John Ferris, Anthony Koo, Tom Pierson, and Don Ricks served on my graduate committee and provided invaluable insights and guidance during both the writing of the dissertation and throughout my graduate study. I wish to thank Drs. Larry Connor, Les Manderscheid and Harold Riley, of the Department of Agricultural Economics, for their unwavering support throughout my graduate study.

Dr. James Bonnen, my major professor, deserves a special recognition for his untiring thoroughness, thoughtfulness, and devotion to scholarly work. During the years of my graduate study, he has always maintained an open door. More importantly, he maintained an open mind; many of my problems became his problems. His warmth and flexibility made my graduate study a pleasure as well as an intellectual experience.

Several governmental agencies are also due recognition. The Economics and Statistics Service of the U.S. Department of Agriculture provided financial support for this study. I would like to thank the Michigan Agricultural Reporting Service for their cooperation in supplying information at several critical points in this study.

The study would not have been possible without the help of the Michigan potato industry. Special thanks are due Mr. Roy Kaschyk, Executive Director of the Michigan Potato Industry Commission, who

introduced me to many members of the industry, and got our work off to a great start. I would also like to acknowledge the gracious assistance of Mr. Larry Jensen, Sales Manager of the Chief Wabasis Potato Grower Cooperative, who also introduced me to many industry participants. I am especially indebted for the patient cooperation of Michigan's processing potato plant managers, buyers, and brokers who gave generously of their time for personal interviews. Many of them were gracious enough to participate in a second interview session when I found it necessary to obtain a clearer understanding and additional information.

Special thanks are due those who provided clerical assistance for this research. My gratitude goes to Debbie Andrews and Lucy Wells who typed the first draft of the dissertation. I would like especially to thank Cathy Cooke who cheerfully and carefully typed the final draft.

To the late Dr. Hezekiah Jackson, former Dean of the College of Agriculture at Southern University, I wish to express my appreciation for his unfailing support and encouragement.

Finally, I wish to extend a sincere thanks to my family. To my wife, Bernita, who provided the support and understanding. To my parents, Ruth and Shelly, who gave their all. And to my brothers and sister whose guidance and support were a source of strength and inspiration.

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CHAPTER I

INTRODUCTION

A. Background

In recent years problems have engendered growing concerns about various aspects of publicly provided statistics. These concerns are expressed by market participants, researchers, and government officials who use or provide these statistics. Who do our statistical programs benefit? What are the relevant aspects of the economy or a particular market which should be monitored? How should the statistical programs be supported and managed given the nature of the beneficiaries and the value which the statistics produce?

Several developments have led to an upsurge of interest in data and information systems: a) costs of information and information systems have risen greatly; b) income distributional impacts of differently structured information systems have begun to be recognized; c) there is a growing realization that our ability to conceptualize often is limited by data; and d) related to the above, there is an expanding awareness that during the past decade our profession may have relied too heavily on deductive analysis without proper concern for the relevance of the data base (Eisgruber). Two fundamental problems confront research on data and information systems: (1) various forms of statistical obsolescence, and (2) the lack of a proven theory and methodology.

B. Statistical Obsolescence

In a changing world, the revision of data and of information systems is not a one-time or occasional adjustment; it must become a continuous ongoing process (Dunn). Dunn describes the demands on the system as increasingly for information in a "learning or developmental mode." This is especially characteristic of policy information systems.

The notion of statistical obsolescence is also germane to the public agricultural information system. The AAEA Economic Statistics Committee observed that a major current problem of our agricultural data system is one of conceptual obsolescence. But errors in data production are not limited to conceptual problems; operationalization and measurement problems also have implications for the reliability of data (Bonnen, 1975, p. 754; and Riemenschneider, p. 27-36). Thus, a major inherent problem of our agricultural information system is one of obsolescence, and it stems from two sources: 1) changes in the reality being tracked by the information system, and 2) changes in the policy agenda.

Obsolescence in a data system arises when there is a failure to conceptualize, operationalize and measure a concept accurately after a fundamental change occurs in the economic structure and organization of the food system. The same failures can affect the analytical frameworks in which that data are used. These structural changes are responsible for some of the current criticism and pressure on agricultural data systems.

Obsolescence in an information system also arises when the nature of the public and private policy agenda changes (Bonnen, 1975, p. 754). For example, the agricultural policy agenda has continued to change and expand to address such problems as rural development, agribusiness interests, environmental degradation, nutrition policy and world hunger. These broad areas of public policy affecting agriculture have not only created new demands for data and information systems but the policy conflicts have also exerted pressure on our agricultural statistical agencies to maintain objectivity in the midst of competing social and political ends.

Historically, the earliest government investments in agricultural information arose out of a national agricultural marketing policy which attempted to improve micro-efficiency through improving private market decision making. Today many would agree that the rationale by which market reporting was added as a government function has been obscured by the passage of time. While some of the apparent deficiencies in the present market information system appear to be real, they do not invalidate the public policy need for market information so much as these deficiencies suggest that different roles for public information systems are evolving. Many problems of the public information can be best examined within markets that have undergone rapid structural changes. The processed potato industry is a prime example where many of the newer problems for agricultural data and within information systems are clearly illustrated.

C. The Potato Processing Industry

This section describes some of the economic characteristics of the U.S. potato industry. The discussion includes the following

topics: production and consumption trends, common marketing channels, economic concentration, and exchange mechanisms.

To place the potato processing industry into perspective, it is helpful to begin by briefly describing the entire potato marketing system. Since per acre yields have increased over the last few decades, and per capita consumption remained fairly constant, the total acreage needed to produce the nation's potato supply has fallen from 2.8 million in 1940 to 1.4 million in 1976 (Sullivan). When taken on an output basis, in 1979 United States growers produced 348.4 million hundredweight of potatoes compared to 226.2 million hundredweight produced in 1940.

A trend toward regional specialization and, subsequently, economic concentration is emerging in commercial potato production. The Western Region--Idaho, Washington, Oregon, and California--accounts for nearly half of annual total potato production. The Northeastern Region, which includes the "processing states"--Maine, New York and Pennsylvania--accounts for nearly 25 percent of the annual potato supply. The West North Central region, in which North Dakota and Minnesota lead in production, ranks third in commercial importance. Michigan is in the East North Central region and ranks tenth among the states in potato production.

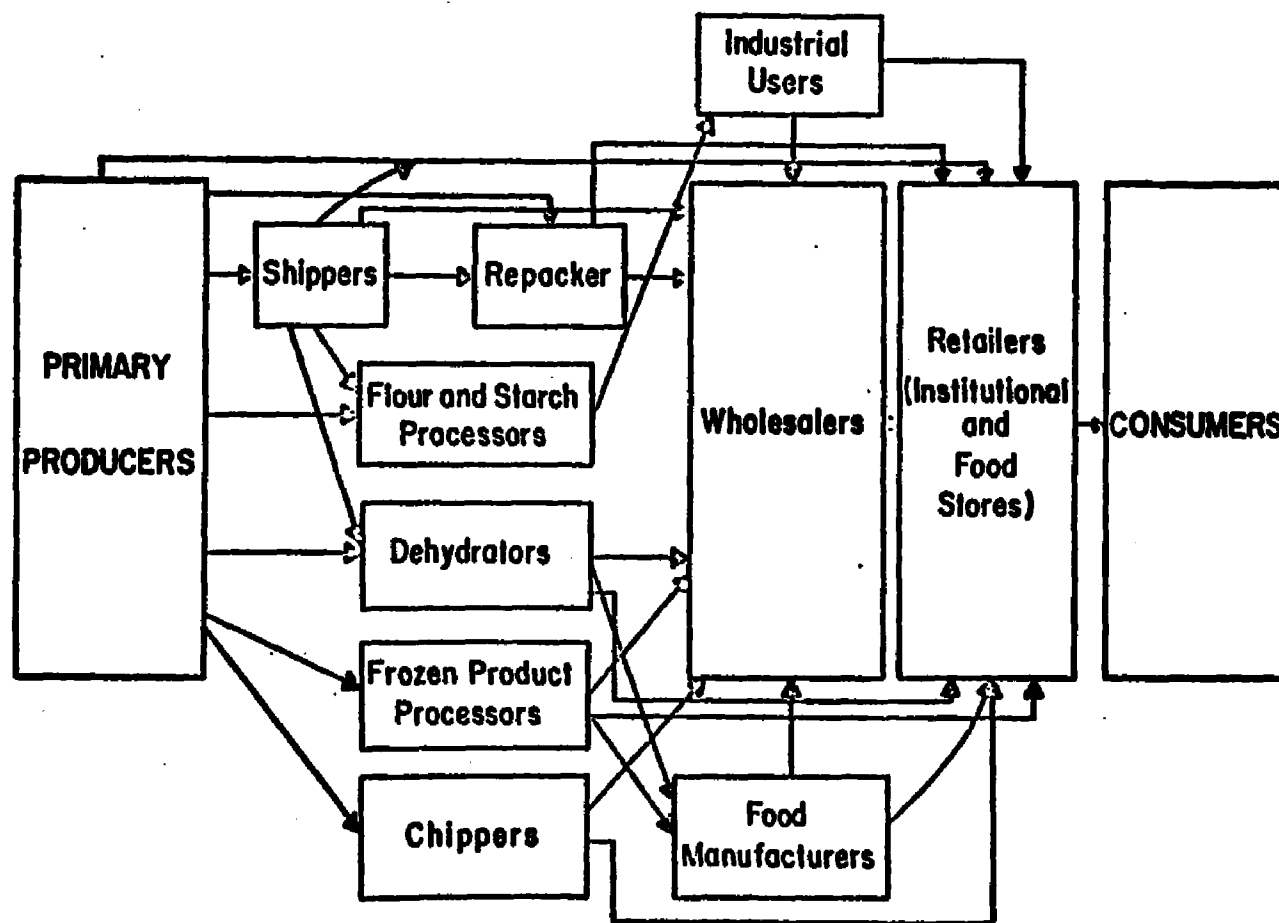
The regionalization in production correlates in part with recent industry trends in consumption. With per capita consumption of fresh potatoes declining, future industry expansion is likely to take place in the processed product. In 1978 frozen potato products accounted for approximately 58 percent of the market for processed potatoes, chips for 23 percent, dehydrated products for about 15 percent and canned products for about three percent (USDA).

The potato industry has two major marketing components: fresh and processed. Potatoes represent the largest fresh vegetable crop grown in the United States. The significant growth in the potato industry which has taken place since 1970 has come primarily in the expanded marketing opportunities for processed potato product. Figure 1.1 illustrates the common marketing channels which potato producers frequently use.

Potatoes grown for fresh market are delivered directly from the field to the retail market by the grower. The growers frequently perform the functions of washing, grading, packing, and shipping the potatoes to retail outlets or alternatively the grower may deliver his produce to shippers who in turn perform the marketing functions. The grower or shipper may deliver potatoes to remanufacturers in urban markets who trade with retailers and institutional food establishments via brokers.

Contracts presently facilitate a small percentage of the exchange between producers and retailers (especially the large chain stores). From the perspective of both parties, contracting can have at least two desirable features: 1) it establishes a price, and 2) it specifies a stable quantity.

Potatoes for processing are grown in many areas of the United States but primarily in the Northeast and West regions. The processing industry is resource oriented so that plants are scattered throughout production areas with plant concentration closely correlated with areas of high crop density. Generally, plants obtain their supplies from local areas in order to minimize procurement costs. Growers deal with five types of processor firms: 1) flour and starch processors, 2) dehydrators, 3) frozen produce



Source: K.M. Harrison, "The Michigan Potato Industry: A Market Analysis." Agricultural Economics Report No. 294, Department of Agricultural Economics, Michigan State University, April 1976.

Figure 1.1 Major Marketing Channels for Potatoes and Potato Products

processors, 4) chippers, and 5) canners. Depending on the region and the type of firm, one of four methods are used in exchange:

1) contract, 2) group bargaining, 3) exclusive agency bargaining, and 4) vertical interaction.

Beyond the processor level, processed potatoes flow into the broad and complex market channels for food. Institutional buyers and other food manufacturing companies are processors' customers, but the dominant outlet is the grocery retailer who may buy directly (i.e., the large food chain) from the processor firm or indirectly through wholesalers.

The number and location of potato processing plants are strongly influenced by production areas and population centers. The West has the largest number of potato processing plants. Also by type of plant, the West leads in plants for frozen product, dehydrated products, and has a slight lead on the Midwest in number of canning plants. (See Table 1.1).

Potato chippers show a somewhat different geographical dispersion than other processing firms. The Northeast accounts for the largest number of chippers although chippers are dispersed fairly evenly in all regions. Because of distribution cost, chippers tend to locate near the final market--large consumer areas.

D. The Processed Potato Industry: Implications for Research

This section of the paper will address the questions of why this subsector and market level are the focus of the research and what are the implications of the structural changes in the processed potato industry for public information systems.

**Table 1.1 Potato Processing Plant Locations in the United States
By Regions, 1972**

Region¹	Freezers	Dehydrators	Chippers	Canners	Starch and Flour	Total
Northeast	11	3	43	11	11	79
West	34	27	36	14	15	126
South	0	0	33	11	1	45
Midwest	7	3	28	13	2	53
TOTAL	52	33	140	49	29	303

Source: K.M. Harrison, The Michigan Potato Industry: A Market Analysis. Agricultural Economics Report No. 294, Department of Agricultural Economics Michigan State University, April 1976.

¹The Northeast region includes Maine, New Jersey, New York, Pennsylvania. The West includes California, Colorado, Idaho, North Dakota, Oregon, Washington. The South includes Alabama, Florida, North Carolina, Texas, Virginia. The Midwest includes Michigan, Minnesota, Wisconsin.

This study focuses on the Michigan processed potato industry for several reasons. First, previous research done at Michigan State (Klein) will allow this study to expand our knowledge on data and information systems in vegetable markets. Second, unlike many vegetables, the single product (main commodity) characteristic of the processed potato industry allows one to follow the product through its market channels and, to the extent market information is correlated with product flow, the researcher can more readily examine the relationships between market characteristics and information. Lastly, given time and resource constraints and the complexity in defining appropriate research objectives for this study, there is an advantage in an in-depth case study that implements and tests a problem definition and methodology before trying to apply it on a broader scale (e.g., regional or national market).

Beyond the above cited reasons for this research lies a more fundamental one--the need to maintain viable and competitive exchange mechanisms in agricultural markets. The question arises, what can public statistical agencies contribute to this end? Heretofore, the open exchange mechanism has generated adequate information for the system's participants. But the displacement of traditional "open market" transactions, usually auction type markets, by other exchange arrangements requires more than the usual amount of effort, if not a new focus in our research and data collection institutions, if adequate information is to be available for monitoring market developments and meeting public and private decision needs in the food and fiber sector.

At this level in the processed potato industry, structural characteristics play an important role in distributing trade information. Structural characteristics of a market can be expressed in several dimensions. For the purpose of this study, three elements of market structure are of interest: 1) size and number of firms, 2) economic concentration, and 3) exchange mechanisms. They will be discussed in the context of the processed potato industry with implications for data and for information systems.

The size and number of firms are important elements to consider in evaluating the informational needs of an industry. Potato processing firms range in size from subsidiaries of large diversified food corporations to small local private firms. Also the number and location of processing plants are strongly influenced by the location of production areas and the location and distribution of the consuming population centers. From the discussion of the economics of information one can deduce that the demand for information will vary across firm size.

Definition of the degree of concentration within an industry is always in turn dependent upon a definition of the relevant market. Since a semi-perishable product like potatoes is capable of national distribution, plants and firms located in any region are potential competitors and local market concentration has little applicability to sales of processed potatoes. For the most part, concentration in the processed potato industry has relevance for regional and national markets. But for the procurement of raw materials, the local market is relevant. Because of the lack of data and the conceptual problem of the nature of concentration in the local processor

procurement market, it is difficult to make a firm estimate of market concentration. It is, however, generally accepted within the industry that concentration in the procurement of raw product is high.

Exchange between processed potato growers and processing firms is, for the most part, accomplished by some form of written contract. Estimates by industry personnel indicate that contract production accounts for between 40 and 50 percent of processed potato production throughout the United States. Mighell and Hoofnagle estimated that 40 percent of processed potatoes were produced under production contracts in 1960 while by 1970 45 percent of processed potatoes were exchanged under contract.

Partly in response to the effects of the high concentration in processor procurement of raw product, potato growers have turned toward alternative exchange mechanisms. Group bargaining by voluntary cooperatives and exclusive agent cooperatives have been organized as a means to counterbalance what seems to growers to be the substantial market power of processor-buyers. Another facet of potato processor procurement methods concerns the extent to which processors have integrated vertically with growers (and vice versa). Estimates by industry personnel indicate that vertical integration accounted for 30 percent of the potato output in 1960 and 25 percent in 1970 (Mighell and Hoofnagle).

E. Problem Statement

A major issue related to the design of market information systems is the concern registered by public administration and statisticians for the growing problems of collecting data at the producer-first

handler level in most fruit and vegetable markets. It is believed that many of the problems in data used for public and private decision making are caused by changes in market structure and exchange mechanisms at this market level. This is especially true of price data. These changes in the vegetable markets have frequently forced the locus of decisions and hence, price and other transaction information to the next market level, the processed market level, where questions of property rights to information become most acute. This research has a primary but not exclusive interest in price information problems.

The concern of this research is not so much with specific problems within the processed potato industry as much as with the general issue of statistical obsolescence, an inherent problem of all information systems, and the implications it has for the nature and design of market related public information in agriculture--in this case for the Michigan processed potato industry. Given the changing structural characteristics of the processed potato industry and the changing agenda of policy and management issues, the first problem is one of obsolescence as it now impacts the data system and related analysis.

While we do not start with any specific evidence of failures in decision within the processed potato industry, the basic premise of this study is that all failures in decision making have their origins in some type of information errors. This follows from the information system paradigm in which the decision maker and his preconceptions and behavior in using data and analysis are internal to the information system. As a general matter, it appears that a higher proportion of errors arise out of mistakes in the analytical process than in data

collection and even a higher proportion of information failure in any system is attributable to decision makers (Bonnen, 1979, p. 16). Therefore, another range of problems arise out of the behavior of decision makers.

Agricultural commodity markets have grown in complexity and become more concentrated--i.e., less atomistic. The difficulties in markets are more frequently "ill structured" issues of change where one's greatest difficulty lies in defining the problem. In approaching such problems, information needs continue to change as learning about the problem takes place. This involves a developmental mode of inquiry. Therefore, emphasis has to be placed on developing and implementing a methodology for examining and evaluating the processed potato information systems. The findings here may have implications for data and information systems operating in other vegetable markets as well as for information systems in general.

F. Objectives

This study has two broad goals. The first is to describe one type of problem, obsolescence, as it relates to the data systems and as it impacts the decision making processes of plant managers in the Michigan processed potato industry. The second major goal is to implement and develop a methodology for evaluating information systems operating in the Michigan processed potato industry.

Several objectives are related to the above study's two goals:

1. To describe the market structures and operational aspects of exchange at the grower-processor level in the Michigan processed potato industry.

2. To describe the publicly supported information services, the private information services and the informal information system operating within the Michigan processed potato industry.

3. To identify important marketing decisions made by potato processing firms.

4. To evaluate the information system supporting these decisions by relating specific marketing decisions to specific types and sources of data.

5. To suggest improvements in the publicly supported statistical services provided by the Michigan processed potato industry.

6. To test the applicability of the information system paradigm and to revise or extend it where possible.

From objectives 1 and 2, it should be possible to reach conclusions about the nature of obsolescence, if any, in the data system. The nature of obsolescence impacting the manager's decision process can be described from objectives 3 and 4. Taken together, suggestions on improving the public data system can be made.

G. Design of Study and Data Collection

The design of this study grows logically out of the information system paradigm. The Michigan potato processing industry will be used as a case study. Because of the general nature of the problem, most of the study will be descriptive.

The study is broken down into three phases. The first phase of the study describes the structural characteristics and procurement conduct of the Michigan processed potato industry. Given the premise

that the nature of information and of the decision maker's needs for information changes over different market structures, a description of the market structure may suggest something about distribution of costs and needs for different kinds of information among various market participants. Structural characteristics may also be related to the question of what are public versus private needs for and rights to various types of information in a market. Dimensions of procurement conduct may also have implications for market information.

Subsequent phases of the study adhere more closely with the information system paradigm. The second phase identified managers of Michigan processed potato plants as a set of important decision makers, their uses of information, and their sources of information. The decision makers and, in some cases other members of the firm (i.e., analysts, buyers), were asked to evaluate the source of information with respect to a specific decision use. Note that this procedure starts with the decision maker. Alternatively, one might have started with the development of specific concepts, their operationalization and measurement, and then, pose the question of their use and implication for the design of the information. Here the normative position is taken allowing the decision makers to identify a data series or concept that is useful to his decision making process. This approach has the merit of covering all sources of information for decision making while, at the same time, allowing for evaluation. Also, this phase of the study included questions involving a preselected set of data sources for the decision maker to evaluate in the context of a preselected set of marketing decisions. As a result, despite its open ended nature, some greater structure can be provided to this phase of the study.

Phase three of the study identified and described the data systems in the market. An a priori classification of data systems would include the public data sources, private market data sources, and the informal communication system maintained by market participants. By starting with the decision maker, a more concrete and complete specification of the data systems can be made.

The target group identified in this study is Michigan potato processing firms. Harrison reported in 1974 that there were twenty-three firms in the state. A current listing of processing firms in the state was obtained from the Michigan Potato Commission.

Potato processing firms range in size from subsidiaries of large diversified food corporations to small local private firms. The economic theory of information suggests that larger firms have an informational advantage relative to smaller firms since large firms can oftentimes recapture a return on their investments in information when small firms cannot. Moreover, the larger firms may possess a more sophisticated analytical capability and thus have more ability to use and understand the same information than smaller firms. Therefore, size of firm may be an important characteristic to consider in evaluating the informational needs of the industry.

Another characteristic of the target population is type of firm. The 1976 industry survey conducted by Harrison indicated that Michigan potato processing firms were distributed by type as follows: three freezers, fifteen chippers, four canners, and one dehydrator. One can expect different priorities to be given to various sources and uses of information across firm type since the most important decisions made by different types of firms may vary considerably.

The major data needs of the study are: 1) structural characteristics, and operational aspects of exchange at the grower-processor level, and procurement behavior of firms in the processed potato industry, 2) decisions made by processing firm managers and their uses of specific data series, and 3) types of information.

The first data need can be obtained from secondary sources. Since much of the literature on Michigan is dated, several questions concerning present structural and behavioral characteristics of the market were also directed toward each manager during the interview process.

To facilitate the second and third types of data needs, personal interviews with managers of processing plants were conducted. Lazer (1971) states that marketing decisions can be classified in many ways. They form a spectrum from the programmed or highly rigid; routine, repetitious, specific type of decision at one extreme to the nonprogrammed, less definite, unknown, uncertain, loosely constructed type at the other. He points out that a common classification distinguishes between decisions related to broad objectives and those that pertain to more specific goals. Marketing decisions may also be classified according to management's degree of certainty or information about choices. There are at least two ways of formulating an a priori set of decisions:

1. Preselect on the basis of a defined set of criteria, or
2. Obtain the decision set from a pilot study of firm managers.

This study relied primarily on the former method and validated this list with extension economists and industry participants. Using this decision set interviews were designed to obtain an evaluation of specific data sources in terms of the specific decisions made by the plant managers.

In this research endeavor, the process became a learning experience. This is particularly true of the interview process. The personal interviews conducted with the various industry participants ultimately shaped and transformed much of my thinking on both the theoretical aspects of market information systems and on the method(s) of conducting this type of research. The interview process was conducted in two settings. First, interviews with managers of processed potato plants were initiated to obtain information about the structural characteristics of the industry and about the firm's evaluation of various types and sources of market information against selected marketing decisions. On average, the interviews lasted about one hour. After the first round of interviews were completed, it became apparent that an important aspect with direct implications for market information was omitted--specific dimensions of firm behavior. Thanks to the patience of my interviewees, a second round of interviews, each lasting about forty-five minutes, were conducted emphasizing elements of firm behavior as they relate to procurement activities of potato processors.

The approach taken in this study is far from orthodox. This arises out of the nature of the problem and the lack of a proven theoretical framework--in effect, one is sailing in uncharted methodological waters.

The problem of statistical obsolescence in its various forms is difficult to analyze. There is no tested methodology from which to analyze this problem. Thus, we approached this study with a broad intellectual framework, the information system paradigm, as a guide in refining the problem and developing or identifying other concepts

and frameworks that might be applicable to problems of information in agricultural markets. The following chapter lays out the synthesized framework used in this study.

This study grew out of the realization that the tremendous changes in the structure of most fruit and vegetable markets have direct implications for our public statistical system. It did not evolve from any felt need expressed by the target group in this study, potato processors. As a result, the question of accessibility and cooperation from the managers of processing firms was initially a concern. However, all firm managers and other industry people were most patient and generous in giving their time and cooperation. This study would not have been possible without their help.

The outcome of this study will attempt to say something about how one goes about conducting research on a market information system. Given the current state of our knowledge, it was thought best to first focus on a target of limited scope and with this experience suggest an approach that may be applied on a larger scale. Therefore, a case study of the procurement side of the Michigan processed potato industry was the focus of this study.

H. Plan of Study

The remainder of this study is divided into five chapters. Chapter II presents the conceptual framework and theories useful in analyzing market information problems. In this chapter, several theories, including an information system paradigm, neoclassical economic theory and institutional economics are critiqued. Theories of industrial organization are incorporated and expanded into an

eclectic framework that is applied to the study of information uses in the Michigan processed potato industry.

Chapter III serves as review of literature by laying out four major methodological approaches that have been used in analyzing market information systems.

Chapter IV presents data which describe the three central components of the study framework: (1) elements of the Michigan potato market structure and procurement conduct, (2) the supporting information systems,, and (3) the decision environment in which Michigan potato processors operate. Most of the information presented in this chapter was obtained through personal interviews with Michigan processed potato firm managers, buyers, and brokers.

Chapter V is an analysis and evaluation of types and sources of market information against specific decision needs of the firm. This analysis is presented across selected elements of market structure. Also, the chapter links the firm's procurement behavior (market conduct) with market information and draws implications for the firm, other firms in the market and public statistical agencies.

The final chapter sums up the dissertation and discusses the implications for market and nonmarket participants and suggests possible future research.

CHAPTER II

INFORMATION SYSTEMS AND THE ECONOMICS OF INFORMATION: CONCEPTUAL FRAMEWORK AND THEORY

A. Introduction

This chapter presents several theories that are useful in analyzing market information problems. Four theoretical frameworks are critiqued: (1) the information system paradigm, (2) neoclassical economic theory, (3) institutional economics, and (4) a theory of information cost over various market structures. Theories of industrial organization are integrated with concepts obtained from the above theoretical frameworks, then applied to the study of information in the Michigan processed potato industry.

B. Information Systems Paradigm

Bonnen (1975) presents an information system paradigm that will serve as the starting point for this study. Although his paradigm does not constitute a full theory of information, it does contribute significantly to identification of the issues, to the use and clarification of terminology and perhaps more importantly to establishing the epistemological nature of data and of information systems. The paradigm posits an interactive relationship between the deductive analytic mode of inquiry commencing from theory, and the inductive empirical mode of inquiry based on observation.

The information system is composed of five components representing the logical steps or processes by which data about

the real world are processed for decision making (Figure 2.1). These are: 1) conceptualization, 2) operationalization of concepts, 3) measurement, 4) analysis and interpretation, and 5) decision making. Within an information system a subsystem can be identified, the data system. The data system function is to represent reality empirically by counting or measuring some empirical phenomena which has been broken down into a set of categories or classes. The data system is defined to include the first three components of the larger information system. In this context, the reliability of data has three possible meanings: 1) conceptual reliability, 2) reliability of operationalization, and 3) reliability of measurement (Bonnen, 1975, p. 757).¹

The information system underscores a useful and significant aphorism: data are not information. In other words, data must be analyzed or interpreted into a form which makes it relevant for specific decision making. Following the logical flow of the paradigm, data become the product of the first three components. Generally, the data system is managed by statisticians who have expertise in measuring observable phenomena in the society. The analytical framework, analysis and interpretation, provides additional meaning to the collected data. Economists, accountants, policy analysts and other disciplines are equipped with a set of theoretical and analytical frameworks which transform data into various forms which finally become information only when used in decision making. Although the information system paradigm appears to be compartmentalized,

¹Bonnen attributes this observation to L.V. Manderscheid.

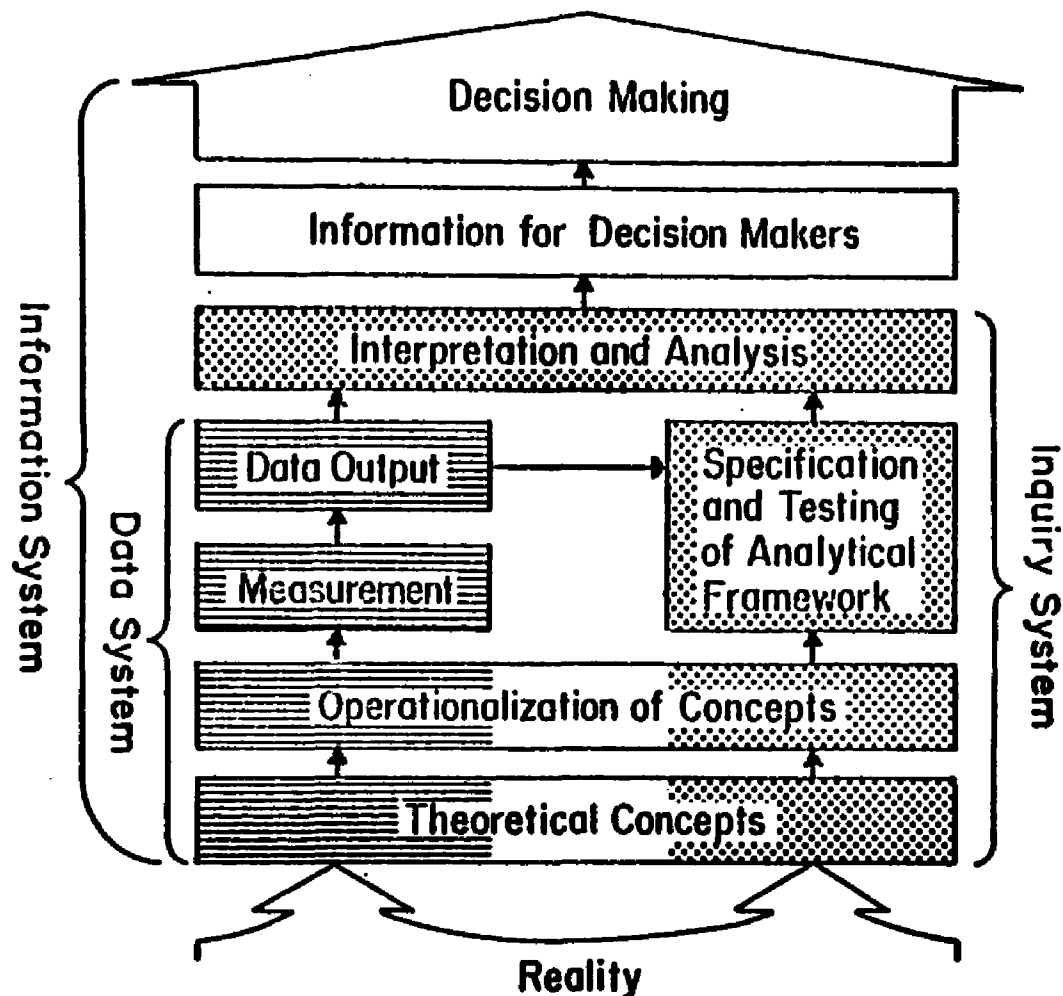


Figure 2.1 An Information System

Source: Bonnen, J.T. "Assessment of the Current Agricultural Data Base: An Information System Approach," Survey of Agricultural Economic Literature Vol. 2, Quantitative Methods in Agricultural Economics 1940s to 1970s. George Judge, et al., editors. University of Minnesota Press, Minneapolis, 1977, pp. 386-407.

interdependency of use and of management of the data base is the responsibility of all involved disciplines.

Explicit to the information system paradigm is the notion that information attains its value in the context of a decision. Therefore, the criterion of use is central to setting statistical priorities. The criteria for the design of data are also derived from the decision uses of that data.

C. Theoretical Concerns in the Economics of Information

Two variables are of fundamental importance for the decision maker: resources and information. Until recently, economic theory has dealt with the problem of resource allocation among competing uses, assuming that information is equally distributed at no cost among all individuals of an economic system and that all individuals possess perfect knowledge. With these assumptions, it becomes immediately apparent that traditional economic theory does not adequately address information problems; they were simply assumed away. A more specific critique of the theory, suggested by Demsetz, questions a comparison of resource allocation produced under a state of perfect knowledge with those produced under a state of imperfect knowledge. Since imperfect knowledge is regarded as a distortion, it becomes difficult if not impossible to separate out the effect of imperfect knowledge from the resulting conclusions of the theory (based on perfect knowledge).

Some economists have attempted to adjust for the above mentioned problem by viewing information as an economic good or commodity (Arrow). And like any other good, it becomes subject to demand

and supply analysis. But unlike traditional marketable commodities, information exhibits a set of characteristics that invalidate the usefulness of a competitive equilibrium analysis; information possesses the characteristics of a public good.

In the Samuelson-Musgrave definition, a public good is characterized by 1) nonrivalness, or jointness in supply and utilization, and 2) nonexcludability. The first attribute implies that the good is equally available to all. The second implies that it is impossible for private producers to appropriate through market pricing the full social benefits arising directly from production or use of the good. That is to say, it is difficult to exclude from utilization of the good those who do not pay for it--the so called free rider problem.

Nonrivalness is an inherent characteristic of information. Arrow comments that a given piece of information is by definition an indivisible commodity, and the classical problem of allocation in the presence of indivisibilities is apparent. For example, the use of information about market transactions by a producer is not hindered by the adoption of the same knowledge by other producers. In essence, the marginal cost of adding an additional user of information approaches zero. If it were zero, then optimal allocation would obviously call for unlimited distribution of information without cost.

Nonexcludability, in contrast, is not a natural characteristic of information, but rather is determined by institutional arrangements. For example, patent laws are institutional arrangements that make a certain kind of information excludable, thereby creating profit incentives for private activities. Arrow points out that in the absence of such special legal protection, the owner cannot cover his

costs of selling information on the open market because any one purchaser can destroy the monopoly inasmuch as he can re-produce the information at little or no cost. As a result, it is generally held that a socially optimum level of supply of such a good cannot be expected if its supply is left to private firms.

The public good characteristics of information also present a problem on the demand side of the information market. Arrow states that similar problems of indivisibility and undervaluation exist for the users of information:

...there is a fundamental paradox in the determination of the demand for information; its value to the purchaser is not known until he has the information. But then he has in effect acquired it without cost.

These problems are clearly serious for those who wish to use neoclassical supply-demand theory for analyses of informational phenomena. Quoting from Newman, Marshak states:

They lead to severe doubts concerning the optimality of the information market in itself and more generally to a view that--when knowledge production is introduced into an economy then neither for the simple competitive mechanism nor for any simple modification of it is the optimality of equilibrium preserved, and even the existence of equilibrium is doubtful.

Up to this point, in reviewing the literature, we have centered the discussion on the economics of information while giving little attention to the institutional aspects of informational phenomena. This is not surprising since most of neoclassical economics is static; the institutional structure of an economy is a fixed parameter in the analysis of resource allocation. Although a complete treatment of information from an institutional perspective has not been developed, some useful interesting notions put forth by the institutionalist are

useful in thinking about informational problems. Central to the institutional approach is the concept of property rights. Information viewed as a commodity always involves property rights. And it is these relationships that determine allocative outcomes independent of the traditional market analysis. Even if it is no more than a personal secret, the rules that govern the relationship between the parties concerned determine who is in the know and who is not. Given this premise, it follows that any efforts to resolve such problems can often be more appropriately directed at the institutional arrangements than at the information market itself. But as one would suspect, any changes in the rules which design or create the flow of information will encounter the reality that essential information is protected by entrenched institutional relationships.

A good example of how the property rights in information operate can be taken from the U.S. food and fiber markets. As industrial concentration continues to grow, "the issues of private ownership of information versus the public's right to know will become more and more critical and heated" (Bonnen, 1975).

Giant firms acquire with their great size not only an impact on market but a major responsibility for public information. Where the data on a market are collected from and distributed to firms by a trade association, the tendency to monopolize data is even greater. (Bonnen, 1975).

Since information as a commodity has unconventional properties such as non-appropriability, increasing returns in use, and indivisibility, Arrow maintains that no amount of legal protection can make a thoroughly appropriable commodity of something so intangible as information. Legally imposed property rights can provide only a partial barrier, since the very use of the information in any productive way is bound to reveal it, at least in part.

Moreover, the inherent characteristics of information are not only applicable to the information market itself, but also to any attempt to alter the institutional rules which govern its flow. Consider, for example, appropriability where the proposed problems of under-supply of information are due to the non-appropriability of returns. That is to say that the under-supply will depend on the degree to which the returns to investments in information cannot be appropriated. This also holds true (theoretically) for any attempt to change the rules. Institutional innovation itself also maintains the properties of a public good.

D. Market Structure Effects on the Costs and Benefits of Information

Because the value of information is only realized ex post of decision, public or private returns on investments in information are difficult to estimate. It may be reasonable for a decision maker to concentrate on minimizing the costs associated with acquiring information. But under some market conditions private decision makers can realize direct benefits from information. Both costs and benefits shape the behavior of decision makers. To help illustrate this, hypothetical cases of information cost and benefit for private firms and for public statistical agencies under four different market structures and exchange mechanisms are presented.

For the purpose of this presentation, we focus on market information which takes on a special meaning. In the strictest sense, we know that market signals are not information per se because they have not been analyzed nor interpreted to serve a specific decision. Economists marvel over the signaling function which prices play under perfectly competitive market conditions. But outside of this

set of preconditions, the limitations of the informational content of prices are well documented (Collins). Nevertheless, given the context of a market, when exchange occurs, there is always the presence of information. The question arises as to who has access or rights to this information, how are costs and benefits from its use distributed; why do public statistical agencies and private firms behave so differently with respect to information distribution and use in different market structures.

To the extent that the distribution of market information varies over market structures, it is reasonable to assume that costs and benefits are distributed differently among various market participants. Even within the same market structure, the total cost of producing information varies between organizations for any number of reasons including, for example, size of organization, purpose of organization, management styles, analytical capabilities and methods of accounting for cost (Burch, 1979, p. 13). Because of its public good characteristics, the problem of measuring benefits of information becomes equally difficult.

The following assumptions are made for each hypothetical case:

1. Given the market structure, one hundred percent of the market volume is transacted under the exchange mechanism typical to that structure.
2. Both buyers and sellers in the market face the same market structures.
3. Firms are not required to report to the public statistical system.
4. The nature and type of information needed for decision making changes over various market structures.

The analysis considers a series of four comparative hypothetical cases. Each case examines how cost and benefits of information are distributed under the condition of a specified market structure and associated price exchange mechanism. The following market structures with a commonly associated price discovery mechanism are considered: competitive market/auction; oligopoly/contract; monopoly/bargaining; and single firm market/vertical integration.

In the first case, we examine the cost and benefit of information to the public agency and to the private firm(s) in a competitive market. A public auction is a close approximation of the competitive market. In this case, it is hypothesized that the public agent and the private firm would both incur relatively low costs for obtaining information. Why? The competitive market with the assumption of many buyers and sellers (etc.), especially in the case of a public auction as the exchange mechanism, presents no problem for a participant or a neutral agent in obtaining accurate and representative market information merely by participating in or observing the centrally located auction process. (A characteristic of information is nonexcludability.) The public agency faces relatively modest costs in this case, compared to what it faces under other market structures. Informational costs are no higher and often lower for the firm but as one competitive firm among many, it finds it difficult to capture any return on its investments in information. The firm is regulated by the market and, to the extent that the market is able to supply an adequate amount of reasonably accurate information, the firm does not invest in the collection of market information. Since no

private firm has an incentive to provide the information needed to facilitate the coordination of the market, the public statistical agency, while facing the same relatively low costs, has the capacity to generate very high social returns to society.

As we move to the next market structure and exchange mechanism, oligopoly and contracts, we encounter higher information costs for the public agency and perhaps slightly lower information cost for the private firm for several reasons. While there are many fewer firms in the market, the cost of information to the public agent is higher because of the substitution of a private contract arrangement for the open market signals of a public auction. Proprietary rights in market information heighten. It is in the individual firm's interest to withhold information so that it maintains a competitive edge on other firms in the market. Information ceases to be a product of the public processes of the market and becomes more an internal firm product of a publicly unrecorded private transaction. But, even if the contracting firms should voluntarily report to the public agent, the complex and varying specifics of each of the many contracts would create major formatting and disseminating costs. Also, much of the coordination of the market follows from the fewness of firms and their interdependence in behavior--reducing the benefits to any public investment in market information. Under this market structure, the firm still faces about the same information costs, but the potential net benefit to an oligopolistic firm is higher. Because of the very nature of the market, the firm can use information internal to its operations to arrive at estimates for the entire market. Moreover, the firm

recognizes that more of the return to its investments in information can be captured by the firm under oligopoly conditions.

Next, we consider bilateral monopoly and a common exchange mechanism associated with monopoly structure, bargaining. Here it is hypothesized that the public agent will experience very much higher information acquisition costs and the firm will incur still lower information acquisition cost. All market information is now the product of the internal decisions of the two monopolists. The public agent information costs are likely to be higher because of the obstacle of entrenched property rights in information by the firm. Information held by the firm is reported only in the case where the firm is required by law to report because of some prevailing public policy concern (see assumption 3). Consequently, the cost of acquiring market information for the public agent becomes extremely high. However, there are potentially high social benefits for such public investments, but for public policies regulating firm behavior, not for facilitating market coordination which is entirely internal to the two monopolies. The firm is in full control of all market information--at least on one side. Exchange between the bilateral monopolists is facilitated by bargaining. Although the cost of bargaining may be high for the monopolist, the cost of acquiring market information is lower relative to the firms in other market structures. Here again, because of market structures, the firm has low informational cost and can realize high private benefits from information.

In the last case, we examine the extreme situation of a single firm economy--no market transactions. Although the potential social benefits of publicly supplied information is high, the acquisition cost of information for the public agent is prohibitively high. The cost of access to information for the firm becomes extremely low. While information processing, managing, and analyzing costs may be high, the cost of access to market information is nil, and the advantage and benefits in the control over distribution of information, especially with respect to public versus private use, lies in the private firm's domain.

Concluding Generalization: As one moves from case to case in the purely hypothetical examples above, market concentration increases, and the cost of market information for the public agent increase greatly, while the cost of market information for the firm probably decreases. As market concentration increases, private benefits to firm investments in market information increase greatly providing a major incentive for the firm to invest in information and to deny access to any public agent. For the public agent, as concentration increases, the social benefits to public investments in information to facilitate market coordination decline rapidly, while those to information for public policy and regulatory decisions grow. Thus, the purpose of public investment in market information changes drastically. These comparative cases provide hypothetical examples based on theory of how acquisition costs and benefits are distributed between the private firm and the public agent over various market structures and exchange mechanisms. It is important to recognize, however, that information is a necessary but not sufficient condition for "good" market performance.

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conceived of this framework, perhaps he did not envision its use in the manner which this thesis proposes. But intuition suggests that the relationship between information and each component of the I/O framework run in a two-way street as shown in Figure 2.2. Information influences market structure, but a given structural characteristic of a market can govern the flow and distribution of information; information influences the behavior (conduct) of the firm, but the firm can reduce its needs for information by adopting various risk management practices which allow it to make decisions in an environment of imperfect knowledge; information can be associated with market performance, but conversely the performance of a market can impact information. Thus, this relationship becomes a full circle. Although, a dynamic relationship between the I/O framework and information is theorized, it becomes more manageable to trace out connections between the two in a single direction. That is to say, one can hold the structural and behavioral dimensions of the market given, and question what impacts do various elements of the I/O framework have on the distribution and perhaps value of information in the firm's decision making process.

Although the I/O framework has contributed to valuable research, it certainly has broader implications than its traditional use. Perhaps the two most commonly cited limitations of the I/O framework are critical in adapting its use to information problems. The I/O framework de-emphasizes (1) vertical relationships, and (2) the behavior of the firm's decision process.

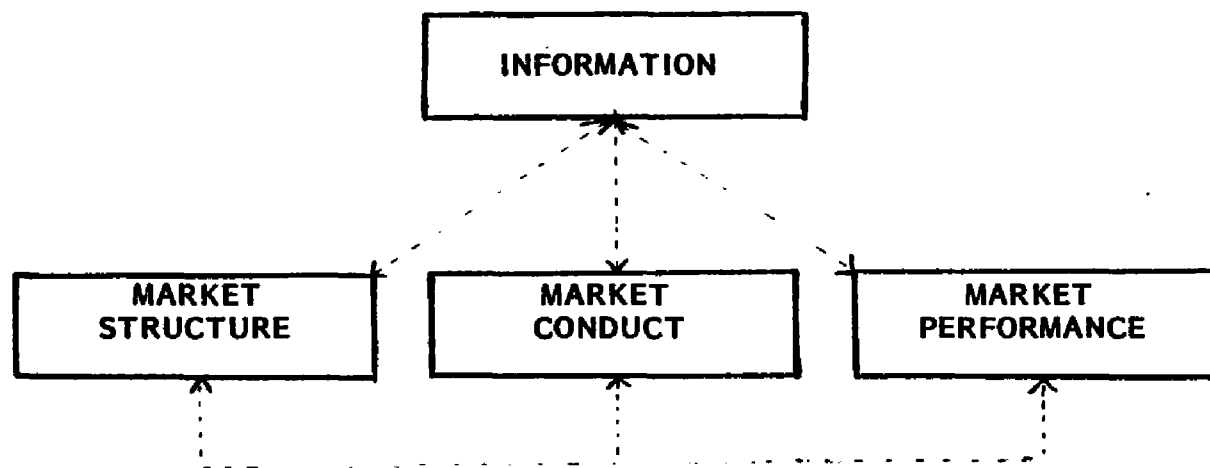


Figure 2.2 Market Information and the I/O Paradigm

Information is a product of exchange. And exchange takes place in both horizontal and vertical dimensions. But traditionally, industrial organization theory has been applied only to horizontal market relationships. More recently several researchers including Boynton, Henderson, Marion, Shaffer (1974), and Williamson (1975) have attempted to integrate and combine vertical coordination with I/O theory. They have all recognized that the I/O paradigm has important applications to the study of vertical market relationships and the coordination of these systems in addition to its early application to single industry research. Developments in this area will have implications for research on information systems because more information (for both private and public purposes) is transferred via vertical market transactions than in horizontal ones.

Researchers argue that the I/O framework omits aspects of reality which, if incorporated, would extend and strengthen the scope of the analysis. The I/O framework has concentrated on conditions external to the firm (i.e., definition of the relevant market). Thus, it has treated the firm like a "black box." Shaffer (1979) calls for linking the I/O framework with the bodies of knowledge developed by organizational behavioralists (Simon, March, Cyert) whose primary concern commences with intra-firm decision making. This line of reasoning would not only add to I/O theory but would also make it possible to investigate the relationship between the firm's decision process and information, a link that is central in the information systems paradigm. If I/O theory does not account for the firm's decision making environment, one cannot expect it to accommodate notions related to information.

Figure 2.3 illustrates a framework which incorporates vertical relationships and the firm's decision making process (Marion). Some definitions of terms as they are used in this figure and as they will be used in this research are presented below.

Structure is a collection of parameters that define the opportunity set of subsector participants. Three classes of parameters are considered :

1. Basic conditions deal with market geography in relation to supply and demand conditions and characteristics of the produce (i.e., elasticities, product perishability, location of market, etc.).
2. Market characteristics include the market structure variables in the application of the I/O framework (i.e., concentration ratios, number and size of firms, entry and exit, product differentiation, etc.).
3. Institutions refers to established customs, rules or procedures.

Conduct describes the behavior of participants influenced by market structure, decision making processes, and goals of the firm. In this study we focus on the conduct of the firm in its input market.

The firm's decision environment pictures the firm in a world of uncertainty influenced by market structure, goals of the firm, and standard operating procedures.

The universe of market information is divided into three parts. Information that arises out of market transactions is referred to as the informal system (i.e., information that is transmitted between grower and processors). Information that is collected by private firms and sold to the market participants is referred to as the private system. And information collected and redistributed by public institutions for the purpose of improving market performance is called the public information system.

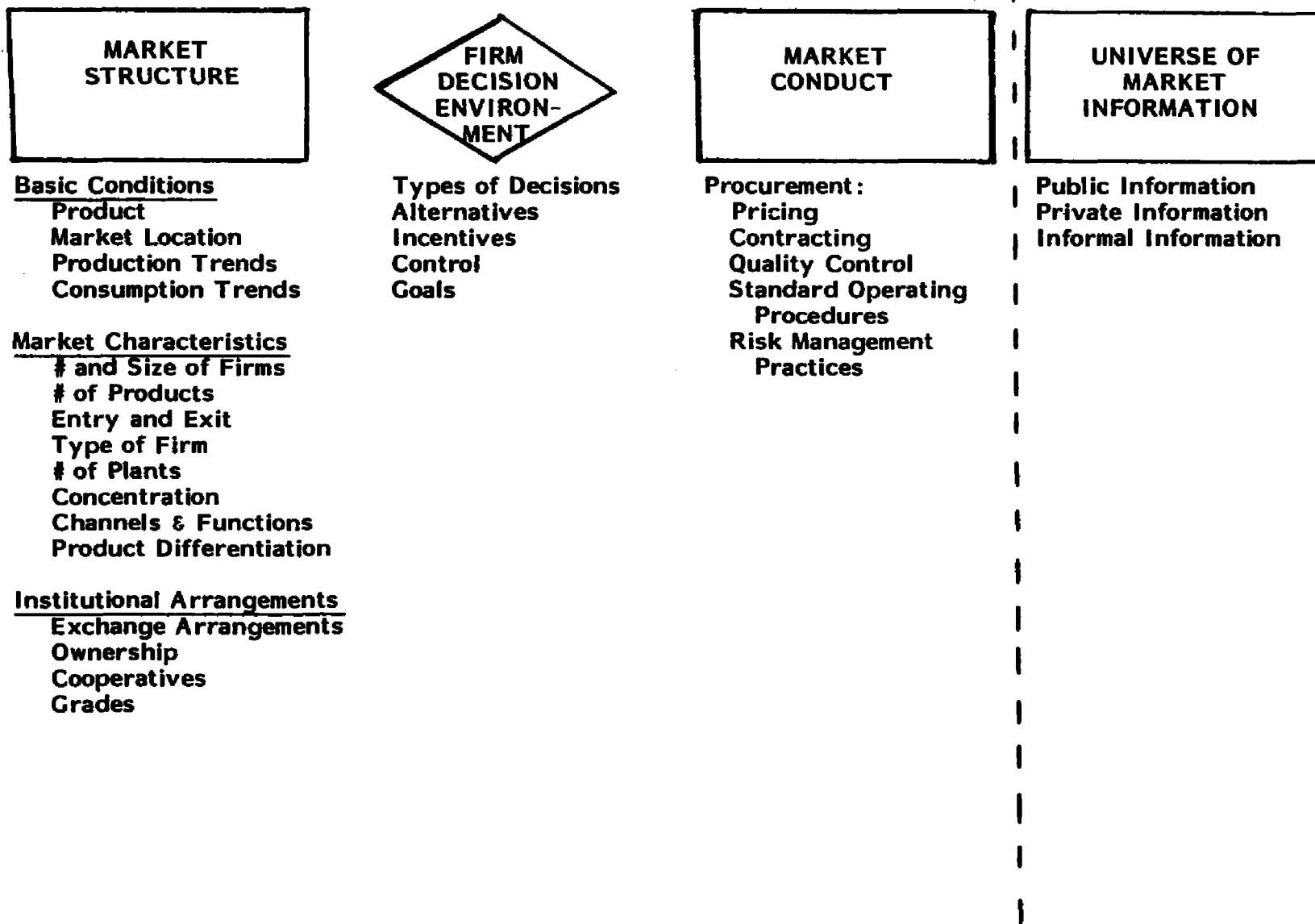


Figure 2.3 Market Structure Analysis and Information

F. A Research Framework

An adequate framework for analyzing market information problems is still to be evolved. Nevertheless, the need for a framework here is evident; it is needed to provide a means of organizing, interpreting, and filtering knowledge about reality while abstracting from the complexities of the real world. Given the nature of the information problems described and the lack of an applicable integrative theory to solve them, a certain amount of research has to be inductive at this stage. Kemeny defined induction as "the process by which a scientist forms a theory to explain the observed facts." Induction reasons from the parts to a whole, from the individual to the general. Thus, a framework arises from the inductive research process and then it is used deductively to suggest causal relationships, predict outcomes, describe a phenomena and test hypotheses. The main focus of this research effort will be in an inductive mold.

At this point, we explain how the integrated framework illustrated in Figure 2.3 is employed in an evaluation of market information for the Michigan processed potato industry. The theoretical origins of each component of the framework will be identified and a discussion of its application in this thesis will be presented. At the outset, it should be noted that this work does not represent a complete integration of all the elements of each component of the framework. We only borrowed what was necessary to illustrate the relationship between information and components of proven bodies of theory. Also, certain aspects of each theory were easier to operationalize in the context of the Michigan processed potato industry and within the resource constraints of this study.

This research effort started out with the intellectual framework presented in the first section of this chapter. The information system paradigm structured the inquiry process in that it focused the research on the decision maker. Alternatively, one may have commenced the research with a given concept and subsequently examined how the information system conceptualized, operationalized, measured, and analyzed the concept for a given set of decision purposes. But this research adopted the approach which starts with the decision maker, and is informed by the notion that information attains its value in the context of a specific decision. The operationalization and qualification of this statement was aided by four bodies of theory: industrial organization, behavioral theory of the firm, theories of vertical coordination, and neoclassical theory.

The study began with the model of industrial organization (I/O) infused with the theory of vertical coordination and applied to the research issue of information and market structure in the processed potato industry. This encompasses the left side of Figure 2.3 under the heading of market structure. The elements listed here are discussed in Chapter IV of this study. Two elements of market structure, firm size and firm type, are incorporated into the analysis presented in Chapter V. Specifically, these elements of market structure were used to stratify firms in the Michigan processed potato industry. Within these structural sets we cross tabulated information obtained from personal interviews with managers concerning their evaluation of types and sources of market information against specific decisions made by the firm. The firm size variable consists of three categories: large, medium, and small. Therefore,

the analysis compared the results of how plant managers evaluated information between each group. Firm type consists of two categories: freezers and chippers. Similarly, comparisons were made between freezers' and chippers' evaluation of market information types and sources.

Central to the evaluation of market information is the decision environment of the firm. This study has pointed out some of the limitations of neoclassical economic theory in describing and explaining firm management decisions. Therefore, a behavioral theory of the firm was adopted which characterized the firm as an adaptive organization subject to uncertainty. In Chapter IV we will lay out this framework and present the descriptive results of each firm's perceptions of its decision environment. This information will then be used to validate a preselected list of types of marketing decisions made by potato processors. The resulting set of decisions was used in the cross tabulations described above.

Market conduct, a central component of the industrial organization framework is used to link the other elements in this study to the firm's procurement activities. In the traditional application of the I/O framework, market conduct has reference to the product market. Here, however, we examined the procurement activities of potato processors. Theories relating to the behavior of the firm were also useful. Concepts and practices of risk management and standard operating procedures are dimensions of firm behavior that the I/O framework does not handle. In Chapter IV we describe these aspects

of the firm and in Chapter V we attempt to infer the direction of impact each category of firm behavior has on the production, distribution and use of market information between a firm, competing firms and public statistical agencies.

This framework provided a means of organizing and interpreting real world observations. It allows the researcher to structure the areas of inquiry. In fact, many questions (research issues) arise from the conceptual framework. Some key areas of inquiry include:

1. What is the relationship between selected elements of market structure and price information?
2. How does firm procurement behavior impact the production, distribution and use of market information?
3. What is the value (measured in terms of usefulness) of various sources and types of price information in the context of specific marketing decisions?
4. What are the firm's risk management practices and how do they impact market information?
5. What are the firm's standard operating procedures and how do they impact market information?

CHAPTER III

A REVIEW OF THE METHODOLOGICAL APPROACHES

A. Introduction

In Chapter II several integrated frameworks were presented which are applicable to the analyses of information problems. The theoretical developments in the economics of information are still evolving and thus methodologies are also developing.

Eisgruber states "neither theory nor methodology exist to address adequately the economics of information, and until recently, little effort was made to overcome this deficiency." Since we are still a long way from a theory of information, economists have employed several methodological approaches in the study of information systems. Each approach reflects the diverse view that has earned this subject matter the title of the "myth of methodology" (Miller). The approaches reviewed here were chosen to illustrate the various methodologies which have been applied to the problem of marketing, especially price, information systems. Four methodological approaches will be discussed: 1) net social benefit, 2) pragmatic user approach, 3) market structure, pricing institution and information, and 4) market performance and information.

B. Net Social Benefit

The widely cited Hayami and Peterson article illustrates this approach. Their study is based on producer and consumer surplus

measures from welfare economics. Therefore, the study makes the traditional assumptions of competition; lack of externalities, perfect mobility, and homogeneous information among the actors.

This study examines whether it is socially beneficial for USDA to seek greater statistical accuracy in crop forecasting. Using an inventory adjustment model and cost figures supplied by USDA on sample surveys with varying levels of sampling error, they found that an extra dollar spent to increase the accuracy of statistical reporting results in net benefits ranging from \$20 to \$100.

The net social benefit approach has several shortcomings. The work of Hayami and Peterson has been critiqued on several fronts. First of all, the global modeling approach, with its heroic assumptions, does not make explicit all the impacts and costs of additional investments in the accuracy of crop reports. For example, more accurate information for soybean producers may be at the expense of reports for the corn market.

Dobson (1979) notes that the researchers neglected an important factor related to the accuracy of crop forecasts--weather. He observes that errors in crop forecasts result not only from sampling errors, but also from changes in growing conditions after the crop surveys are taken.

The Hayami-Peterson study leaves the reader uninformed concerning how much of the error in crop forecasts results from sampling error and how much error results from abnormal conditions which occur after the sampling date. The reader also is left to ponder how much improvement in crop forecast might be obtainable from more accurate sampling and how much improvement would be obtained from developing usable long-range weather forecasts which would permit adjustments to account for expected changes in conditions after the crop survey.

C. Pragmatic User's Approach

A review of various studies employing the pragmatic user's approach suggests that it best encompasses problems that are ill-defined. Some would argue that this approach lacks a theoretical base but nevertheless, the pragmatic user's approach contributes to the identification of the issues, to the use and clarification of terminology and to a better understanding of the nature of our data and information systems. In a sense, this approach is disciplinary in that it potentially can lead to theoretical contributions as well as add to further testing of the methodology involved in this type of research. It proposes no sophisticated analytical testing. Before we can get to the stage of selecting appropriate analytical procedures to quantify the relationship between information and decisions, we have to complete the task of identifying and defining those relationships and developing a systematic conceptual framework.

The pragmatic user approach could serve as the link between the statistical system and an ever changing decision environment. The approach relies on the expert opinion of a selected group of decision makers to render suggestions about the design (in terms of their specific needs) of the statistical system. In the application of the pragmatic user's approach, one often lacks clear cut criteria for deciding trade-offs between alternative decision makers. Priorities among alternative statistical activities are difficult for a government agency to establish. The Panel on Methodology for Statistical Priorities concluded that benefit-cost analysis should be used consistently in all federal agencies to determine data plans. While deriving cost of the program may be fairly straightforward, the

difficulty lies in estimating anticipated benefits to the users of the information. Nevertheless, the cost-benefit criteria does provide a possible decision rule for determining statistical priorities and has been applied in several studies reviewed below.

The search of the literature at this point focuses on the pragmatic user methodology employed in studies on information for agricultural markets. Within the cash grain market, the USDA has completed the most comprehensive study on market information (Helfner, et al.). The study was primarily concerned with assessing the market decision makers' evaluation of market information, and determine what implications the users' evaluation has for the design (in terms of improving accuracy) of the Agricultural Marketing Service's Grain Market News. The study describes the participants in the grain pricing process and the flows of price information. A mail survey was employed with follow-up interviews on the volume of grain traded at selected transaction points during 1974. Also of interest was data on the terms of trade and the kind of information used by grain firms in making their buying and selling decisions. Supplementary information was obtained from government market reporters via an open-ended interview process.

Since the study was concerned with assessing one market participant's evaluation of market information, a broad system perspective was not adopted; it only concerned itself with the informational needs of producers. Therefore, trade-offs between various other users of information (elevators, processors, etc.) were not of concern in the study and the problem of allocating public investment between alternative users of information was not addressed.

Although the study highlighted significant implications of the design of the statistical system (from the perspective of producers), it did not provide a basis for determining such questions as how large a program is needed, or the returns to investing in alternative statistical methods. The study implicitly assumed producers to be the only users of the information and therefore set an objective to meet their decision needs.

To a great extent, the study took under consideration how structural characteristics and price discovery mechanisms impact the use of information in the market and subsequently the data designs of the statistical agency. However, some of the relationships between various price discovery mechanisms (futures market--cash market structure) were not explored. A second, but closely related, issue is the question of how relative prices among locations and grades over time reflect cost differences. While the former concern is with linking structure and price discovery to the statistical design question, the later issue deals with the relationship between the design of the statistical system and market performance (measured in terms of price dispersion).

Within other commodity groups, particularly the potato industry, a comprehensive study evaluating the price data base was completed in 1975 (Sjodin and Dahl). The authors sent a questionnaire to a random sample of the market participants to obtain their evaluation of market price information. The researchers operated under the premise that data is collected for some specific purpose or set of purposes and that the objective of the data system is to fill the need

of the market decision maker. While insights can be gained from the market participants who provide information to the statistical agency, this approach does not reflect the problems and views of the agency's market reporters nor does it account for public decision makers or other market participants. Here again the pragmatic user approach is employed without considering a broader range of users of publicly marketed information. Also, the study does not develop or apply a decision rule for choosing between alternative user groups.

An important empirical study evaluating the California Federal-State Market News Service also placed emphasis on the users of information. However, this study goes a step further by attempting to apply a decision rule to establish trade-offs between the various user groups. The study identifies broad categories of both market and non-market users of the publicly supported statistical system. It does not, however, include the analytical use of data by universities and government agencies. The purpose of the study was to determine the feasibility of measuring the net benefits (value) of the California Federal-State Market News Information Service. Given a value for information supplied by the statistical agency, the researchers could apply the cost-benefit criterion to the allocation of market information. They concluded that it is feasible to measure some benefits derived from Market News Service, but that these measures understate the "true" economic value of information. Furthermore, it was found, in the conventional sense, practically impossible empirically to measure the benefits to non-market users and consumers. Because the value of information was not empirically derived, the researchers concluded that the cost-benefit ratio is not a feasible criteria for designing a statistical system.

The California study does recognize a viable approach to the problem by stressing the institutional dimensions of the statistical agency. Therefore, identifying the institutional relationship between the organizational structure of the agency and organizational performance dimensions (criteria for change) may offer an approach when dealing with design questions. Hence, the researcher concluded that further research efforts might be directed toward improving the organizational efficiency of the statistical agency. Furthermore, they recognized the alternative approach of linking changes in market structure and price mechanisms for the design of the statistical system.

This section discussed several alternative ways of organizing research efforts to address the problem at hand. The above mentioned studies pull together some of the applications of one broad method--the user's approach. There are several characteristics of the user's approach. First, this approach focuses on identifying the users of information provided by the statistical system (Professor Raup presents an interesting discussion of the three broad functional uses of data in the evolution of a statistical data system). Next, the needs of the data user are obtained. Then other steps often include identifying appropriate measures that will improve the system and establish decision rules (criteria) for allocating resources.

D. Market Structure, Pricing Institutions, and Information

Numerous authors have developed theoretical relationships and implications between market structure and information (Grossman and Stiglitz, 1976; Salop, 1976; and Hayek, 1945). The pricing system is the central mechanism for communicating information. The

organizational structure of a market impacts the stability of prices and thus has a direct relationship to the generation, value, and use of information for economic decision making. For example, the competitive market with decentralized decision making coordinated by a price system is recognized as the most efficient market organization. Implicit in this position is the view that such a market organization has superior information properties (price accurately reflects scarcity). Hayek summarized the advantages of employing the price system:

The most significant fact about this system is the economy of knowledge with which it operates, or how little the individual participants need to know in order to be able to take the right action. In abbreviated form, by a kind of symbol, only the most essential information is passed on, and passed on only to those concerned. It is more than a metaphor to describe the price system as a kind of machinery for registering change, or a system of telecommunications which enables individual producers to watch merely the movement of a few pointers, as an engineer might watch the hands of a few dials, in order to adjust their activities to changes of which they may never know more than is reflected in the price movement.

In markets that exhibit some degree of concentration, the informational content of prices decline and firms often invest in the collection of additional information in order to defend themselves against or gain an edge on their competitors. Because firms in concentrated markets can to some extent realize a return to their investments in information, they are more inclined to develop private systems and view this information as the private property of the firm.

Bonnen (1975) discussed the property right issue involving information in concentrated markets:

Some data problems arise because many of the property rights vested in information are privately held by firms and interests with considerable economic and thus political influence...we find that essential information is often held by a few firms whose immediate interests would not be served by the release of that information---As industrial concentration

continues to grow in food and fiber markets, the issue of private ownership of information versus the public's right to know will become more and more critical and heated. Giant firms acquire with their great size not only an impact on markets but also a major responsibility for public information.

Although segments of agricultural markets behave noncompetitively, for many products, farmers tend to represent the classic example of pure competition on the seller's side of the market. Hence, price and its ability to signal and inform market participants are important qualities of the concept that is studied under the heading of price determination. Price determination deals with the theory of pricing and the manner in which economic forces influence prices under various market structures and lengths of run.

The relationship between market structure and information is well founded in economic theory. This relationship in and of itself does not present a problem to public statistical agencies. Sundquist notes that with respect to statistics on the structure of agriculture, though data needs for decisions have changed, the institutional means and procedures for collection have not adequately kept pace. For example, Raup cites a fundamental change that is already upon us.

It involves the compelling necessity to distinguish between the 'firm' and the 'plant' in our analysis of agricultural industry prices. No distinction of this type has been necessary in the past, for the firm and the plant were identical over a decisive part of American agriculture. The identity can no longer be taken for granted, however, for it has been seriously disturbed by the erosion of the economic boundaries that once clearly defined a farm unit.

Other structural changes in American agricultural sectors that have caused problems with our current statistics include: growing diversity in size of production units, nonagricultural activities, and concentration of production and marketing.

Here Sundquist takes structure to mean essentially the number, size and decision-making control that prevails for firms engaged in the production and marketing phases of our natural food and fiber industry. This broader definition includes subsets of structure such as tenure, legal form, production composition of firms and degree of vertical integration.

Theoretically, prices may perform some or all of three major functions in any market or economy: allocative functions, distributive functions, and equilibrating functions (Tomek and Robinson, Houck).

Allocative Function. Price acts as a signal in the economy. This signaling concept lies at the heart of most allocation decisions. Allocative information is to a large degree used in short run tactical decision making. For example, in making marketing decisions a producer is interested in the current market price because it enables him to decide when and where to market his product.

Distributive Function. The distributive function in which price theoretically plays a part, relates to longer periods of time where prices serve as measures of economic performance and as indicators for longer-run allocation decisions--strategic decisions. This function reflects market performance rather than market coordination. That is, price functions as a scorekeeper determining how much economic reward is received by various market participants.

Equilibrating Function. Together, the allocative and distributive functions of price perform a third role, the equilibrating or market clearing function. In pure theory, an equilibrating set of prices can be viewed as the solution to specific mathematical

problems which simultaneously embody both allocative and distributive functions of economic activity.

Collins recognized the changing role of price in agricultural markets as a coordinating function and concerned himself with alternative methods and procedures. He stated that three conditions should prevail if coordination in a decentralized, specialized marketing system is to be achieved. First, there should be a communication network to link the performance units in the system. Second, signals should be developed which accurately reflect the relevant economic variables. And, third, participants of the system must be able and willing to translate the signals received into an appropriate set of actions.

Collins points out that historically, for many agricultural products, the functions of communication and coordination have been served within an open market system using prices as the director of economic activity. "Yet in agricultural marketing, as in many industrial fields, other avenues for coordinating the activities of different firms have been increasingly employed." He cites vertical integration but notes that varying degrees of incomplete integration are common in agriculture.

Thus far, the discussion has been in terms of the determination of prices and the distinctions in its theoretical functions in the market. We now turn to price discovery, the process by which buyers and sellers arrive at specific prices. The various methods used to arrive at prices for agricultural products have been classified in a number of ways. Tomek and Robinson state that the following five categories cover most of the pricing systems now employed in

agricultural markets: private negotiation between individuals, trading at organized market places including auctions, bargaining between groups, formula pricing, and administered pricing.

Many economists and market participants believe that at present many markets are characterized by price discovery mechanisms that do not perform well. Some of the causes include: concentration of decision making, high cost of operation, limited marketing alternatives for producers, lack of market information and thin markets, coupled with factors external to the market such as the introduction of sophisticated technology in marketing and applied political pressure. Thus, alternatives to traditional price discovery mechanisms are increasingly prevalent. For example, remote pricing, forward contracting, and vertical pricing arrangements are growing and may correct some of the shortcomings in the traditional system.

Changes in pricing discovery mechanisms, like changes in market structure, create a new set of decisions for both private and public decision makers. In the light of the preceding, it can be seen that these changes have at least three implications for publicly supported information:

- 1. The informational needs of the decision-makers must be identified because one can expect changes in their needs as market structure and price discovery mechanisms change.**
- 2. As market structure and price discovery mechanisms change, one might expect the public statistical system to employ different data collection methodologies.**
- 3. These new market arrangements bring into question whether or not public funds should be invested in some market information systems.**

Researchers have long debated the causal relationship between market structure and price discovery mechanisms. Two general hypotheses are implicit in the foregoing discussions and hence are implicit in the research on pricing mechanisms in agriculture. One is that a causal relationship exists between pricing mechanisms and market structure, government policy, and other variables. As a result, the mechanisms are subject to change. That is, price discovery mechanisms are endogenous variables in the marketing system, and if the performance of a pricing mechanism is somehow unsatisfactory, private or public decision-makers may be able to influence the development of more appropriate mechanisms. Thus, the general justification for research on the topic is to develop information for such decision-making.

A second hypothesis is that the causation may not run exclusively from structure to mechanism, but rather may be simultaneous in character. Structural characteristics help determine the nature of the pricing mechanism, but the nature of the mechanism may also influence structure. For example, farmer bargaining may be a response to the declining number of buyers, but the development of a farmer bargaining group may, in turn, contribute to changing the structure of buyers.

At any rate, arguments centered around this issue are likely to continue. We can all agree, however, that the price discovery process and structure of the market can influence the quantity and quality of information available, as well as the distribution of information to market participants, and the evaluation of that information in the sense of traders' decisions to buy or sell.

In a very general sense, the notion of market organization and informational properties is important to the design of a statistical system. The structural characteristics of a market may serve as a criterion for public investments in information. This view suggests that the amount and kind of information that an individual decision maker demands is related to the structure of the market. One can possibly test the relationship between market structure (market arrangements-price discovery mechanism) and information. For example, an examination of two or three price discovery mechanisms in a major agricultural commodity market can be evaluated on the basis of their ability to generate information for the market participants. A major outcome of this approach is a demonstration of how the demand for information is altered under various market arrangements. Moreover, inferences can be made as to how the present day publicly supported statistical system can better facilitate decision making of various market participants. Related research questions would include: What are the institutions used for product transfer? Where within these institutions do prices exist? What function or functions do these prices perform? How does the role of price change as institutions change? Finally, what is the relationship, if any, between the various kinds of prices that exist within or among various institutions? While this approach does not necessarily lead to a value of information per se, it can provide a criterion by which choice can be made between alternative market decision makers. Not only should the results of this research be useful to the public statistical agencies, but it could tell us a great deal about where and how to collect price information and, perhaps more importantly, what price information is really needed and what it means in a specific institutional context.

E. Market Performance and Information

While the structure of a market can have substantial impacts on the design of the statistical system, an association between information and some measures of market performance may also serve as criterion for public investments. Several studies have attempted to link information to selected dimensions of market performance such as price stability and price dispersion.

Houck and Pearson investigated the effect of USDA crop reports on price stability in four major commodity markets. Two hypotheses were tested in the study: 1) Crop Reporting Board crop production forecasts from one month to another vary inversely with market price. 2) Prices in commodity markets are less volatile following a crop report than just before it is released.

Using daily prices before and after crop production and prospective plantings reports over a 13 year period (1963-75), they measured the market reaction to the release of the USDA figures on corn, soybeans, spring wheat and winter wheat. In general, they concluded that a fairly strong relationship existed between quantity forecast by SRS and subsequent prices.

In testing the second hypothesis, they examined the effects of crop reports on day-to-day price fluctuations during the week before and after SRS releases. Their findings ran counter to the hypothesis that price fluctuation should decline following crop reports. To the extent that this relationship can be empirically measured, it may be useful in estimating benefits of information in terms of the value of the resulting price stability.

The body of information theory offers the plausible hypothesis that information imperfections can result in price dispersions.

Price dispersion is a manifestation--and, indeed, it is the measure--of ignorance in the market. Dispersion is a biased measure of ignorance because there is never absolute homogeneity in the commodity if we include the terms of sale within the concept of the commodity. Thus, some automobile dealers might perform more services, or carry a larger range of varieties in stock, and a portion of the observed dispersion is presumably attributable to such differences. But it would be metaphysical, and fruitless, to assert that all dispersion is due to heterogeneity. (Stigler.)

This theory in a competitive equilibrium framework argues that price dispersion is a phenomenon of market disequilibrium. If the cost of information acquisition is low enough, consumers will gravitate to the lower-priced firm; other firms will be obligated to lower their prices to regain customers, and the price dispersion will effectively disappear (Dahl and Hammond). The optimal dispersion of prices at equilibrium is assumed to occur when prices accurately reflect consumer preferences with appropriate allowances for transportation, processing and storage costs (Divine).

Divine conducted several experiments that examined the relationship between selected Canadian retail food markets and price information. The experiments involved the publication of comparative retail price indices in selected test markets while monitoring the control markets. The study had four major hypotheses: (1) Significantly different prices for a standardized market basket of food products would be charged by competing sellers prior to the dissemination of comparative price information. (2) The public dissemination of comparative price information would alter the dispersion of prices across stores and lower the average market price level in the test market. (3) The level of consumer satisfaction with food stores and

food products would increase significantly in the test market as a result of the comparative price information program. (4) The perceived and estimated value of comparative price information would exceed the cost of providing such information.

Some of the concerns of the retail market price reporting study range from methodology to practical implementation of such a system. The cost of operating the system, contrary to the findings of the Divine study, may be prohibitive. How one accounts for costs is central to arguments on both sides. Some economists feel that an appropriate market basket should include a larger number of items than that which the Divine study included. Also, market baskets should reflect the diverse make-up of various communities (ethnic background, class, etc.) within and between cities. Thus, a larger market basket and increments in the number of market baskets would certainly raise the costs of such a service.

Opponents of retail price reporting systems also argue that price reporting systems at the farm level cover homogeneous products (at that level in the market) and price signals accurate information for making comparative decisions. But at the retail level in the market, products are extensively differentiated and as a result a simple price statistic cannot transmit adequate information for accurate consumer decisions. Also, retail price reporting systems ignore other factors of importance to consumers which determine their shopping patterns. Other factors include freshness of meats and vegetables, quality of food and location of store, etc.

Aspects of the retail price reporting system certainly require more research. This does have significant implications for the performance of markets.

F. Summary

This chapter presented four methodological approaches to the study of market information. Each approach reflects a theoretical base which, in many cases, is inadequate to address specific informational problems. This chapter also illustrates the differences in approach employed by economists in studying informational phenomena.

The net social benefit approach derived from the neoclassical framework fails to deal with many of the underlying problems of information as a commodity with public good characteristics. The pragmatic user's approach, guided by a limited theoretical base, is often applied to a single class of users. Therefore, questions regarding alternative uses of information are seldom considered. The relationship between market structure and information is primarily an intuitive one in the hands of most economists. For the most part, the literature has only dealt with this relationship in conceptual terms with no empirical studies. While economists marvel over the information signalling abilities of the competitive market, how information relates to other market structures is given scant attention in the literature. The final approach reviewed here relates market performance with information. Most studies attempted to show this relationship empirically without considering behavioral dimensions of the market participants. In short, each methodological approach has serious theoretical limitations. This void in economic theory has direct implications for further research on market information systems.

CHAPTER IV

THE MICHIGAN PROCESSED POTATO INDUSTRY, THE FIRM'S DECISION ENVIRONMENT, AND SUPPORTING INFORMATION SYSTEMS: DESCRIPTIVE RESULTS

A. Introduction

This chapter presents a description of three major components of the study framework: the Michigan processed potato industry, the supporting information systems operating in the market, and the decision environment of the firm. Personal interviews were conducted with managers of processed potato firms to supplement existing information on the structure and conduct of the industry. Follow-up interviews were made to obtain information on the procurement behavior of the firm. Information sources were identified in the interviews and secondary documents were used to provide a description of the supporting information systems operating in the market. The last section describes the nature of the firm decision environment and is based on personal interviews with firm managers.

B. The Michigan Processed Potato Industry

1. Market Structure

Michigan's agricultural industries are of great importance to both the agricultural and to the industrial life of the state. Although the problems of agriculture are inextricably enmeshed in the business judgements of these firms, relatively little attention has been given to the problems of the handlers and the processors of

agricultural commodities. Indeed, the business decisions made at this market level impact the entire food system in numerous and significant ways.

In general, the structural characteristics of the commodity markets which supply most food and fiber industries differentiates the problems of these industries from those of others. The raw product used by the processed potato industry comes from thousands of farmers who in total are producing a fairly homogeneous product which is exceedingly difficult to control; the product enters the market in accordance with weather and seasonal determinants that are exogenous to the production process. Therefore, special kinds of problems occur in potato processing because of the uncertainty in supply of the raw product.

Another distinctive feature of this segment of the potato industry is that usually the identity of the producer becomes an unimportant factor since the commodity can be standardized and graded. This is true particularly when potatoes are bought and sold on the open market.¹ The economic implications of this situation are significant. When products can be bought and sold by description, severe price competition usually exists. Price becomes market determined and subjected to any number of exogenous factors which create price instability. Also, some producers believe that their ability to "control" is further diminished by the fact that there are relatively few buyers who can exert their market power to depress the prices of raw product.

¹"Open market" is an expression used in the industry which implies that the buyer (processor) purchases product usually for cash without any contractual arrangements with the seller.

Finally, the potato marketing season, as with other vegetables, is relatively short. Although potatoes can be stored, the participants in the market must decide who should bear the costs and risks associated with storing a perishable product over the course of a year. The short market season brings on to the local market, within a two to three week span, a crop which often further depresses prices during harvest. The growing and marketing season, of course, varies considerably over the nation, especially from north to south. Because of the number of producers, the comparatively standardized commodity which they produce, and the concentrated marketing season, the processing firm enters a complex marketing system for the purchase of raw commodities.

The above characterization of the production of potatoes is, for the most part, that of a competitive agricultural market. But as the product enters the processor's level in the market, the market becomes more concentrated; it has a small number of firms producing differentiated products. This market organization creates an interesting set of implications for the processed potato industry. The discussion that follows deals with the topics of pricing, location of plant, procurement problems, quality problems and product differentiation.

At this level in the market, the processing firm tends to be a price maker. While price still is an important consideration, non-price variables--quality, quantity, etc.--become of greater importance as the firm gains more control over the price of the product.

The problem and methods of purchasing are distinctive in the processed vegetable industries. The supply-price, variations in volume of inventories, quality and methods of procurement are affected

because the commodity purchased is a product of the farm and therefore subject to uncontrollable events. Significant variations in the supply of raw product can result from changes in farming practices, in government programs, or in weather conditions and other variables. Such variations not only have an impact on the firm's procurement practices but also affect location of plants, construction of storage facilities and inventory policies.

Chipping and freezing firms, the dominant forms of potato processing in Michigan, decide plant location on very different criteria. Potato chip firms locate their plants near urban areas; they are market-oriented. The national distribution of chipping plants by region supports this contention since the largest number of plants are located in the heavily populated northeastern region. Within Michigan, all chipping plants are located in urban areas. Two main factors influence the location of chipping plants. First, the transportation costs of the finished product relative to the raw product are higher. The high volume-low bulk density of the finished product results in high transportation costs. Second, quality in terms of freshness of chip is important to the consumer. Transporting the finished product over long distances would lead to quality deterioration, stocking problems and shelf rotation difficulties. Therefore, plants are typically built to serve a specific city or metropolitan area.

Greig, on the other hand, contends that there are considerable economies of scale in potato chip plants. He cites the fact that chip plants in Pennsylvania service areas from Florida to New York. He feels that the industry as a whole would operate more efficiently with a smaller number of plants. Most plants still serve a limited market area and locate on that basis.

Quality of raw product is an important locational factor for frozen potato processing. Most freezers tend to locate near their source of potatoes. Nationally, most freezers are located in the western potato producing states of Idaho and Washington.

Product differentiation supported through various forms of advertising and product quality variation, etc., is of interest here because of the possible protection which it might afford the individual processor from the competitive pressure of other processors and potential entrants to the market. In describing product differentiation as a dimension of the processed potato market, it is important that we distinguish between the nationally advertised brands and what is commonly referred to as "minor brands" (brands that are not advertised nationally). In Michigan, there are plants of two firms producing nationally advertised brands, one a freezer and one a chipper. The remaining firms serve the minor brand market.

For the most part, nationally advertised brands have an advantage over other processors in that they can command price premiums. Presently available data do not allow detailed examination of these advantages, but several reasons can be cited for downgrading the importance of national brands as a substantial source of market power (Helmberger and Hoos).

1. Small as well as large processors are able to put up a high-quality pack, and private labels on fancy grade products as opposed to standard or extra standard grades, are very common.

2. The products as consumer goods are relatively non-technical in nature and are purchased and consumed frequently so that comparisons can easily be made.

3. The higher prices received by national processors are at least partially offset by advertising and promotional expenses.

In minor brand markets, product differentiation provides the processor with very little protection from the rigors of competition. In this segment of the market there are many relatively small sellers who sell a product where quality differences are reflected in price. Beyond the processing level in the potato industry, the next market level includes retail chains, stores, remanufacturing and the institutional market.

A complete structural picture of the industry would look much like that of an hour glass. Starting with a highly competitive producer sector, one finds many growers producing a homogeneous product that enters a concentrated processing sector characterized by a few firms who transform the raw product into a number of finished products which ultimately find their way via retail outlets to the competitive market of many consumers. The hub of this market system--the processor level--is the focus of this study.

Number of Plants. Lack of available time series data limits an analysis of the changes in number of plants and firms operating in Michigan over the years. To some extent, however, the interview process and secondary data provided some information on the number of firms in the industry (see Table 4.1).

Although the total quantity of processed potatoes produced in Michigan has increased over the last two decades, the number of companies engaged in potato processing have decreased substantially. In 1960, there were approximately 23 to 30 potato processing firms in the state; in 1974, there were 23 firms. Today only 14 processed

Table 4.1 Number of Potato Processing Plants in Michigan

Type of Plant	1960	1970	1980
Chippers	21	15	8
Freezers	2	3	2
Other		5	4

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980.

Table 4.2 Average Output per Processing Plant, 1980

Annual Output (000 cwt)	Number of Plants	Percentage
Under 100	2	20
100 to 1,000	5	50
Over 1,000	3	30
TOTAL	10	100

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980.

potato firms operate in Michigan. Only two of these are freezers; eight are chippers. The largest change in number of firms occurred among the chip processors (see Table 4.1). The 1960s were volatile years for the chipping market which was characterized by mergers and bankruptcies. Many of these firms were located in Detroit where at one time as many as twenty plants operated in that city alone.

As part of the Frito-Lay's national expansion, at one time twenty plants were acquired in various cities across the nation. The company entered the Detroit chip market during the early sixties. In 1968, the Federal Trade Commission charged the Frito-Lay Company with violation of Section Seven of the Clayton Act. The Company was subsequently ordered to divest itself of ten plants. The impact of Frito-Lay's activities on the Detroit market is difficult to estimate, but during that time period, several firms in the city went out of business while others sold out to larger companies. The most significant change over the last twenty years in the number of firms in the Michigan processed potato industry occurred in Detroit during the 1960s.

Number of Products Handled . In general potato freezers tend to process a single product--potatoes. On the other hand, chipping firms are largely multi-product operations. A major reason for operating multi-product plants is to extend the processing season and to broaden product lines. This tends to reduce fixed costs per unit of output. Although there is no apparent relationship between plant size and number of products handled (see Table 4.3), most plant managers indicated that they processed the optimum number of products given the size of their plants.

Table 4.3 Number of Products Processed per Plant, 1980

	Number of Products			
	1	2	3	4 or more
Type of Plant				
Chip	2	2	2	1
Freezer	2			
Annual Output (000 cwt)				
Under 100	1			
100 to 1,000	1	2	2	
Over 1,000	2			1

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980.

There is no horizontal integration among Michigan potato chippers and freezers. All chipping plants were engaged in processing potatoes for chips. Potato freezers located in Michigan maintain only that line of business.

Market Concentration. Economic concentration in the Michigan processed potato industry is difficult to estimate. Several problems are associated with measuring a static concentration ratio for the processed potato industry. First, in the chip market, where plants are built to serve a specific market area or urban market (minor brand market), national or industry wide concentration measures do not apply. Second, freezers serve a national or regional market which makes a state's measure of concentration inappropriate. In short, the relevant market for most processed potato firms does not coincide with the state; in addition, chipping and freezing are so different they in effect constitute separate industry subsectors. This market pattern will likely maintain itself given the present market conditions (technology, taste and preferences of consumers). Thus, making economic concentration difficult to measure.

While there is little data on the concentration of the Michigan processed potato industry, it is possible to provide some insights on the concentration of procurement of raw products by employing a measure of distance of procurement. Much like product sales, complete documentation on the degree of concentration of procurement in local processor-grower markets is difficult, if not impossible, because of the lack of good data and the conceptual problems associated with market measurement. The perishability and bulkiness of potatoes necessitate locating freezing plants near sources of raw

product supply. On the other hand, chip plants are market-oriented and therefore locate near urban areas. Table 4.4 displays the percent of raw product procured over various distances from the plant and reflects the fundamental distinction between freezers and chippers.

Aspects of Exchange. Raw product quality is a major concern of potato processing firms. To maintain quality and to insure a dependable flow of product supply into the plant, processors make extensive use of contracts with growers. Results of direct interviews with processors indicate that contractual exchange with growers is employed in procuring 68 percent of the raw product used by processors (Table 4.5). Brokers provide approximately 16 percent of the raw product processed by these firms, and 16 percent of the raw product was obtained via open market. Oral agreements, vertical integration (own or rent land) and grower cooperatives each make up a small fraction of the raw product marketed for processing.

Freezers obtain 83 percent of their raw product via written contract with growers while relying on the open market to supply 17 percent of their raw product needs. Chippers, on the other hand, use written contracts less extensively than freezers. Chippers indicated that they employ written contracts with growers to supply 62 percent of the raw product. Brokers and open market arrangements accounted for 24 and 13 percent respectively of raw product supply. Compared to freezers, chippers employ brokers to a greater extent. As a general matter, Michigan chippers rely on brokers to supply their raw product needs from other states, after the potato storage season ends in Michigan.

Table 4.4 Share of Total Raw Product Procured Within Specified Distances from Michigan Potato Processing Plants, 1980¹

	Chippers	Freezers	All Firms
	Percent of Total Raw Product		
Miles from Plant:			
Less than 50	14	63	30
51-100	11	5	10
101-200	7	5	6
Over 200	68	27	54
TOTAL	100	100	100

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980.

¹Weighted on basis of the average volume of potatoes handled in 1980.

Table 4.4 shows that chippers procure 14 percent of their raw product within a 50 mile radius of the plant compared to 63 percent by freezers. Subsequently, for each distance category greater than a 50 mile radius, chippers procured a larger percent of their raw product than did freezers. Within the 51-100 mile radius chippers obtained 11 percent and freezers five percent; within the 101-200 mile radius chippers obtained seven percent and freezers obtained five percent; and over 200 miles, chippers obtained 68 percent while freezers obtained 27 percent of their raw product needs.

Table 4.5 Operational Aspects of Exchange

Source of Raw Product	Freezers	Chippers	All
	(Percent)		
Contracts:			
Written	83	62	68
Oral		(*)	(*)
Own or rent land	(*)	(*)	(*)
Grower cooperative		(*)	(*)
Brokers		24	16
Farmer's Market			
Other Processors			
Other (specify _____)			
Open Market	17	13	16
TOTAL	100	100	100

Source: Data collected from personal interviews with Michigan potato plant managers, 1980.

* Amounts that are less than one percent.

¹Weighted on the basis of the average volume of potatoes processed in 1980.

Types of Buyers for Processor's Product. Retailers of all types (national chains, regional and local) purchased 71 percent of the 1980 output of the potato processing plants included in this study (Table 4.6). Within this group, national food chains accounted for 48 percent of the product purchased from processors and regional and local food chains accounted for 12 percent and 11 percent respectively. Further, within their respective markets, retail buyers of freezers' output are fairly well distributed between the national, regional and local food chains. Buying of Michigan potato chip plant output, on the other hand, is controlled for the most part by national food chains (72 percent). This figure runs much higher than estimates of extension economists. Nationally, food chains take about half of all potato chip output. It is likely that respondents had varying notions of what constitutes a national chain. Regional and local food chains purchase eight percent and five percent of Michigan chippers' product respectively.

The second largest market for processed potatoes is the institutional market. Institutions buy approximately 19 percent of all processed potatoes. Freezers sell more to institutions than chippers in that this retail outlet accounts for 34 percent of frozen product compared to four percent of the product from chippers. Cooperative wholesale buyers and government agencies buy about five percent of the freezers' and chippers' products.

2. Procurement Conduct

We have mapped out, in a general fashion, the major elements of market structure--number and size of firms, concentration, product

Table 4.6 Type of Buyers for Processor's Output, 1980

Type of Buyer	Freezer	Chipper	All
	(Percent)		
National retail food chains ¹	19	72	48
Regional retail food chains ¹	19	8	12
Local retail food chain ¹	19	5	11
Cooperative wholesale buyers	4	6	5
Institutions ²	34	4	19
Government agencies	5	5	5
Other food manufacturers and processors			
TOTAL	100	100	100

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980.

¹The various categories of food chains, though terms in common usage do not have a clear, widely established definition in the industry. In its absence, therefore, the concept was respondent defined here.

²Establishments such as restaurants, hotels, hospitals and cafeterias.

differentiation, and several lesser ones--which make up the economic environment of the Michigan processed potato industries. As developed in the theory presented in Chapter II, market structure has an undeniable relationship to market conduct, the topic of this section.

In its most common application, market conduct refers to the firm's policies toward its product market and toward the moves made by its rivals in that market (Caves, Scherer). For the purposes of this section, emphasis is placed on the behavior of the firm in procuring raw products for processing rather than documenting the firm's behavior in its finished product market. Firm procurement of raw products is of interest for several reasons. First, it allows this study to link with previous studies done at the producer's first transaction level in the market. Second, little work has focused on this vertical relationship from the processor's perspective. Finally, this market level provides a manageable scope of the industry from which to study the implications or relationships between market conduct and information.

In traditional industrial organization theory, key variables commonly used as measures of market conduct include pricing behavior, product strategy, research and innovation, advertising, legal tactics and others. These variables are of interest because they enable one to understand how firms behave under a given market structure. This section defines and describes a set of variables that explain the behavior of processed potato firms in procuring raw product. In the next chapter (Chapter V), these practices are linked to the supporting market information systems. In other words, here we explore the important categories of firm behavior in procuring

raw product. In the next chapter, we also examine the implications of firm behavior (market conduct) for the informational needs of the firm. To make this study manageable, market conduct as it relates to the procurement activities of the firm is divided into the following primary areas of concern:

1. Contracting policies and practices
2. Pricing policies
3. Quality control policies
4. Market information attitudes and behavior of the firm

Contracting Policies and Practices. Contracts are widely used in the Michigan processed potato industry. They make up 68 percent of the volume of product exchanged between the processing firms and the growers. As the number of processing firms declined and as a larger percent of the Michigan potato crop has been marketed for processing, contract exchange has increased in use over the years.

Several reasons are cited by economists for the existence of contract exchange (Sargent). First, the markets in which contract exchange occurs generally trade in non-homogeneous products. Second, contract exchange usually covers an extended time period that involves two or more parties in an exclusive commitment. And finally, contract exchange often arises because of specific product or service demands on the part of the buyer.

Since a primary purpose of this study is to describe the relationship between firm behavior and information, it is necessary to understand the terms discussed in contract exchange between potato processors and producers. To this end, two basic questions were asked of all potato processors: 1) what terms of trade are

covered in your contracts with producers? 2) Which additional terms of trade do you believe should be included in the contract? The responses to these questions are discussed below.

All firms indicated that their contracts covered price, delivery schedules, weighing procedures and quality standards. Price was a term of trade on all firms' contracts and under certain conditions price was subject to change. For example, chipping firms included provisions for the producer to store the product over the year, which affected the final price of the product received by the grower. Usually storage fees are added to the price of the product at a rate of 20¢ to 40¢ per month per hundredweight. Also, freezers would contract to pay a premium for the quality characteristics of the raw product. Although delivery schedules and weighing procedures were considered in each contract, the enforcement provisions and arrangements differed among the processing firms. Some firms admitted that their delivery schedules under contract were flexible and more or less served as a guide to the grower. Weighing procedures differed; some firms, usually the larger ones, would weigh the load at the plant while some other firms would require a delivery ticket indicating the load had been weighed at the source of delivery. Quality provisions were also important terms specified in the contracts. As part of the contract, some processors insisted upon higher standards of quality than other processors. For example, some chippers contracted for 100 percent Grade A load while others contracted for 85 percent Grade A load.

Responsibilities and rights during production were sometimes specified. These features determine the distribution of expenses for spraying, whether certain chemicals were used, or who applied the sprays. For the most part, freezers make provision for such terms of trade in their contracts while the large chipping firms did not contract for production terms of trade.

When questioned on the need for introduction of new terms of trade in the contract, firm managers indicated that they were satisfied with the present number and choice of terms included under contract. One manager believed that the terms included in his contract were the optimum number. He stated that more terms would make a complex process more complex and would inhibit exchange.

Contracts vary greatly from processor to processor. There are clearly no standard contracts in use although several standard conventions occur as features of individual contracts.

Types of Prices Contracted for by Processors. Pricing policies are a key measure of firm behavior. The pricing policies of firms are used in distinguishing oligopolistic markets from competitive markets in that firms in oligopolistic markets are "price makers" rather than "price takers." Several case studies and some empirical research have suggested that many firms use relatively simple rules of thumb (standard operating procedures) for setting price--cost-plus, mark-up, fixed cost pricing, etc. (Scherer, Breimyer). In this case, the policies used by processing firms in setting price to growers for raw product is of interest. What are the processing firm's rules of thumb for setting contract prices with potato growers?

From the review of other studies and based on informal discussion with market participants, several types of prices which processors may offer in contracts with a grower were identified. A base price is established prior to planting and is common in most contractual arrangements. This price is not a market determined price in that it may not reflect the relative scarcity of the commodity; it may not reflect the opportunity cost of growing potatoes relative to other crops; and it may not reflect changes in the costs of inputs over time. This form of pricing is typical in most vegetable markets. To gain some insight into the pricing procedures of Michigan processed potato firms, each manager was asked to describe his pricing policies.

Two firms indicated that the price they contracted for was a base price (see Table 4.7). A base price is agreed upon prior to planting. The final price paid the producer, however, is ultimately dependent upon storage fees or the quality of raw product delivered to the plant. Freezers primarily employ "quality clauses" in their contracts which reward or penalize (provide incentives) the grower according to the quality of the product (size, percent bruise free, color, etc.).

Most processors indicated that the price they settled on was pegged to an ongoing contract market price. Two processors stated that they would follow or match the price offered by the dominant firm in the market because they felt that the larger firm for the most part set (controlled) the market.

Two firms stated that they really made their pricing decision independent of the other firms in the market. One stated that the price he offered a grower was heavily dependent on his operating budget. The other processor, who dealt with a limited number of

Table 4.7 Kinds of Prices Contracted for by Processors

Type of Contracted Pricing	All Processors
Base Price	2
Pegged to Some Market Price	4
Pegged to Grower Costs of Production	
Formula Price Dependent upon Quality Levels	
Dominate Firm Followed as Price Leader	2
Other	2

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980.

growers, indicated that one of his primary concerns was to "keep the grower in business" and that he often paid a premium to his growers. This statement may reflect how some processors view the importance of dealing with growers who can consistently deliver quality product. But it is unreasonable to expect the firm to reward the grower for "good will" purposes. Growers who produce a quality product may receive price premiums.

Quality Control. Quality control, as a dimension of market conduct is perhaps a unique variable to be considered under procurement conduct. Quality control becomes of particular importance here for several reasons: (1) this study focuses on the procurement activities of the processor who faces that part of the agricultural sector of the food marketing system where perishability is a constant threat; (2) price oftentimes does not reflect quality of product and therefore measures of quality become a separate topic of negotiation between exchange partners.

In an environment where the market fails through the pricing system to transmit information about quality of the product being exchanged, decisions with respect to quality become negotiated decisions which are supported by one or both of two arrangements: contract and government grades and standards. One is a public decision, the other is private.

The contract performs many functions--specifies forms of trade, reduces uncertainty, assigns risk, and establishes liabilities. This instrument is a response to market failure characterized by imperfect information, high cost associated with committed resources, and undesirable ex ante distributions of risk. At this level in the market,

the contract plays an important role in defining the quality of raw products. This process may be handled exclusively between the seller and buyer or it may benefit from established government grades and standards.

Shepherd and others have identified the U.S. grades and standards for agricultural commodities as one of the facilitating functions. Hill states that standardization is especially important in the list of facilitating functions because it is closely related to one of the structural requirements for perfect competition. "Competition among sellers is possible only if they are selling identical or comparable products." Uniformity of terminology and measurement of important characteristics is useful for establishing relative values between the various forms of the product.

In the case of potato grades and standards, this uniformity or standardization serves two basic purposes: (1) it permits buying and selling of the product by description rather than by inspection of each load offered for sale; (2) it provides a method for buyers to estimate the value of a particular load and to communicate this value back through a complex market system to dealers and producers. Therefore, grades and standardization is one of the primary functions of the marketing system. They are essential in any market where millions of dollars change hands via the telephone.

To gain insight into how potato processing firms handle quality of raw product, the following question was posed to Michigan potato processing firms: How does your firm control for product quality? The responses are summarized below.

Because quality of product (particularly on the sales side of the firm) is a major determinant of product differentiation in the processed potato industry, most firm managers indicated that raw product quality was a major concern of the business. Managers responded to the question of controlling product quality in several ways. The most common response was "to inspect each load." Managers indicated that all loads delivered to their plant would be inspected by taking a sample off and running it through various tests--gravity, color, percent of foreign objects. This was a standard operating procedure that ran consistently throughout the industry.

The second most common response was the use of grades and standards via the contract process or when buying potatoes on open market. One manager stated that he specified particularly high standards of quality on contracts to assure that the delivered load would fall within the limits of acceptability. Also, he had each load inspected at the plant gate.

Least often mentioned as a measure of assuring product quality, but nevertheless cited by two processors, was the reliance on a long term trading relationship with a "good grower." The managers stated that the relationship which they had developed with a few growers over the years was perhaps the main factor in insuring a dependable supply of high quality product.

Processors Attitudes Toward Information. This section attempts to measure processors' attitude toward information within the processed potato industry. Several scale questions were posed to each firm manager. The results are reported in Table 4.8.

Table 4.8 Processors' Attitudes Toward Information¹

Statement	Scale Rating Score
1. Information is a major source of power in the market process.	4.444
2. We could fully share information (on prices production, costs, concerns and plans) which we have with growers and their organization without putting us at a competitive disadvantage.	3.555
3. We solicit such information actively.	3.444
4. A processor and grower plan jointly their marketing strategies, coordinate price structures and exchange information between each other about their plans and goals.	
Do you believe that it should be permitted?	2.444*
Do such actions ever have desirable market consequences?	2.555*
Cases such as this probably occur frequently.	4.000
5. Two processing firms exchange information about sales plans and price schedules.	
Do you believe that it should be permitted?	1.444*
Do such actions ever have desirable market consequences?	1.666*
Cases such as this probably occur frequently.	3.222

¹For each of the statements given, respondents were asked to check the most appropriate response below.

5 = Strongly Agree

4 = Agree

3 = No Opinion

2 = Disagree

1 = Strongly Disagree

*3 = Yes

*2 = No Opinion

*1 = No

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980.

The first three statements were designed to obtain a reading on the firm's attitude toward information, toward sharing information with growers and toward selecting information for the firm's use. Most managers believed that "information is a major source of power in the market," responding to the statement with an overall 4.44 rating out of a scale of 1 to 5. When managers were asked to rate statements about sharing information with growers or soliciting information from other market participants, they responded with an overall score of 3.555 and 3.444 respectively. Therefore, it was concluded that they had no opinion on which they were likely to act about sharing information with growers or obtaining information from other market participants.

The last two statements presented the manager with a situation involving sharing information with other market participants. Statement 4 dealt with processors and growers sharing information. For the most part, processors responded by rating the statement slightly above a no-opinion response. However, they all agreed that processors and growers do exchange information frequently. Statement 5 dealt with two processors sharing information. Processors in general believed that such cases did not occur frequently and also were of the opinion that the action of two processing firms exchanging information would not have desirable market consequences. Interestingly, processors indicated that they had no opinion on whether they exchange information between themselves.

C. The Supporting Information Systems

This section will attempt to describe the major information systems operating in the Michigan processed potato industry. This study

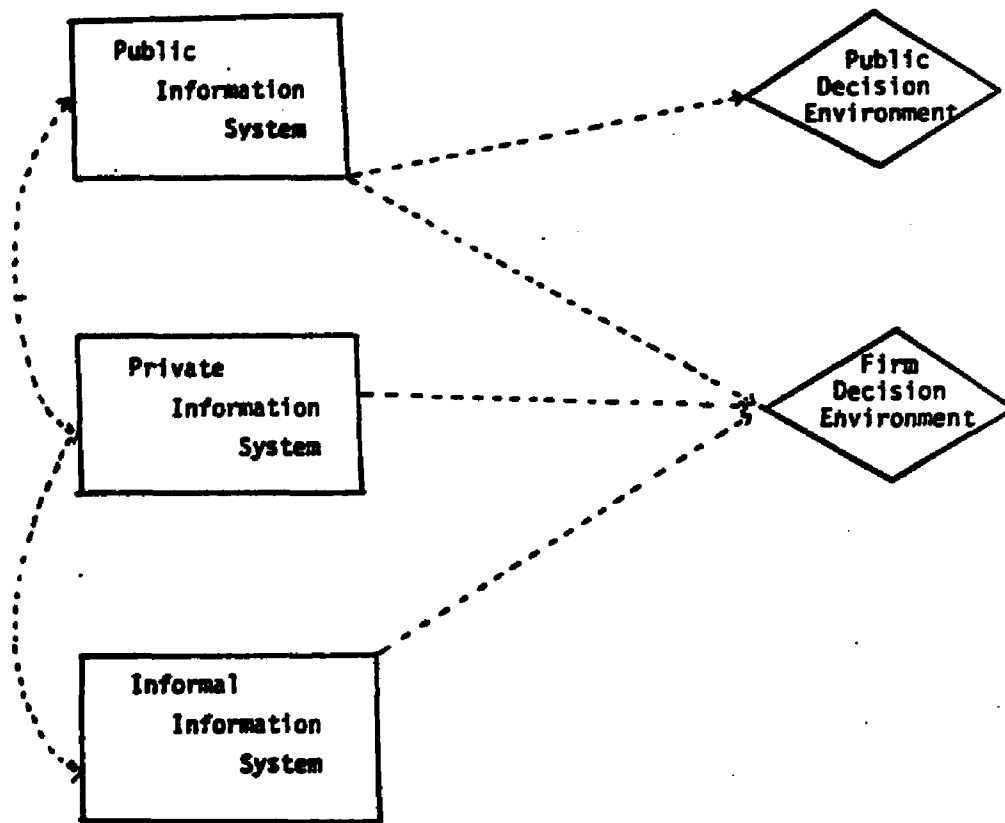


Figure 4.1 The Supporting Information Systems in the Michigan Processed Potato Industry

prices received by growers, estimates of crop sizes, and farm income estimates. This information is generally thought of as an indicator of sector performance. On the other hand, AMS publishes spot market prices and develops the grades and standards for fresh and processed produce. Their data are designed to reflect the current market situation and are directed toward market participants to aid in their decision making.

The Private Market Statistical System. The private statistical system is distinguished from the public statistical system by the fact that private market firms supply information to market participants for profit while the public agency supplies information for the purpose of facilitating the functioning of the market and meeting public policy information needs related to our food and fiber sector. From the interviews conducted with Michigan processed potato plant managers, we learned there are at least three private statistical firms operating in the market.

The Informal Statistical System. The informal statistical system is perhaps the most difficult to define. Unlike the above two systems, this system does not supply information to market participants for profit, nor attempt to achieve public policy goals. For the most part, the system is composed of market participants who transmit information automatically through their activities in the market or when queried about market events.

Brokers, buyers, marketing cooperatives all perform informational functions. They aid in the transaction of goods and services between buyers and sellers.

D. The Firm Decision Environment

In Chapter II, an information system paradigm was presented that underscored the nature of the relationship between information and decision: information attains its value only in the context of a specific decision. The chapter went further into a discussion on the economics of information, the limitations of neoclassical theory in dealing with informational phenomenon, and suggested an alternative framework for analyzing and identifying market information problems. Thus far, little has been said about decision, the process that requires information.

Decision making, more than information, is a major concern in economic theory. But to a large degree, economic theory does not provide any unified set of analytical tools proven empirically (particularly as decision relates to the firm and its environment) which one could call the theory of firm decision making. Do firms actually equate marginal costs with marginal revenues? The need to study the decision environment of the firm in the context of evaluating information is nevertheless self justifying and necessary. This section of Chapter IV has three main objectives: (1) to review the management decision making theories of the firm, (2) to present the results of the interviews with firm managers on marketing decisions, and (3) to outline some broad principles for viewing firm behavior (decision) as it relates to information in the market place.

Theories of management decision making at the level of the firm fall into two broad groups: formal models and informal behavioral models (Joskow). Formal models are essentially microeconomic. This

body of theory contains certain assumptions and concepts about the way businessmen make pricing and production decisions under prescribed market conditions. Virtually all of the theories assume (a) that the decision maker is omniscient and rational, (b) that firms seek to maximize profits, and (c) some behavioral assumption concerning the ways in which a particular firm relates to the others in the market. Given this framework, what then are some of the difficulties in using microeconomics theory as an aid in studying decision making at the level of the firm?

The limitations of microeconomic theory in firm decision making are well documented (Spencer, Cyert and March). First, the notion of "economic man" as an omniscient, high speed computer confronting a set of known or probabilistic outcomes is a grave distortion of reality. Second, the utility function is too ambiguous and abstract to accommodate the varied objectives of the modern firm. That is, the firm may have objectives other than profit maximization (market share, good will, power, etc.). Third, the traditional theory of the firm ignores the internal problems and conflicts of the firm resulting from organizational structure, because it is assumed that in the long run, competition in the market place will permit the survival of only the most efficiently organized firms.

The above limitations (and others) of neoclassical microeconomic theory serve as a point of departure and perhaps an incentive to reformulate theories that explain the firm decision making process. The work of Nobel Laureate, Herbert Simon and others are noted for exploring the firm's decision theory (Behavioral Theory).

This school of thought asserts that real world organizations do not maintain continuous, perfectly calibrated control over all their activities in order to insure "optimal" outcomes. Simon and others argue that doing so is often impossible, and in any case it is generally not globally rational; the gains of perfect over imperfect decisions are typically not worth the added costs. Instead, "satisfactory" solutions rather than "maximatory" behavior are sought to a series of problems as they are generated by changing external circumstances, bureaucratic routines, or the poor performance of the organization in the eyes of its members (Roberts).

Decision theory of the firm is also complicated by a heterogenous external and internal environment of the firm which extends from a competitive market, with many firms and hence many decision makers, to one of pure monopoly with a single decision maker. Somewhere between these extremes is the oligopolistic market where theoretical formulations are not as well developed. What makes oligopoly theory different from competitive market theory is the recognition by the firms that outcomes of their decisions are affected by the behavior of other firms. Since it appears that the important characteristics of oligopoly behavior are not captured by conventional (formal) models, the informal school points out that research based on the "oral" traditions of industrial organization theory involves more careful analysis of actual firm decision making processes and the phenomena which determine decision formulation. More specifically, the important characteristics of much of this applied work incorporates the use of informal models, case studies, the consideration of particular decision making processes, situation-specific reasoning, consideration of uncertainty, information costs, transaction costs, and various institutional constraints (Joskow).

In that tradition, this study employs an oral case study approach which emphasizes the decision makers' perception of the decision making processes within their firms. It is assumed that each manager has a conception of his decision set and information needs. For a manager to know what information he needs he must be aware of each type of decision he needs to make and he must have an adequate conceptualization of each decision. It would appear from the following results that these conditions are seldom satisfied. Most managers had a conception of at least some of the types of decisions they make. Ackoff, writing on common misconceptions about management information systems, notes that the decision makers' conceptions about their decision environment are likely to be deficient in a very critical way, a way that follows from an important principle of scientific economy: "The less we understand a phenomenon, the more variables we require to explain it." This situation leads to an environment where the manager/decision maker demands more information than he really needs and therefore may overload the decision process with an "over abundance of irrelevant information."

To obtain insight into the firm's decision environment, the study posed the following question to each plant manager: What are your most important marketing decisions? The responses to this question are summarized below.

Firm #1. When questioned on the nature of the firm's marketing decisions, the manager of this large potato processing firm responded with broad operational and structural explanations reflecting his role in a complex organization. He began to explain the organizational structure of the firm emphasizing the relationships and responsibilities

of each division. In this context, the manager characterized his role as that of a leader who conformed to a democratic style; he did not participate in the day-to-day operations (activities or decisions) of each division head, but retained veto powers over each decision. He did see his overall responsibilities and objectives as operating an efficient (profitable) plant.

The types of specific decisions he saw himself making ran through a spectrum. His responses did not focus directly on marketing decisions per se, but rather focused on the broad operational type of decision (production schedules, labor contracts, budget and finances). He did indicate that during contract time he sat in on the bargaining sessions but that for the most part he allowed his field people to negotiate. He supplemented the negotiation procedures with information relating to the firm's processing plans for the upcoming year.

Firm #2. The manager of this medium size potato processing firm emphasized the importance of maintaining "control" of his business. He defined control of the business in terms of selecting the buyers of his finished product; he determined the distribution of sales to alternative retail outlets. The policy of the firm was to resist the attempt of large national chains to control a majority share of the firm's product market. Therefore, the firm primarily dealt with local chains and other small retail outlets.

Because of inflation, specific decisions on changes in weights of finished product, size of packages and prices of raw and finished products become important. The amount of private labeling was also

important because the firm also viewed this aspect of the business as a method of maintaining control over market share. The manager also mentioned the need to make decisions on the quality of raw product on a daily basis.

Firm #3. Manager of this medium size processed potato firm indicated that pricing decisions for raw product and for his finished product were very important. He also noted that decisions relating to transportation of raw product are of major concern because of the rapid increases in fuel prices. The manager also mentioned decisions related to expanding his plant. The plant had been expanded five times over the past forty years and he anticipated expanding his plant again within the next year.

Firm #4. Because of the general conditions of the economy, the manager believed that his decisions were not clearly defined. A major objective of this firm was merely to survive. He believed that it was important for decisions about product changes to be accepted by his customers. Because of the rapid changes in neighborhoods, he felt that there was a great need to change the composition of his product lines to meet the changes in demand. He emphasized that only the private sector could and would adjust rapidly to changing market demands.

Firm #5. The manager of a small potato processing firm stated that he made all decisions--from contracting with growers to the sale of the finished product. Pricing decisions were of major concern to this processor. The manager stated that he knew that the prices of his products were "out of line" (higher) than other processors. He indicated that this did not concern him very much because at the

current price levels his firm was able to make a modest profit although he quickly stated that there were seasons his firm had and would operate at a loss. In effect, the inflation problem was complicating pricing decisions. The manager also expressed concerns about developing a product that would meet changing consumer preferences.

He also noted that decisions relating to the procurement of raw product would vary in nature over the course of the year. When the potato season came to an end in Michigan, he used brokers to procure most of his raw product needs from other producing areas, therefore relieving him of this problem.

Firm #6. The manager stated that his marketing decisions were those of meeting the inventory needs of the various processing plants. That is, his job was making sure that potatoes were supplied on schedule. Also, he saw the need to make decisions about quality of raw product. The manager stated that he was fully aware of the interdependence between the grower and the firm and therefore attempted to resolve all conflict that might arise between the two parties.

E. The Behavior of the Firm as an Adaptive Institution¹

Thus far, a case has been presented that characterizes the formal theory of an omniscient firm as inappropriate in dealing with questions of microbehavior. As a result, a behavioral approach was employed which relaxed the classic assumptions and hence viewed the firm as an institution that is confronted by the uncertainty of its environment,

¹This section borrows heavily from Cyert, R.M., and March, J.G. A Behavioral Theory of the Firm. Prentice-Hall, Inc., Englewood Cliffs, 1963.

confronted with problems of maintaining a viable vertical business coalition, and confronted with a limited capacity to assemble, to store, and to utilize information.

Cyert and March in A Behavioral Theory of the Firm, characterize "the firm as an adaptively rational system rather than an omnisciently rational system."² They argue that a business organization is an adaptive institution; the firm learns from its experiences. They assume the adaptive system has the following properties:

1. There exist a number of states of the system. At any point in time, the system in some sense "prefers" some of these states to others.
2. There exists an external source of disturbance or shock to the system. These shocks cannot be controlled.
3. There exist a number of decision variables internal to the system. These variables are manipulated according to some decision rule.
4. Each combination of external shocks and decision variables in the system changes the state of the system. Thus, given an existing state, an external state, and a decision, the next state is determined.
5. Any decision rule that leads to a preferred state at any point is more likely to be used in the future than it was in the past; any decision rule that leads to a nonpreferred state at one point is less likely to be used in the future than it was in the past.

Cyert and March assert that as long as the environment of the firm is unstable, the heart of a behavioral theory must be a process of short run adaptive reactions. To examine the major attributes of short run adaptation by firms existing in a changing world, they focused on the standard operating procedures of business organizations and the ways in which these procedures changed. Standard operating procedures are a set of fairly well-defined rules which enable the firm

¹See H.A. Simon, Models of Man, New York: Macmillan, 1956. Cyert and March state that they "prefer the term 'adaptively rational' to reflect some sentiments about the rationality of learning."

(decision process) to adapt to different environments; they are the formal institutional memory of an organization. For example, in micro-economic theory one finds the decision rule which equates costs and revenue at the margin ($MC=MR$). For similar purposes, the firm adopts a set of rules that aid in decision making.

As part of the short run nature of the firm, Cyert and March summarize three basic principles of general choice procedures:

1. Avoid Uncertainty. Rather than looking for ways of dealing with uncertainty through certainty equivalents, the firm looks for procedures that maximize the need for predicting uncertain future events. One method uses short run feedback as a trigger to action, another accepts (and enforces) standardized decision rules.
2. Maintain the Rules. Once it has determined a feasible set of decision procedures, the organization abandons them only under duress. The problems associated with continuously redesigning a system as complex as a modern firm are large enough to make organizations cautious about change.
3. Use Simple Rules. The firms rely on individual "judgement" to provide flexibility around simple rules. One of the most common forms of a decision rule consists in a basic, simple procedure and the specification of a list of "considerations" describing the conditions under which the procedure may be modified.

Specific examples of standard operating procedures of the firm are reviewed. Cyert and March note that procedures most likely to be treated as fixed are those incorporated in the explicit standard operating procedures of the firm. "They give stability to the organization and direction to activities that are constantly recurring." In addition to providing needed stability, the standard operating procedures influence (and in many cases dictate) the decisions made in the organization.

Consider the four major types of procedures described below:

1. Task Performance Rules are a set of rules that relate to a specific "job" or duty that is performed by a member or subgroup within the firm. Task performance rules are important to the organization for several reasons. First, they permit the transfer of knowledge gained by other members in the organization. Second, organizations oftentimes require solutions to problems that are consistent with a large number of other solutions to other tasks being performed in the organization; these rules control behavior within the firm.

Task performance rules originate from two sources: within the firm and external to the firm. They emerge from in-house training of workers to rules that are learned within the organization and communicated to other organizational members. On the other hand, they can be introduced by recruitment and selection. Also, some rules are more general than the individual firm and therefore originate out of a broader setting such as "standard industry practices," or "standard business practices," "ethical business practices," or "good business practices."

2. Records and reports kept by the organization enable one to deduce important characteristics of the firm's decision-making system. In most organizations record and report keeping are used to maintain control and make predictions. Records tend to be related to elements of business operation that are most important to the effective operation of the firm (financial statement, cost reports, etc.).

3. Information-handling rules are found in all business organizations. They transmit information in the form of directions, estimates, and results. In order to provide reasonable certainty that relevant information will be available at the proper place and proper time,

rules developed by the firm govern the flow and content of information. Certainly the size and sophistication of the firm determines the detail, specification, and complexities of the rules.

Standard operating procedures for information are of two types: routing and filtering rules. "Routing rules specify who will communicate to whom about what" (Cyert and March). The best known and one of the most important of such rules is the "through-channels" rule, where the organization requires that certain kinds of information be handled through the prescribed channels (chain of command). For example, the president talks only to the Board of Directors, his staff and vice presidents. The through-channels rule is closely related to the standard organization chart which is itself a rule for communication.

Filtering rules are procedures which eliminate the "irrelevant bits" of information or entire bodies of information or pass on "relevant bits" of information to the proper sources. From this point of view, it is clear that biases are introduced in the filtering rules. (For example, each department within the firm may view information relating to their performance differently than an unbiased appraiser would evaluate the department's performance.) But it is observed that in the long run, organizations learn to provide counter biases for each bias. Moreover, in the long run, information-filtering and bias has a learning effect. Quoting from Cyert and March, "one of the ways in which the organization adapts to the unreliability of information is by devising procedures for making decisions without attending to apparently relevant information." Thus, the internal biases in the organization increase the pressure (from external

uncertainty) to develop decision methods that do not require reliable information (other than the simplest, most easily checked information).

Plans and Planning Rules are activities performed by the firm which prescribe a future course of action. In the usual sense of the word "plan," one thinks of long-term planning which plays a relatively minor role in day-to-day decision making in the firm. But firms do engage in activities that may be classified as planning (described as such by the firm) and these activities are specified as standard operation procedures. Also, because plans are made on a periodic basis, they enforce a variety of interesting behaviors within the firm. Perhaps the best example of a plan is that of the budget. It plays two basic roles within the firm. First it is used as a management control device to implement policies which executives have decided and to clock achievement against established criteria. Second, the budget is a device for determining feasible programs. In both cases, the budget tends to define in advance a set of fixed commitments and fixed expectations. In this sense, the budget affects the firm's behavior and decision making process.

This section has presented a theoretical picture of the firm in a real world environment of uncertainty, change, and adaption. It deviates from the depiction of the firm assumed in microeconomic theory. Cyert and March subscribe to the notion that the firm is an adaptive institution and five properties of that system were presented. Also, it was pointed out that the firm is heavily conditions by rules (standard operating procedures) and these rules in turn reflect organizational learning processes by which the firm adapts to its environment.

The classification of specific standard operating procedures will be useful in obtaining insight into the firm's decision making process. How specific operating procedures are employed by the firm have many implications for market information systems. At the outset, some categories of operating procedures will be more useful in developing this relationship than others, primarily because information on some standards are held closely by the firm and are difficult to obtain. Task performance rules are general and can be identified fairly easily. It was expected that the firm's records, plans and budget would be "sensitive information."

CHAPTER V

AN EVALUATION OF INFORMATION AGAINST PROCESSOR'S DECISIONS, MARKET STRUCTURE AND FIRM BEHAVIOR

A. Introduction

This chapter presents a brief evaluation of the supporting data and information systems operating in the Michigan processed potato industry. In a previous chapter, the shortcomings of neoclassical theory in evaluating (valuing) information were discussed. This chapter is premised on the notion that information attains its value only in the context of a specific decision. We will attempt to evaluate current market information against decisions made by potato processors. This analysis will then be extended by relating it to dimensions of market structure and of firm behavior.

The data analyzed in this chapter were obtained from direct personal interviews with managers and buyers in Michigan's processed potato firms. The interviews were designed to obtain information on the nature of the decision environment of the firm, types and sources of information used by the firm and its perceived value for decision. Responses were elicited by open ended questions on each of the above areas. These open ended responses were used in validating other questions using a pre-selected list of types and sources of information, and specific decision sets. An attempt was made to evaluate existing information systems of the processed potato industry from the perspective of the processor's decision making needs.

This procedure for evaluating information differs from the usual opinion poll approach in that the questions posed to each manager were placed in the context of that firm's decision environment rather than just rating an information source or type directly against a general qualitative variable. Managers were asked to rate the usefulness of different types and sources of information in the context of how they were used in specific decisions of the firm. This analysis has as its primary premise that information can be valued only in the specific decision context.

The Likert scaling method (Lansing and Morgan) is used to measure the degree of usefulness to processing firms of various types and sources of price information for decision making. Lansing and Morgan point out that scaled questions are well adapted to the discovery of general attitudes. "People are asked to respond to each item not simply by agreeing or disagreeing, but by indicating the degree of agreement or disagreement." Typically several steps, in this study four, are given between extreme agreement and extreme disagreement. This forms an ordinal scale which ranks individual attitudes along a continuum. There is, however, no implication of distance between the scores. The scale questions asked respondents in this study included "very useful," "moderately useful," "rarely useful," and "not useful" as possible responses.

The Likert scaling method has advantages as well as disadvantages. Birch and Schmid note that "scales offer the advantage, over open-ended questions, of providing easily quantifiable measures that are amenable to statistical manipulation and interpretation." The authors state that while scaled questions are useful in discovery

of general attitudes, "they are not useful . . . in the discovery of respondents' specific marginal preferences." They further note that "there are no limitations preventing a person from saying that he feels all problems are serious or taking some other consistently extreme position." Another limitation in this specific study is that it is a case study and as such empirical results are based on a limited number of observations. On the other hand, small as it is, the universe of Michigan potato processors was completely enumerated in the study.

This chapter is divided into three sections. Section one presents the results of the interviews with Michigan processors concerning their evaluation of the value of various types and sources of information for use in specific processing firm decisions. Section two stratifies the group of firms by market structure variables (i.e., size of firm and type of firm) and presents the results of Section one arrayed across various elements of market structure. Section three of this chapter examines the relationship, if any, between the firm's behavior in the procurement of raw product and of market information.

B. Types of Information Used by Potato Processors in Making Marketing Decisions

Table 5.1 presents the processors' evaluation of the usefulness of various types of information in making marketing decisions. Information is divided into four broad categories: price, supply, demand, and cost. An a priori list was first constructed from variables derived from published data, from economic theory, and from other studies. This list was then modified after directing an open ended question to plant managers. The absolute number of firms responding in the survey to each data type is presented in the table.

**Table 5.1 Usefulness of Various Types of Information
in Decision Making, All Processors**

Types of Information	Very Useful	Moderately Useful	Rarely Useful	Not Useful	Total
(Absolute Frequency)					
Prices					
Quotations	6	2	1	0	9
Contracts	4	3	1	1	9
Wholesale	6	1	1	0	8
Retail	5	3	0	0	8
Futures	2	1	3	2	8
Past Year	3	5	1	0	9
Forecast	4	2	1	2	9
Other	7	0	0	0	7
Supply					
Pvt. Intentions	4	2	1	2	9
Crop Estimates	4	2	0	3	9
Vol. Ship	2	4	1	1	8
Stocks (Storage)	4	3	2	0	9
Demand					
Population Trends	1	4	1	2	8
Income Trends	2	4	1	1	8
Consumer Profile	3	4	1	0	8
Demand Estimates	2	4	2	0	8
Cost					
Production	6	1	1	0	8
Processing	8	1	0	0	9
Transportation	8	1	0	0	9
Labor (Wages)	5	2	2	0	9

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980, survey question 11.5, Appendix A.

Within the category of price information, price quotations, contract prices, wholesale price information, retail prices, forecast price and prices of inputs were rated most often as "very useful" by all processors. Past year price received a rating of "moderately useful." Futures market prices were rated "rarely" to "not useful" by more than 50 percent of the firms.

In general, current price--price quotations, wholesale and quotes on input prices were given higher ratings. Historical price information or estimates of the future were generally rated lower. These results are not surprising in that many of the firm managers indicated that the general current economic situation (inflation) dictated the need to maintain a daily check on prices. Moreover, they indicated that because of price fluctuations common in agricultural markets, daily monitoring of prices was important.

Non-price information; supply, demand and cost are also important categories of information to processors. Of the three categories, cost information was most consistently rated "very useful" by all processors. Cost information included four categories: production, processing, transportation and wages. Processing and transportation cost were given the highest rating. Although information on wages was given a rating of "very useful" by over 50 percent of the firms, it received the lowest overall rating within the cost category. Plant managers indicated that labor union contracts, which often covered several years, reduced the usefulness of wage information to the firm.

Within the supply category, planting intention reports, crop estimates and stock reports received a rating of "very useful" from

44 percent of the firms. At the same time, crop estimates were of little importance to 33 percent of the processors. Those processors who rated crop estimates low stated that this information was often incorrect and therefore was not useful in making decisions. While planting intentions received a high rating, 30 percent of the processors "rarely used" or did not use this information. This latter group rated planting intentions low because they believe that the growing season is too unpredictable and thus the information is usually erroneous.

Although 50 percent of the firms rated all types of demand information as "moderately useful," the actual usefulness of the types of information displayed in the question are possibly lower. Several reasons lead to this conclusion: only a few firms rated information demand types as "very useful." Second, firms for the most part employ a general market trial and error approach (market tested) in determining the demand for their products. Finally, information on population trends, income trends, and demand estimates are usually available in aggregates that do not apply to the processor's relevant market. Also, demand information such as the type obtained from consumer profiles are a product of an analytical process the capacity for which many of the firms in the study do not possess.

C. Sources of Information in Decision Making

Table 5.2 presents the results of processors' evaluations of the usefulness of various sources of price information in decision making. The list of price sources was developed a priori and modified via an open ended question posed to each firm manager. Over 90 percent of the processors rated brokers/dealers as a "very useful" source of

**Table 5.2 Usefulness of Sources of Price Information
in Decision Making, All Processors**

Source of Information	Very Useful	Moderately Useful	Rarely Useful	Not Useful	Total
(Absolute Frequency)					
Radio and T.V.	2	1	3	3	9
Newspapers	3	3	1	2	9
Magazines	0	4	2	3	9
University Publications	2	1	2	4	9
USDA Economic Publications	3	4	1	1	9
USDA Crop Reports	3	3	1	2	9
Consultation with Persons in Govern- ment or University	0	1	6	2	9
Commercial Marketing Services	1	3	2	3	9
Banks	0	0	6	3	9
Retail Stores	2	5	1	1	9
Dealers, Brokers	8	1	0	0	9
Other Processors	3	3	3	0	9

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980, survey question 11.6, Appendix A.

price information. Surprisingly, even the firms who employed buyers also indicated that brokers/dealers were very useful sources of price information. Newspapers, trade journals (magazines), USDA economic publications, and other processors were rated "moderately" to "very useful" sources by over 80 percent of the firms. Rated low in usefulness as a source of price information were radio and T.V., consultation with government or university, commercial marketing firms and banks.

Several reasons can be offered for the above evaluation of the usefulness of the sources of price information. Perhaps the most important factor arises out of a distinction between information sources that are part of the market and sources that are not direct participants in the market. Brokers/dealers perform an important function in the market; they are bearers of information. The information they transmit is often current and accurate. If not, their trading partners--processors, producers, and buyers--can choose to deal with other brokers. They can exit. This potential penalty provides an incentive for the broker to perform well. On the other hand, participants who transmit information but who are not directly involved in the market are generally rated low in usefulness. Processors feel that these non-market sources transmit "stale information" but perhaps more importantly, the processor-decision maker has little recourse if the information obtained from the non-market source leads to a poor decision. The logic here does not suggest, for example, that USDA, a non-market source of information, must become a direct market participant in order to gain creditability as a useful source of information. But it may suggest to the non-market participants, who wish

to become a useful source of information, to build in feedback mechanisms so that the public statistical agencies can respond or modify the information source for better use in decision making.

D. Usefulness of Price Information in Specific Decisions Made by Potato Processors

Table 5.3 presents the results of the processors' evaluations of the usefulness of price information in making specific decisions. An important but difficult part of this analysis is specifying the decision making environment so that a representative list or set of decisions can be identified. The approach in identifying this set of decisions is similar to that used in developing the lists of types and sources of information. First, an a priori list of decisions was constructed. This list was compared with responses obtained from open ended questions posed to firm managers about their decision set. Inasmuch as the resulting list of decisions were not modified very much, this leads one to conclude that: 1) the a priori list adequately reflected the firm decision environment, or 2) open ended questions are perhaps not a good approach for acquiring knowledge about the firm's decision environment.

At any rate, the results of the open ended questions on the firm's decision environment reinforced the list of pre-selected decisions. Also, it should be noted that no attempt was made to rank the list of decisions in terms of importance and therefore it is assumed that all decisions are of equal importance.

In general, price information was found to be very important among more than 50 percent of the processors in making the following

Table 5.3 Usefulness of Price Data for Various Decisions, All Processors

Type of Decision	Very Useful	Moderately Useful	Rarely Useful	Not Useful	Total
(Absolute Frequency)					
Size of Plant (Expansion)	1	3	3	2	9
Number of Plants (Build)	1	4	3	1	9
Variety of Potato To Buy	4	2	2	1	
When to Buy Potatoes (Timing of Purchase)	5	4	0	0	9
Geographical Market in Which to Buy Potatoes	7	2	0	0	9
Market in Which to Sell Potatoes Product	5	3	1	0	9
Quality of Raw Product	1	2	4	2	9

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980, survey question 11.8, Appendix A.

decisions: 1) variety of potato to buy, 2) timing of purchases, 3) place or market to buy raw product, and 4) market in which to sell processed product. Several reasons may exist as to why price information is very important in the above decisions. With a number of different varieties of potatoes grown in Michigan and other varieties shipped in from other states, the processors demand for potatoes is fairly specialized. The finished product yield varies by variety of potato. Processors prefer the varieties that are known to have high potential product yield. Therefore, they will pay a premium but not an excessive premium, for a variety that will give higher yields. Decisions on when to sell and buy and in which market are, of course, directly influenced by price.

Decisions in which price appears to have little impact as rated by processors are expansion of plant size, number of plants, and quality of raw product. The complexities of decisions to expand operations and to build additional plants are such that a single bit of data (e.g., price) cannot possibly supply all the needed information. Price information is a factor but other types of information must be considered: the cash flow statements, supply, demand, interest rates, transportation, and so on.

Price information was rated very low by 70 percent of the processors when making decisions about quality of raw product to purchase. In other words, they believe that price carries very little information about the quality of the raw product. Pricing decisions and quality decisions are two separate decisions. This relationship appears to be consistent in all processing firms. Some processors stated that they would not accept raw product of poor quality for a

lower price while other processors were willing to make some marginal trade-offs between price and quality.

Although there were no apparent inconsistencies between evaluating the usefulness of price in the context of general decision uses as compared to its evaluation in the context of a specific decision, the possibility may exist. In general, price information received a high rating in all direct market exchange (buy and sell) situations. In other aspects of the business, price becomes one of many factors to consider. Of major interest here is the fact that processors believe that price transmits little information about the quality of the raw product.

E. Information and Market Structure

This section presents an analysis of the usefulness of information across various elements of market structure. In an earlier chapter, a review of the literature on the relationship between market structure and information was presented. Although the literature is very diffuse, economists have long recognized this relationship in theory and intuitively, but the topic is poorly developed; there are few empirical studies which attempt to analyze this basic relationship.

In traditional market structure studies employing the I/O framework, it is common to focus on several structural variables: size and number of firms, barrier to entry, product differentiation and concentration ratios.

For the purpose of this study, two elements of market structure were selected, size of firm and type of firm. These variables were selected because they are easy to obtain given budget constraints;

they are critical to this study's hypothesis on the relationship between market structure and information; and they can be operationalized.

Two basic types of potato processing firms operate in Michigan: freezers and chippers. The question raised in this section is whether the usefulness of information for decision making differs by firm type.

Size of firm, the second element of market structure under consideration is defined in terms of the volume of raw product handled by each plant.

1. Types of Information Across Firm Type

Table 5.4 presents the results of processors' evaluation of various types of information across firm type. In general, freezers gave higher ratings to most types of information than did chippers. Several interesting observations can be made on differences between freezers and chippers. With respect to price information, freezers consistently rated all types of price information (for both procurement and product markets), except potato futures prices, as "moderately useful" to "very useful." Somewhat surprisingly, chippers rated contract price information at 2.857, which is slightly below "moderately useful." On the other hand, chippers viewed wholesale (product) price information as more than "moderately useful." Another major difference between freezers and chippers is in their evaluation of forecast (product) price information. Freezers rate this type of information as "very useful," while chippers indicated that forecast price information is "rarely useful" to them when making decisions.

With non-price information, a similar comparison is made between the usefulness freezers and chippers place on various types of information. Here again, freezers generally rated all types of information

**Table 5.4 Average Ranking of Various Types of
Information Across Firm Type¹**

Types of Information	All Firms	Freezers	Chippers
Prices			
Quotations	3.555	4.000	3.428
Contract	3.111	4.08	2.857
Wholesale	3.625	3.500	3.666
Retail	3.600	3.500	3.666
Futures	2.375	2.500	2.333
Past Year	3.222	3.500	3.142
Forecast	2.888	4.000	2.570
Other Inputs (Oil)	4.000	-----	4.000
Supply			
Plt. Intentions	2.888	3.500	2.714
Crop Estimates	2.777	3.500	2.571
Vol. Shipments	2.875	3.500	2.666
Stocks	3.222	4.000	3.000
Demand			
Population Trends	2.500	2.500	2.500
Income Trends	2.875	2.500	3.000
Consumer Profile	3.250	3.500	3.166
Demand Estimates	3.000	4.000	2.666
Cost			
Production	3.444	4.000	3.285
Processing	3.888	4.000	3.857
Transportation	3.888	4.000	3.857
Labor (Wages)	3.333	3.500	3.285

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980, survey question 11.5, Appendix A.

¹The average number is based on assignment of number 4 to "very useful," 3 to "moderately useful," 2 to "rarely useful," and 1 to "not useful." Therefore, the highest rating possible would be 4.0 and the lowest, 1.0.

more useful than did chippers. All supply type of information, planting intentions, crop estimates volume shipments, and carry-over stocks were rated "moderately useful" to "very useful" by freezers. Chippers rated supply type of information as "rarely useful" to "moderately useful." Demand and cost types of information were evaluated fairly consistently between types of firms with the exception of their evaluation of demand estimates. Freezers rated demand estimates as "very useful," while chippers felt that this information type was less than "moderately useful."

Some generalizations can be made about how the freezers and chippers rated the usefulness of various types of information. As noted above, freezers generally rated most types of information higher than did chippers. For example, freezers rated contract price and all supply information as "very useful." Chippers generally rated product side information types as more useful. For example, they gave higher ratings to wholesale and retail price information than did freezers. Moreover, freezers rated information types that require more analysis (i.e., forecast price, demand estimates) higher than did chippers.

2. Sources of Information Across Firm Type

Table 5.5 presents the results of processors' evaluation of various sources of information across firm types. Most of the sources of information for both freezers and chippers were rated "rarely useful" to "moderately useful." Freezers and chippers both rated brokers as a very useful source of price information. Freezers rated other processors, USDA economic publications, and commercial marketing firms as a "very useful" to "moderately useful" source of information. On

**Table 5.5 Average Ranking of Sources of
Price Data Across Firm Type¹**

Source of Information	All (9 firms)	Freezers (2 firms)	Chippers (7 firms)
Radio and T.V.	2.222	2.000	2.285
Newspapers	2.777	2.000	3.000
Magazines	2.111	2.000	2.142
University Publications	2.111	2.500	2.000
USDA Economic Publications	3.000	3.500	2.857
USDA Crop Reports	2.777	3.500	2.571
Consultation with Persons in Government or University		2.500	1.714
Commercial Marketing Services	1.888	3.500	1.857
Banks	1.666	1.500	1.714
Retail Stores	2.888	2.500	3.000
Dealers, Brokers	3.888	4.000	3.857
Other Processors	3.222	4.000	2.714

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980, survey question 11.6, Appendix A.

¹The average number is based on assignment of number 4 to "very useful," 3 to "moderately useful," 2 to "rarely useful," and 1 to "not useful." Therefore, the highest rating possible would be 4.0 and the lowest, 1.0.

the other hand, chippers rated newspapers and retail stores as "moderately useful" sources of information. Here again, from examining the ratings given each source, it appears that for freezers information on the procurement side of the firm is most important, while for chippers information from the product side of the firm is more important for decision making.

3. Specific Decisions Across Firm Type

This section of the analysis presents results on processors' perceptions of the usefulness of price information in making specific types of decisions (see Table 5.6). Freezers rated price information "moderately useful" to "very useful" for the set of decisions. Price information was rated "very useful" in deciding on the number of plants to build, when to buy raw product, and from which geographical market to buy raw product. For chippers, price information rated the highest when deciding in which geographical market to buy. Chippers make a greater distinction than freezers when making quality/price trade-offs. In other words, chippers rate price information as "rarely useful" when making raw product quality decisions while freezers rated price information as "moderately useful." Chippers also rated price information low when making decisions on the size of plant and in making a decision on the number of plants to operate.

4. Size of Firm and Market Information

Table 5.7 presents the results of processor evaluations of types of information across various sizes of firm. For the most part, large firms rated information sets as "very useful" to "moderately useful." Medium and small firms, on the whole, rated information types lower. Price information received a "very useful" rating by the large firm.

**Table 5.6 Average Ranking of Price Data for
Various Decisions Across Firm Type¹**

Decision	All Processors (9 firms)	Freezers (2 firms)	Chippers (7 firms)
Expansion of Plant Size	2.250	3.500	1.833
Number of Plants	2.625	4.000	2.166
Variety of Potato	3.111	3.500	3.000
When to Buy	3.555	4.000	3.428
Geographical Market in Which to Buy	3.750	4.000	3.666
Market to Sell	3.500	4.000	3.333
Quality of Raw Product	2.000	3.000	1.857

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980, survey question 11.8, Appendix A.

¹The average number is based on assignment of number 4 to "very useful," 3 to "moderately useful," 2 to "rarely useful," and 1 to "not useful." Therefore, the highest rating possible would be 4.0 and the lowest, 1.0.

**Table 5.7 Average Ranking of Various Types
of Information Across Firm Size¹**

Types of Information	Small ²	Medium ²	Large ²	All Firms
	(2 firms)	(4 firms)	(3 firms)	(9 firms)
Price				
Quotations	3.500	3.400	4.000	3.555
Contracts	2.000	3.400	3.500	3.111
Wholesale	4.000	3.400	4.000	3.625
Retail	3.000	3.800	4.000	3.600
Futures	1.500	2.400	4.000	2.375
Past Year	3.000	3.000	4.000	3.222
Forecast	2.000	2.800	4.000	2.888
Other Inputs (Oil)	4.000	4.000	4.000	4.000
Supply				
Plt. Intentions	2.000	3.200	3.000	2.888
Crop Estimates	1.000	2.800	3.500	2.777
Vol. Ship	2.500	2.800	4.000	2.875
Stocks (Storage)	3.000	3.600	3.000	3.222
Demand				
Population Trends	2.000	2.400	4.000	2.500
Income Trends	2.500	2.800	4.000	2.875
Consumer Profile	3.000	3.200	4.000	3.250
Demand Estimates	3.000	2.800	4.000	3.000
Cost				
Production	3.000	3.400	4.000	3.444
Processing	3.500	4.000	4.000	3.888
Transportation	3.500	4.000	4.000	3.888
Wages	2.500	3.400	4.000	3.333

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980, survey question II.5, Appendix A.

¹The average number is based on assignment of number 4 to "very useful," 3 to "moderately useful," 2 to "rarely useful," and 1 to "not useful." Therefore, the highest rating possible would be 4.0 and the lowest, 1.0.

²Firm size measured in volume of potatoes handled annually by the plant, as defined in Table 4.2, Chapter IV.

All non-price information received high rating from large firms while medium and small firms ran the spectrum from "moderately" to "rarely useful." In other words, medium and small firms did not express strong feelings one way or the other on the usefulness of information types.

The results indicate that larger firms rated supply information higher compared to small and medium firms' evaluations of supply information. Within this category, volume of product shipped was the only information type that large firms rated as very important. The high rating of supply information may indicate that larger firms are more concerned about stable supplies of raw product than small and medium sized firms. As a result, they find supply related types of information more useful.

Another reason that may explain why larger firms rate most information higher than small and medium firms is the greater analytical capability of the larger firms. Larger firms have, for the most part, an analytical sophistication which results in a greater realized value for information in their decisions. Therefore, it can be expected that larger firms rate most information as "very useful."

5. Firm Size and Source of Information

Table 5.8 presents the results of processor evaluations of sources of information by size of firm. Broker/dealers are rated as the most useful source of price information, all other sources of price information were rated low by all firm sizes. Besides giving brokers a "very useful" rating, the large firms also rated USDA crop reports as a "very useful" source of price information. Other processors as a

**Table 5.8 Average Ranking of Sources of
Price Data by Firm Size ¹**

Sources of Information	All	Small²	Medium²	Large²
	(9 firms)	(2 firms)	(4 firms)	(3 firms)
Radio and T.V.	2.222	3.000	2.000	2.000
Newspapers	2.777	3.000	2.600	3.000
Magazines	2.111	2.500	1.600	3.000
University Publications	2.111	2.000	1.800	3.000
USDA Economic Publications	3.000	2.500	3.000	3.500
USDA Crop Reports	2.777	2.500	2.400	4.000
Consultation with Persons in Govern- ment or University		2.000	1.600	2.500
Commercial Marketing Services	1.888	2.500	1.800	3.000
Banks	1.666	2.000	1.400	2.000
Retail Stores	2.888	3.500	2.400	3.500
Dealers, Brokers	3.888	3.500	4.000	4.000
Other Processors	3.222	2.500	3.200	3.000

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980, survey question II.6, Appendix A.

¹The average number is based on assignment of number 4 to "very useful," 3 to "moderately useful," 2 to "rarely useful," and 1 to "not useful." Therefore, the highest rating possible would be 4.0 and the lowest, 1.0.

²Firm size measured in volume of potatoes handled annually by the plant, as defined in Table 4.2, Chapter IV.

source of price information were rated "rarely useful" by small firms and "moderately useful" by medium and large firms.

6. Size of Firms and Specific Decision

Large firms rated price information "very useful" in all decisions except for decisions related to quality of product (see Table 5.9). Medium and small firms rated price information as "rarely useful" when making decisions related to the quality of raw product for processing.

Price information was rated "not useful" to "rarely useful" by small plants when confronted with decisions to expand or built plants, and to choose a variety of potatoes to process.

For all firm sizes, price information proved to be "very useful" to "moderately useful" in making decisions on when to buy and in which geographic market to buy.

F. Implications of Firm Behavior for Market Information Systems

In the previous chapter, the question was posed of, "What are the major dimensions of input market conduct?" Four elements were discussed: contracting, pricing, quality control, and attitudes toward information.

Beyond the conventional notion of market structure, environmental characteristics should be considered as factors which influence procurement behavior of processors. This would include such factors as technology, uncertainty, and imperfect knowledge. Imperfect knowledge is the "code word" in economic theory for information. In this study it is of particular importance to trace the relationship between

**Table 5.9 Average Ranking of Price Data for
Various Decisions Across Firm Size ¹**

Decisions	All	Small²	Medium²	Large²
	(9 firms)	(2 firms)	(4 firms)	(3 firms)
Size of Plant (Expansion)	2.250	1.000	2.400	4.000
Number of Plants	2.625	2.000	2.600	4.000
Variety of Potato	3.111	2.500	3.200	3.500
When to Buy	3.555	3.500	3.600	3.500
Geographical Market	3.750	4.000	3.600	4.000
Which to Buy				
Market to Sell	3.500	4.000	3.200	4.000
Quality of Raw Product	2.111	2.000	2.400	1.500

Source: Data collected from personal interviews with Michigan processed potato plant managers, 1980, survey question 11.8, Appendix A.

¹The average number is based on assignment of number 4 to "very useful," 3 to "moderately useful," 2 to "rarely useful," and 1 to "not useful." Therefore, the highest rating possible would be 4.0 and the lowest, 1.0.

²Firm size measured in volume of potatoes handled annually by plant as defined in Table 4.2, Chapter IV.

market information and firm behavior. With this broader view of the firm's environment, it seems appropriate to pose a more encompassing question, "What are the firm's rules (standard operating procedures), policies, strategies that guide its decision making process in procuring raw product?" Why do firms vertically integrate? Under what market conditions do firms employ brokers? What are the firm's information handling rules? The premise here is that the above practices of the firm exist not so much because information has changed the firm's behavior, but rather, the lack of information (uncertainty) has altered its behavior (practices). These behavioral practices influenced by uncertainty subsequently impact market structure and market performance.

Given the above dimensions of market conduct and risk management practices of the firm, what implications do firm procurement market behavior and risk management practices have for market information? Here, we are concerned with three actors: the firm, other firms in the market, and non-market participants (public statistical institutions). It should be evident that a firm's behavior has implications for its information needs. Earlier, the firm was portrayed as an adaptive institution. The behavior of the firm will certainly impact its decision process and hence suggest something about its information needs. At the same time, the firm's behavior also has implications for other market participants, their decisions and information needs. The last actor, statistical agencies, is a non-market participant. In this case, reference is to the two principle public supported USDA statistical institutions, the Economics and Statistics Service, and the Agricultural Marketing Service.

Typically, commodity procurement strategies, pricing policies and the like are closely held by the firm because of the potential competitive repercussions. Firms tend to hold onto their "secrets." As a result, much of the following discussion stems from personal interviews with managers and observations supported by other studies. No effort was made to obtain information on two important standard operating procedures, the firm's record keeping and its planning, because it was thought most firms in the industry would not provide this information. Nevertheless, information on task performance rules and information handling rules were solicited from the firm and other market participants.

1. Contracting

Three main observations come out of the description of contracts (in Chapter IV, see Procurement Conduct) used by Michigan processed potato firms. These have direct implications for the distribution, need, and perhaps value of information in the market.

First, the contracting process is complex. Many dimensions of the product and conditions must be discussed before exchange takes place between producer and processor. To the extent that there is no consistency between contracts offered by each firm, the terms of trade or information which flows from the exchange process becomes tailored for the firm, difficult to summarize and, in any case, generally closed to the public. The complex contracting process would make information (price, quantity, etc.) collection costs high for the public statistical institutions. Also, this closed information exchange arrangement makes it difficult to evaluate market performance.

Second, the contracting process deviates from competitive market conditions. In theory, price is the single signaling agent which is expected to aid decision makers with resource allocation. In a market where the informational content of price is limited, some other mechanism is required to perform the information signaling function--contracts. The contracting process does provide a forum through which information is generated while goods and services are exchanged.

The third observation about contracts in the Michigan processed potato industry deals with the relationship between the firm's behavior and other firms in the market. The existence of information and contracting costs have important implications for many aspects of firm behavior. The oligopoly firm is not only concerned with the prevailing market information--price, costs, quantity--but is also concerned with the behavior of rival firms and potential entrants in the market (Juskow). Juskow states that the firm's ability to monitor and respond to the actions of rivals, both real and potential is limited by considerations of information cost. Also, the firm's ability to form, monitor and enforce informal collusive agreements (contracts) is determined by the same considerations. The direct implications of this statement are that the lower information and contracting costs become, the greater will be the ability of a small group of firms to behave the way one single monopoly firm behaves. Barriers to entry become extremely high. The larger are information costs, the more likely will firms behave competitively, thus easing the barriers to entry.

2. Pricing Behavior and Strategy

Because of the volatility of price in agricultural commodity markets, procurement decisions are becoming increasingly important. Processors can employ several strategies in procuring raw product; (1) purchase from the open market and be subjected to price instability, (2) position themselves in the market in advance and in this case stand to gain if price increases and lose if market prices fall, and (3) employ a combination of these two strategies.

If price instability is characteristic of a market, the firm's timing of commodity purchases has a significant influence on the cost of the finished product, and thus on its competitive position relative to other firms in the market. Hayenga notes that key elements in the decision must include

the forecast probability distribution of the relevant cash and future delivery commodity price levels (and their 'basis' relationship) over the time period prior to use, the key contingencies or environmental factors (weather, government policy changes, etc.) affecting those probabilities, the typical distribution of forecast error, and the current cash and future contract price.

Although an accurate assessment of the probability distribution of future commodity price levels is difficult, it is critical in effective risk management. Hayenga constructs a model which shows how the expected probability distribution of commodity prices, which will be available to the firm in the future time period, fits into the firm's decision process. In Figure 5.1 the expected probability distribution of future commodity prices available to the firm is illustrated. Because a greater number of undetermined factors can influence prices, the figure is constructed such that prices in the more distant time period are portrayed with a larger variance. Hayenga states that the firm

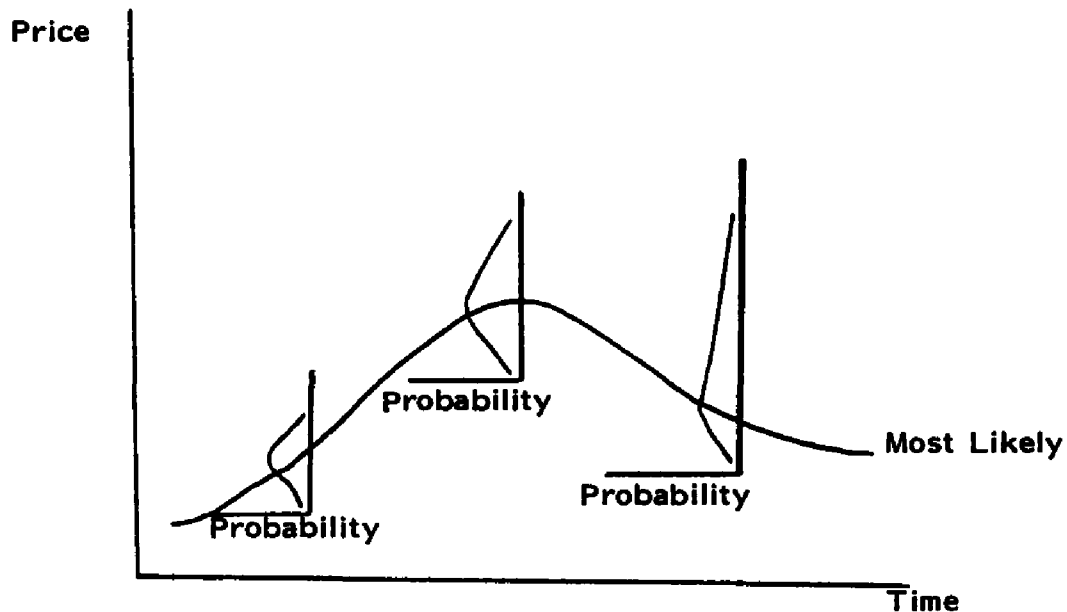


Figure 5.1 The Firm's Decision Process and Expected Probability Distribution of Future Commodity Prices

can incorporate this information into the management decision process by taking commodity prices presently available for current and future delivery, and overlaying them on the expected prices in the future. Hayenga identifies additional factors critical to firm's decision on commodity prices. They include the expected price of the products to be sold by the firm, the resulting margin, expectations regarding competition's behavior in both the commodity and product market, and the level of risk acceptable to firm management.

Results from direct interviews with managers of potato processing firms indicate that they employ much simpler rules in making decisions on prices. Freezers, for example, minimize their risk through forward

purchases of production (acreage) contracts. Chippers employ contracts to lock in a price of a future delivery of raw product to their plant. Both freezers and chippers buy on the open market to fulfill processing short falls throughout the year. Thus, they use a combination of pricing strategies.

When it comes to determining an offer price, interview results indicated that processors resorted to a combination of pricing rules that ranged from a price leadership model to a market determined price. The price leader model holds particularly true in Michigan during late winter and early spring of the year when the processor comes to terms with the grower on the contract price. One firm stated specifically that they were not signing contracts with their growers in 1980 until the dominant firm in the market had completed its contracting. He further indicated that his firm would attempt to match the price offers of the dominant firm. This supports the results of other research on the market conduct of processors in the determination of their procurement policies which suggested barometric price leadership of a competitive variety as a plausible form of pricing behavior (Collins, Mueller and Birch). Quoting from Helmberger and Hoos, Jesse Markahm defines barometric price leader of a competitive type which "appears to do little more than set prices that would eventually be set by forces of competition." The authors state that in this type of price leadership, the price leader is more or less the victim of competition; an announced price by a would-be leader is not intended to achieve price discipline among other firms, but rather to reflect or anticipate an inevitable development.

This behavior has significant implications for price information systems. It appears that the cost of price determination falls on the dominate firm; this firm has the task of arriving at a price which ultimately serves (or greatly influences) the market price. Assuming that the smaller firms in the market rely heavily on the actions of the dominate firm in making pricing decisions, the cost of this activity should be low for the smaller firm. They become free riders in that this strategy facilitates smaller firm decision making on pricing without having to invest in collecting price and other types of information.

The public statistical agencies could not rely solely on this source of price data because a public information agency is charged with the responsibility of collecting representative market prices. Price offers determined by one firm may not represent the entire market (industry) in that contract prices are often signed with specific groups of farmers in a concentrated production area.

3. Quality Control Rules

Evidence strongly suggests that processors make pricing decisions separate from decisions on quality of raw product purchases. Therefore, information related to quality is needed by the firm for its quality decisions. The firm has two options in plotting a quality control strategy: 1) invest in obtaining information on quality of raw products, or 2) adopt specific rules and procedures which reduce the need for such information thereby simplifying the decision process. Results indicate that the latter option best describes the behavior of Michigan processors in making quality related decisions.

The contract is the integral mechanism for controlling quality of raw products in the processed potato industry. The contract displays the "rules," specified by the firm and agreed upon by the producer that governs raw product quality. This specification ranges from production practices to specific grades of raw product. One rule that has been controversial is the so called "chip on arrival rule." The rule provides for rejection of any potatoes that do not chip to the buyer's (processor) satisfaction. Although favored by processors, the rule is not favored by many growers because they feel that the clause is used to break contracts and obtain lower priced supplies (Harrison). Contracting is standard procedure with most firms and even if not included in a written contract, the chip on arrival rule appears to be a procedure practiced industry wide.

The firm's decision process is significantly influenced by the standard operating procedures of the industry relating to quality control. This rule reduces the information needed by the firm in making quality decisions.

The operating procedures for quality control of the individual firm, although practiced industry wide, have little impact on other firms in the market. Quality plays a significant role in product differentiation and each firm strives for the highest possible standards of quality. Each firm sets its standards somewhat independent of other firms in the market. For example, it was found that firms in the Michigan processed potato industry specify different percentages of Grade A potatoes in their contract and require different rules governing quality control.

Non-market participants perhaps could contribute to the marketing process not by supplying more information on quality, but rather by strengthening rules (standards) which will enable market participants to make better decisions relating to quality. For example, research could provide some basis for establishing chipping potato disease and defect color charts (Chipper Snacker). Although the industry has developed such charts, little is known in the Michigan market about the processes underlying their development, their basis, whether growers were involved, and so on. At any rate, it seems that a plausible solution to this issue is for the statistical agency to supply information relating to standard procedures rather than quality related data.

4. Risk Management Practices

A variety of risk management practices adopted by the firm have implications for market information needs of the firm, competing firms and non-market participants. (1) Why do firms vertically integrate?¹ First of all, vertical integration through ownership in the Michigan processed potato industry is limited to two firms and therefore does not represent a major form of exchange. Although vertical integration is not a major market arrangement in the Michigan potato industry, it is a common practice in many other fruit and vegetable markets. Protection against risk is one of the major reasons many processors

¹"Vertical integration embraces a broad range of inter-firm relationships between successive stages in production. Elements in vertical integration exist in almost all inter-firm arrangements that affect production other than those arrived at in the open competitive market" (Mighell). In this study vertical integration has reference to ownership.

(and growers) integrate for supplies of raw product. This form of market arrangement ensures processors a quantity of perishable products to the firm. Further, uncertainties associated with price instabilities are controlled to a greater degree.

Vertical integration also provides the processors with some control in the input market which may serve as a barrier to potential market entrants (Williamson). The extent of vertical integration in the Michigan processed potato industry is so limited that it probably does not provide enough "market power" to cause much of a barrier to market entry.

(b) Broker versus Buyer? The choice between employing a broker or a full time buyer is often dictated by the size of the firm. For the most part, larger firms employ buyers and the smaller firms employ brokers to procure their raw products. Results from the previous section of this chapter report that without any doubt, brokers are thought of by the firms in the Michigan processed potato market as the major source of information. Also, from the firm's perspective, brokers play an important role in reducing risk.

Given the important role that brokers play in reducing risk and transmitting information in the processed potato industry, personal interviews were conducted with five of the largest brokers in the state. All brokers indicated that they arrange the exchange between buyers and sellers. This process often requires the broker to bear much of the risk involved in the market. For example, one broker described it by saying that his business was to "protect the market." He arranges the exchange between a risk adverse grower and a risk adverse buyer by taking responsibility of ensuring payment of goods

and transportation of goods over a specified time period. The broker believed that this function was necessary because neither buyer or seller would otherwise undertake the risk of making the transaction. These responses may exaggerate broker risks since brokers are rational and, in addition, only infrequently take title to the potatoes.

Another dimension of risk bearing occurs when a load of potatoes is "rejected at the plant door" by the processor. In some cases, the broker takes the responsibility, thus reducing the risk of a bad quality load to both grower and processing firm by absorbing transportation costs, or if possible, by locating another buyer who requires lower quality standards (soup firms, etc.).

Information transmitting is a primary function performed by the broker. In a sense, one can think of his commission as the value of information to the firm. When questioned on their sources of market information each broker indicated that they telephoned various market participants around the country. One broker stated that while he supplied USDA with price quotes, public price reports were not useful to him because they were not timely enough to meet his immediate decision needs. This may ignore the use of such USDA information for ex post validation of other sources.

The functions of the broker have tremendous implications to the firm decision process with respect to the procurement of raw product. Michigan processors employ brokers in procuring 16 percent of their raw product needs. The firm simply delegates this function to the broker and as a result many of the firms' decisions and their information problems are resolved.

(c) Information handling rules. These rules arise in the processed potato industry from basically two situations: 1) those that are industry wide (filtering rules related to information sources external to the industry), and 2) those that are internal to the firm but characteristic of the market structure (oligopoly).

Firms within the industry seem to have established a set of rules which govern the value of various sources of information. Non-market information sources are generally considered not useful. Information resulting from market participants whether requested by the firm or obtained via transaction (exchange) is given a higher premium. This runs fairly consistently throughout the industry.

Because of the structure of the industry, the firm can observe its internal operations and make inferences about total market information. One manager indicated that the best source of information about his competitors was obtained by monitoring the changes in volume of finished product demanded in the market. Also, the sales force of the firm served as information collectors. One firm manager indicated that he has weekly meetings with salesmen to discuss information gathered on their competitors. Other firms in the industry tended to have a fairly "loosely structured" organizational system for acquiring market information. That is, they have not developed rules for transmitting information within the firm and for the most part they collect market information on an ad hoc basis.

CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

A. General Conclusions

This research had two broad goals. The first was to describe one type of problem, obsolescence, as it relates to the data systems and as it impacts the decision making processes of firm managers in the Michigan processed potato industry. The second major objective was to develop and implement a methodology for evaluating information systems operating in the Michigan processed potato industry. Several objectives are related to the above major goals: (1) to describe the market structures and operational aspects of exchange at the grower-processor level in the Michigan processed potato industry; (2) to describe the publicly supported information services, the private information services and the informal information system operating within the Michigan processed potato industry; (3) to identify important marketing decisions made by potato processing firms; (4) to evaluate the supporting information system by relating specific market decisions to specific types and sources of data; (5) to suggest improvements in the publicly supported statistical services provided the Michigan processed potato industry, and (6) to test the applicability of the information system paradigm and to revise or extend it where possible.

At the outset, it should be pointed out that the generality of inferences drawn from this study is somewhat limited because a case study approach was adopted. Moreover, given the relatively small number of firms, although comprising the total population within the state of Michigan, the results may not be directly applicable to the national processed potato industry. In addition, in Michigan there are only two freezers and nine chippers (eight chippers participated in this study). The analysis of the firms' evaluation of various types of market information was done using the Linkert scaling method. Since scaled questions do not result in cardinal, but rather in ordinal results with no basis of comparability, one cannot assign levels of significance to observed differences, for example, between freezers and chippers. This leaves one with a substantial amount of descriptive material but a limited potential for extensive analysis. Nevertheless, there are some conclusions from this study which have implications for the following defined areas of concern: the firm decision environment, structural change in the processed potato industry, agricultural economic research, public statistical agencies, the method used here, and future research.

This study began with the premise that one of the major problems of an information system is statistical obsolescence. Given the nature of all information systems, this fundamental problem is seen as stemming from two sources: (1) changes in the policy agenda, and (2) changes in the reality being tracked by the information system (Bonnen, 1975).

In the context of the market, the phrase "policy agenda" is taken to mean "decision agenda." And, therefore, this study was concerned with the types, nature, and changes in the decision agenda of processed potato firms that might render the supporting information system obsolete. The need to study the decision agenda was found not only necessary to illustrate obsolescence in the information system, but it was also necessary to indicate the relative value of different types of information to the decision maker. Thus, throughout the course of this dissertation, the following premise has been argued: information obtains its value only in the context of a specific decision. As a result, the decision process of the firm became a primary area of inquiry.

Although decision is an integral part of economics, microeconomic theory does not provide a true theory of management decision making at the firm level. Therefore, the behavioral theory of the firm has been employed to study the decision environment of processed potato firms.

For the most part, one would expect the decision agenda for private market firms to remain fairly constant over time. This is to be expected because the firm, unlike public institutions, is primarily concerned with the pursuits of limited "well defined" objectives. Public decision makers, on the other hand, are concerned with a multitude of objectives--efficiency, equity, growth, balanced budgets, national security, to list a few. Moreover, changes in political power alter the emphasis placed on each of these objectives. In a relative sense, the firm sails in still waters. But from time to time, it experiences extremely rough waters that rock the boat and make decision less clear.

Recent years have been tough times for the business community in general. Inflation has had a tremendous impact on the firm's ability to plan and thus make decisions concerning pricing, expansion, and disinvestment. Many apprehensive feelings were voiced throughout the interview process. Quite a few managers had never operated a business during inflationary periods and as such registered concern about its effect on their decision processes.

Statistical systems also become obsolete when fundamental changes occur in reality of the market which make it more difficult for the statistical agency to collect data. Sometimes the agency does not even recognize the change when it evolves slowly. Within the processed potato industry, changes in market structure are the major factors contributing to statistical obsolescence.

Perhaps the most noticeable change in the potato industry is the great shift away from fresh toward processed outlets in potato markets. This change has implications for the market channels, market functions, and many economic aspects of exchange. Each of them, in turn, have implications for our public statistical system.

For many years the producer had one major outlet for his potatoes, the fresh market. But with the growth in the potato processing industry over the past two decades, the spectrum of possible marketing channels has widened significantly. Along with these new marketing alternatives arises the need for information to meet the new set of marketing decisions faced by producers. Also, some decisions are no longer faced or have become less important and therefore so have related information needs. This phenomena has occurred in many segments of our food sector. And for the most part, public statistical agencies have responded appropriately to

this change by reporting statistics on the new products that flow through the various channels. This trend is likely to continue as consumer demand for the more convenient processed food expands.

USDA's statistical agencies have generally adapted well to this sort of change and have established the necessary institutional mechanisms to deal effectively with this phenomena. For example, user workshops conducted by ESS-Statistics are well suited for identifying the changes in marketing channels and the new statistical needs of the industry. This is the type of feedback any statistical system should seek in order to retain credibility with its data users. This mechanism provides "feedback" from the users of statistics to the managers of the statistical agency. When engaged in this effort, however, a statistical agency needs to develop criteria for deciding on the adoption of changes in statistical programs which are suggested by the various market participants. It appears that in some cases the industry through its various industrial associations could and should provide for certain of its own data needs. Some ideas are dubious in terms of cost effectiveness. Others benefit a quite narrow segment of the food marketing system and the benefits are almost, if not, entirely captured by food marketing firms. In other cases there are major social returns to consumers and the public and public investments in data are justified. However, at this point we lack suitable criteria for deciding such trade-offs.

The second important consequence that this change in potato market organization has for our public statistical agencies is that it alters the distribution of marketing functions at the first handler level between the three major actors--growers, brokers, and processors.

Market organization changes cause marketing functions to be defined differently, sometimes discontinued, and oftentimes exchanged between the actors. For example, at one time many of the marketing functions--from production to transporting produce to market--were performed by the producer. But as specialization in agricultural marketing intensified these activities were spun off the farm to other market participants (and vice versa). The degree to which this has occurred varies across geographical markets, across market channels, and even across individual firms (both producer and processor). This brings up the question whether these changes are reflected in current statistical agency procedures to collect and compile data series on prices received by growers. Perhaps a further question to consider is could or should statistical agencies respond to these changes.

ESS-Statistics has, for example, recently responded to the shifting marketing functions in potatoes by examining a new data series (proposed by a farmer organization) which would report a synthetic farm gate price of potatoes by subtracting out of the first transaction price any marketing functions performed by the grower. This price concept brings up important questions about the merits of any synthetic statistic. What decisions does this information facilitate? How accurate an indicator of farm level prices would this statistic be? Are there dangers in reporting prices that are not market determined? Are ESS-Statistics price series designed to make state comparisons?

It is difficult to conceive of any direct decision needs that a synthetic farm gate potato price would serve. In contracting or

bidding, market participants are surely sophisticated enough to understand and discount these variations in marketing functions (especially as they affect their own costs) performed by potato farmers. If the market already discounts for this phenomena and, as reported in this study, if processors do not now find USDA prices very useful in their decisions, one is at a loss to know what practical value a "farm gate" potato price concept would have either for processors or growers. Klein's evaluation of potato grower information needs does not suggest any urgent grower decision uses for a synthetic farm gate price either in the case of processing or fresh markets. Moreover, costing out market functions from a market determined first transaction price may greatly distort the signalling ability, if any, of the reported market determined price series. Price is derived from the interaction of supply and demand forces in the market place. Cost is a major component on the supply side. To subtract out cost on a per unit basis would result in a concept with little meaning. Moreover, costing out marketing functions could, especially in an inflationary period, result in an agency periodically reporting negative prices--which only underlines the question of what the concept behind such a price means and what real world uses it might have. Finally, the primary purpose of ESS price data are to provide measures of market performance especially when combined with quantity sold to provide a farm income measure. In this use, a synthetic farm gate price would understate farmer income and distort the measure of farmer welfare.

Another structural change in the potato industry which has implications for public statistical systems focuses on the exchange

mechanism. As the industry shifts from fresh toward processed markets, the primary exchange mechanisms are also shifted from an "open system" to one that is closed. The exchange mechanism which traditionally transferred fresh produce, a terminal market, resulted in a situation where the public statistical agent could directly observe and report the prices that prevailed in the market. But as more product moved through the processed potato market, the exchange mechanisms were altered to meet the needs of the potato processing firms. The new exchange mechanism, contracts, makes it difficult to obtain accurate price data since the flow of information in the exchange process is highly tailored to the individual firm and is closed to the public. This type of structural change represents a serious problem for the public statistical system because it involves the fundamental question of property rights to information--a question that is yet to be resolved.

In the context of the potato industry shift from fresh to processed markets we find even more fundamental structural change. In Michigan between 1964 and 1974 the number of potato growers declined from 3154 to 860, while during this period, potato acreage per farm increased from 12 to 47 acres (Harrison). From all indications processing firms have also declined in number while increasing in size. These structural changes and others suggest the need for some fundamental adjustment in our statistical institutions. If adequate information is to be available for monitoring market developments and meeting public and private decision needs, a new focus in our research and data collection institutions is needed.

B. Market Structure, Procurement Behavior and Information: The Results

This research approach, in effect, held market structure and firm behavior constant, and then evaluated information in the context of the firms' decision environment. More specifically, this study evaluated types and sources of market information against the firms' marketing decisions. Current market price information--farm level price quotes, wholesale prices, and quotes on input prices were given high ratings by most of the firms. Historical price information and estimates of future price were, on the whole, rated lower. Within the non-price information categories, all types of cost information were most often rated useful by potato processors. Prices, however, stand well above all other types of information in their value in processor decisions.

Brokers and dealers were rated as the most useful source of price information by processors. Brokers perform the function of information transmission. They are market participants and therefore they are subjected to recourse by producer or processor if they transmit faulty information. USDA price reports were considered by the processors as the next most useful source of price information. Given the public good characteristic of information, it can be assumed that other sources such as newspapers, radio, and T.V. relied heavily on USDA price data as a source.

Price information was given higher ratings when considered in specific decisions that involved direct exchange of goods in the market. It is interesting to note that price information was rated very low by processors when making decisions about quality of raw product. Also,

price information was rated low in specific decisions related to expanding or building new plants. Because price information was rated low in this instance, it is assumed that a single statistic could not provide enough information for this set of complex decisions.

Two elements of market structure, size of firm and type of firm were used to evaluate information in the processed potato industry. Cross tabulations ranking the usefulness of various types and sources of information were employed. With respect to information types, freezers generally rated most types of information higher than did chippers. Moreover, freezers rated highest information types that were related to the procurement side of the firm. Chippers, on the other hand, rated product market information higher. This clearly reflects the relative dominance in decision maker concern for product market problems in the case of chippers and procurement problems in the case of freezers.

Both freezers and chippers recognized brokers as that most important source of market information. For the most part, again, freezers tended to rate sources on the procurement side higher and chippers rated product side market information sources higher.

Freezers and chippers were also asked to rank the usefulness of price information in making specific decisions. Freezers rated price information "moderately useful" to "very useful" for their decisions. For chippers, price information ranked the highest when deciding in which geographical market to buy. The results indicate that chippers rate price information as "rarely useful" when making quality decisions.

This study also examined the relationship between size of firm and type of information. As was expected, large firms rated most information types as "very useful" to "moderately useful." One interesting result is that larger firms rated supply decision information higher compared to small and medium firm's evaluation. The high rating of supply information may suggest that larger firms require more control over the stability in supply of their raw products than do small and medium sized firms. And as such, they place a higher value on supply information. All firm sizes cited brokers/dealers as a "very useful" source of price information.

In making specific decisions, all firm sizes ranked price information as "very useful" to "moderately useful" in making decisions related to direct exchange of goods. Here again, price information was ranked low in making decisions about the quality of raw product to purchase.

Elements of firm behavior and how they relate to market information was also of concern in this study. A distinction was made between firm behavior that arises from and is influenced by market structure, and behavior that stems from the firm's environment (general market conditions). The latter behavior is primarily influenced by uncertainty or lack of information. This category of behavior generally involves risk management practices. Within each group, specific elements were discussed in the light of the implications for informational need of the firm, other firms in the market, and the public statistical agency. Under the behavior of the firm contracting, pricing, and quality control were considered. Under the risk management practices the discussion included (1) why do firms vertically integrate, (2) broker versus buyer, and (3) information handling rules.

Generally, the firm attempts to reduce the risk by employing any number of the above elements of behavior. Whenever a marketing practice becomes too risky, the firm avoids this activity by attempting to shift it toward another market participant.

This research examined the usefulness of publicly provided information in an oligopoly market, the Michigan processed potato industry. From the theory of cost and benefits of information across different market structures, as developed in Chapter II, one can draw some inferences about the provision of public information in the Michigan processed potato industry. First of all, this market structure is perhaps the most difficult one in which to assess the directional distribution of costs and benefits to private and social investments in information. Let us first consider cost distributions. The theory suggests that the cost of data accessibility for the firm declines as one departs from competitive conditions. We reason thus because, as the market grows more monopoloid, the firm can obtain an estimate of various parameters of the entire market by examining its internal operations in relation to the market. The largest firm has the greatest advantage in this, and the smaller less. This follows from the basic structure of an industry with few firms. Further, a firm in this market can reduce the cost of information for decision making by employing any number of risk management practices and standard operating procedures. On the other hand, public statistical agencies without the cooperation of the oligopoly firm experiences relatively high cost of collecting market information. This, in part, explains why public statistical agencies do not collect very much information for facilitation of markets in concentrated industries. Further, the use of

contracts that are tailored for each firm adds to the heterogeneity of transaction, and to the public cost of collecting market information.

One must also consider the social benefits of investing in information in oligopoly markets. Aside from the difficulties of accounting for social benefits of public investments in information, the direction of social benefits of publicly supplied market information appears to diverge in oligopoly markets between returns to (1) market facilitation, and (2) public policy and regulatory programs. As pointed out in Chapter II, the benefits of public information in markets that approach the competitive model are realized primarily in gains from facilitating market coordination. But as one moves away from competitive markets to substantially concentrated ones, the benefit of public information takes the form of returns to various types of public policy which often require information on the performance of the market. With the case of the Michigan processed potato industry, we found little evidence of market coordination problems that can be improved by simply providing more market information--especially price data. Also, public policy issues were of the nature which suggest that more statistical information would not add substantially to social benefits. There is a need for research to track and better understand the effects of the changes taking place in markets such as this.

On market structure and procurement, one can offer the following conclusions:

1. An evaluation of price information against specific decisions made by potato processing firms suggests that only current price information directly related to the exchange of goods is valued highly by the firm. The results also indicate that only the market can provide

this type of price information to meet the firm's decision needs. So called "third party" information sources for the most part are valued lower. USDA was considered by processing firms to be the most reliable non-market source of information.

2. Structural characteristics of the processed potato market do have an impact on how various types of market information are valued. In the main, processors across different market structure elements rated brokers as the most useful source of information.

3. Elements of firm procurement behavior do have an impact on the distribution and value of market information to the firm, other firms in the market and public statistical agencies. The firm as an adaptive institution can adjust its behavior by employing risk management practices to operate under uncertainty or to transfer market functions when the risk becomes too great.

4. A tangential question that ran through this research effort was what are the potentials for USDA to improve its statistical services to processors and conversely, how can processors aid in improving public statistical products. While some processors indicated that they cooperated by filling out state crop reporting questionnaires, most processors thought that they and the USDA could do little to improve public market information.

C. Implication for Public Reporting System

It should first of all be noted that USDA's statistical agencies were not designed directly to serve the informational needs of food processors, the focal group in this study. In fact, the informational needs of this group of firms are perhaps inherently a lower priority on their statistical agenda than are producer needs. But the reality

of the situation, the problem of statistical obsolescence, makes it possible for one to draw some inferences from this study for the public statistical system whose primary mission developed some years ago and has not fundamentally changed. Increasingly, the decisions made by processors affect the entire food system and thus the activities of processors impact the public statistical agencies. With the tremendous change in market organization, new types of problems arise, and therefore, the need for information for both private and public decisions increases.

Perhaps one of the most important public data series is that of prices. While it is questionable whether or not this data series can significantly alter the firm's behavior, results of this study indicate that public price data series, nevertheless, rank second in usefulness in processor's decision making. Most of the benefits of these price reports go unnoticed because information can easily be reproduced by other institutions and distributed as theirs without many market participants knowing the connection between the various sources. Results of this study indicate that nonprice data series are also quite important to processors. Crop estimates and planting intentions are two major data series published by ESS-Statistics. The informational content of prices is being reduced by changes in market structure and pricing mechanisms. The ability of price to perform its signaling function so that resources are efficiently allocated has been reduced. Consequently, nonprice information increases in value to the decision maker. This is particularly true in agricultural markets where price elasticities are such that small changes in supply can drastically affect market prices. If a market participant in the potato

industry waited to react to changes in market prices, he would be placed at a disadvantage compared to the participant who had prior direct information about changes in the size of the crop.

Because of inflationary pressures, the cost of marketing has risen rapidly in recent years. Many marketing services are in fact becoming more costly than the per unit value of the raw product. Marketing data, in most cases, are not reported by the public statistical agencies, despite their importance to the food system. For example, transportation makes up ten percent of all food-marketing costs. Data published on food transportation is reported by the Interstate Commerce Commission. Upchurch asserts that food hauling is, for the most part, by unregulated carriers where there is no complete and consistent body of data. Cost information on transportation of processed food would be of value to the industry as well as the public sector.

Improved information on another area that would be of value to both private and public sector decisions involves grades and standards in the potato industry. Research on this problem area can perhaps best be performed by AMS with ESS cooperation. Consistent grades and standards tailored to processing uses could greatly enhance the exchange of products between producers and processors.

D. Appraisal of the Information System Paradigm: Methodological Implications

This study has employed the information system paradigm in the analysis of market information in the Michigan processes potato industry. Here the strengths and weaknesses of this framework are discussed.

Perhaps the greatest strength of the framework lies in its ability to aid the researcher in defining problems. It helps bring clarity to a complex setting. The framework is applicable to most informational problem areas at both a micro and macroeconomic level. It is particularly suited for that type of research where the problem is ill-defined and the emphasis of the research is at least partly to articulate the problem better.

Another strength of the paradigm, as exemplified by this study, is that it can easily be combined with various concepts from theories which aid in shedding light on the research problem. The framework is an epistemological taxonomy, not a methodology, which allows it flexibility. For example, in this study the information systems paradigm was combined with concepts from neoclassical theory, institutional economics and from industrial organization.

The information system paradigm does not help one with the fundamental paradox of information: decision makers cannot place a value on information until they have used it. Therefore, decision makers' evaluation of information types and sources is limited to their realm of experience with existing information types and sources. The framework relies on the complete specification of the users decision environment to identify emerging informational needs of decision makers. This is an empirical matter which is often difficult to assess.

Another limitation of the framework is that it does not provide decision rules so that, for example, trade-offs can be made between competing data users. The framework does not help the researcher in prescribing which types of information should be publicly supported and which type should be supported by the private market. All

this hinges on the fact that there remain serious problems in placing a value on different uses of data and on the distribution of benefits.

The above characterization of the information system paradigm are germane to its application to almost any problem. There are, however, some specific insights and difficulties arising directly from the application of this framework to the particular problem in this research.

Previous studies have identified difficult problems in applying the information system paradigm. Riemenschneider stated that the problem of identifying the universe of data users was critical to his study of the USDA farm income data system. Klein also alluded to the problem of identifying data users in his study of the potato price data series in Michigan. Because the data users in this study were a relatively definitive group, identifying or obtaining a frame did not present a problem as much as there was a problem of identifying and validating the decision environment (i.e., specifying a specific list of decisions) of the user. Specifying the decision environment of a modern day firm is difficult for at least two reasons: (1) lack of theoretical explanation for firm management decisions, and (2) conceptual problems of defining the phrase "marketing decisions."

As pointed out earlier, microeconomic theory serves as a limited guide to the management decisions of the firm. Therefore, this theory could not be totally relied upon in developing a set of decisions against which to evaluate various types and sources of market information.

The second concern deals with the conceptual problem of what are marketing decisions. Almost any decision made by processors would in some way directly or indirectly affect the demand or supply of the market product. As a result, choices of decisions to include in the decision set must conform to some definition which operationalizes the concept of market decisions. This study adopted Lazer's concept of marketing decision. He notes that

marketing decisions are often made from a different basic perspective than decisions in the organizational areas . . . The perspective of the market place is adopted and the marketing executive tries to perceive his alternatives and decisions through the eyes of consumers.

This concept of marketing decision provides some basis for selecting some types of decisions while rejecting others.

The above two concerns had a bearing on the methodology employed in this study. The procedure that was followed involved developing a set of pre-selected marketing decisions made by potato processing firms. A combination of economic theory and Lazer's concept of marketing decisions were used in developing this pre-selected list of decisions. The list of decisions was then validated in a pilot survey and with an open ended question posed to plant managers in the target group. By allowing the firm manager and other knowledgeable market participants to modify this pre-selected decision set, the procedure takes on a normative aspect. It has the advantage of identifying other decisions which may not otherwise be recognized by theory. By the end of this exercise, very few changes occurred in the pre-selected list of decisions. That leaves this validation procedure open to question because it was expected that the list would be modified or extended.

Moreover, it is difficult to determine whether the decision set used to evaluate information types and sources represented a complete list of marketing decisions made by potato processors. Also, the decision set was not prioritized so that one could assign importance to one type of decision over another. Thus, we have a decision set that is assumed to be representative of the firm decision environment and that is assumed to contain a list of decisions that are equally weighted.

This method not only involved the evaluation of types and sources of information against specific firm marketing decisions, a procedure whose importance is implied by the information system paradigm, but also stratified firms along elements of market structure, as defined by industrial organization theory. Hence, this procedure integrated two intellectual frameworks. The structural variables used in this study were firm size and type of firm. These elements of market structure in the Michigan processed potato industry were relatively easy to operationalize. But there are several other elements of market structure which may have an impact on the distribution and value (to the decision maker) of information that could be incorporated in this analysis such as various dimensions of product differentiation. For the most part, the approach only serves to form an association between selected elements of market structure and the value of information to decision makers. It does not specify the desired structural (institutional) arrangement that will provide market information of value to the decision makers. To do so would involve the institutional question of specifying in detail the elements of market structure which will yield the desired informational flows to market

and non-market decision makers. The approach applied here merely illustrated the directional impacts of selected elements of market structure on the value of information. But it is a necessary first step in the development of ideas about the specification of a model of market structure impacts on the information desired by decision makers.

This research approach involved a further integration of the I/O framework with the information systems paradigm by tracing out the probable relationships between selected elements of the firm's procurement behavior and market information. Here again, this approach is limited to the explanation of directional impacts of variables (that is, the impact of the behavior of the firm on market information). As in the case with market structure and information, directional impacts are a necessary first step in analyzing firm behavior and information. Establishing this relationship is difficult. One cannot hold constant many of the other variables which may also influence the value and distribution of information to the firm's decision maker. This analysis basically inferred from the existing procurement behavior and risk arrangement practices of potato processing firms the likely impacts on information distribution and value for the firm itself, other firms in the market and public statistical agencies. This approach could greatly be enhanced if a method were available to measure directly the impacts of the firm procurement behavior on the value and distribution of market information.

E. Implications for Agricultural Economists

Out of this study flow certain implications for agricultural economists. Because much of the problem solving and subject matter research of any field of study is largely constrained by the

strengths and weaknesses of its theory, the comments which follow will address the limitations of economic theory, in its application to information systems research.

As a result of this research experience it became abundantly clear that in its current level of development, neoclassical economics makes but a limited contribution toward the solution of informational problems. The theory rests upon assumptions that avoid the problem of information. Lack of theoretical development in this area is perhaps responsible for the inactivity of applied research (problem solving and subject matter) on information systems. As the costs of producing information increase, questions concerning the derived benefits (value) of information services will arise more frequently. Economics has yet to provide a practical framework for valuing information, a critical input into both public and private decisions. If we are to deal with many of the present day and emerging problems facing our public statistical system, we must further develop our economic theory base.

Another area which lacks applicable economic theory development is that of management decision theory of the modern firm. The modern firm makes economic decisions on resource allocation, prices, output, quality of product, and any number of matters. Cyert and March note that there is a "disparity between the process by which business decisions appear to be made by complex organizations in the real world and the way in which they are explained by economic theory." Thus far, much of the research conducted by agricultural economists has involved firms (the farms) in markets that are competitive. Increasingly this is no longer the case for agricultural markets; they are growing

more concentrated and less competitive. The firms which make up the food and fiber markets from production units to retail outlets are becoming more complex. This suggests that agricultural economists cannot totally rely on their current economic theory base to solve many emerging problems of our food and fiber system.

F. Further Research

This research involved a case study which addressed some aspects of valuing information at a given market level in the Michigan processed potato industry. A case study was undertaken because this approach could best test an unproven methodology on a limited scale with the minimum resource requirements. From this experience, the following observations are offered for future research on market information systems.

First of all, many conceptual and theoretical aspects of the paradigm need further work. As noted in Chapter II, no all encompassing framework exists for dealing with the problems of information. Perhaps the greatest possibility of strengthening the information system paradigm exists in integrating it with other conceptual frameworks. Even this proposition requires more investigation.

At its current stage of development, this framework could be usefully applied to some agricultural marketing research problems. For example, several emerging institutions within agricultural markets have tremendous implications for the use, value, and distribution of information. A study of various pricing institutions, particularly as practiced in cooperatives, would be a fertile area of research.

APPENDIX

APPENDIX A

QUESTIONNAIRE DIRECTED TO PROCESSED POTATO FIRMS

The purpose of this questionnaire is to provide information on the major characteristics of the Michigan processed potato industry. The answers will be used to determine how potatoes are bought and sold in the market. All information you provide will be kept confidential. No identities of individuals' responses will be revealed in the report derived from this study.

SECTION I: Economic Characteristics of the Processed Potato Industry

1. Please indicate the major use of potatoes in your firm.

chipping _____ freezing _____ other _____

2. What is the average volume (cwt) of potatoes your firm handles in a year? _____

3. What other commodities are processed by your firm?

A. _____ D. _____

B. _____ E. _____

C. _____ F. _____

4. Potato products represent what proportion of your total sales? _____ %

5. By what method do you obtain raw product (potatoes)? If more than one means of acquiring raw product is used, please indicate the proportion of potatoes acquired by each method.

Contracts:

Written _____ %

Oral _____ %

Own or Rent Land _____ %

Grower Cooperative _____ %

Broker _____ %

Farmer's Market _____ %

Other Processors _____ %

Other (specify _____) _____ %

6. If you contract with growers directly, how many growers are involved? _____

7. What is the distance of raw product (potatoes) supplies from your processing plant(s) ?

Distance	% of Raw Product		
Less than 50 miles	_____ %	_____ %	_____ %
51-100	_____ %	_____ %	_____ %
101-200	_____ %	_____ %	_____ %
over 200	_____ %	_____ %	_____ %
Location of Plant	_____	_____	_____

8. Indicate the percent of product sold to the various buyers.

National retail food chains	_____ %
Regional retail food chains	_____ %
Local retail food chains	_____ %
Cooperative and buying group	_____ %
Wholesalers	_____ %
Institutions	_____ %
Governmental agencies	_____ %
Food manufacturers	_____ %

9. What proportion of your firm's processed output (potato) sold to chain retail outlets is marketed as private label? _____ %
10. How many processing plants do you operate? _____
- Which of the following functions are performed by your firm after you have taken title to the potatoes?
- | | |
|-------------|-------------------------|
| Wash _____ | Storage _____ |
| Grade _____ | Other (specify) _____ |
| Pack _____ | None of the above _____ |
- Transport (from the farm to the processing plant) _____

11. From which of the major potato production areas do you buy your raw product?

Manistee	_____	%
Mecosta	_____	%
Montcalm	_____	%
Monroe	_____	%
Bay	_____	%
Red River Valley	_____	%
Other (specify) _____	_____	%
Other (specify) _____	_____	%
Other (specify) _____	_____	%
Other (specify) _____	_____	%

SECTION II: Information Sources, Marketing Decisions and Uses of Market Information (Evaluation)

1. What are your most important marketing decisions?

2. What are your sources of market information?

3. What is your primary use of price information?

4. What types of data do you feel best suit your decision making needs?

5. Various types of information are available to aid managers in decision making. Please indicate how useful the following types of information are to you when you make marketing decisions. Check one category for each type of information.

Type of Information	<u>Very Useful</u>	<u>Moderately Useful</u>	<u>Rarely Useful</u>	<u>I do not use because Not Useful</u>	<u>Not Aware</u>
<u>Price Information</u>					
Potato price quotations	_____	_____	_____	_____	_____
Current contract prices	_____	_____	_____	_____	_____
Wholesale prices	_____	_____	_____	_____	_____
Retail prices	_____	_____	_____	_____	_____
Potato futures prices	_____	_____	_____	_____	_____
Reports of potato prices for past year	_____	_____	_____	_____	_____
Potato price forecasts	_____	_____	_____	_____	_____
<u>Supply Information</u>					
Intentions to plant	_____	_____	_____	_____	_____
Estimates of acres planted, harvested and yields	_____	_____	_____	_____	_____
Volume of potato shipments	_____	_____	_____	_____	_____
Estimates of stock (carryover)	_____	_____	_____	_____	_____
Grade-size distribution of potatoes delivered to processors	_____	_____	_____	_____	_____
<u>Demand Information</u>					
Population trends	_____	_____	_____	_____	_____
Income trends	_____	_____	_____	_____	_____
Consumer profile data	_____	_____	_____	_____	_____
Demand estimates	_____	_____	_____	_____	_____
<u>Cost Information</u>					
Cost of production	_____	_____	_____	_____	_____
Cost of processing by product	_____	_____	_____	_____	_____
Transportation cost by product	_____	_____	_____	_____	_____
Marketing cost by product	_____	_____	_____	_____	_____
<u>Labor</u>					
Wage rates	_____	_____	_____	_____	_____
Labor availability	_____	_____	_____	_____	_____

6. Price information can be secured from various sources. From the following list please indicate which sources of information you find to be useful to you in making marketing decisions.

<u>Source</u>	<u>Very Useful</u>	<u>Moderately Useful</u>	<u>Rarely Useful</u>	<u>Not Useful</u>
a. Radio and T.V.	_____	_____	_____	_____
b. Newspapers	_____	_____	_____	_____
c. Magazines	_____	_____	_____	_____
d. University publications	_____	_____	_____	_____
e. USDA economic publications	_____	_____	_____	_____
f. USDA crop reports	_____	_____	_____	_____
g. Consultation with persons in government or university	_____	_____	_____	_____
h. Commercial marketing services	_____	_____	_____	_____
i. Bankers and lending institutions	_____	_____	_____	_____
j. Retail stores	_____	_____	_____	_____
k. Potato dealers, brokers, shippers, etc.	_____	_____	_____	_____
l. Other processors	_____	_____	_____	_____
m. Other sources (specify)	_____	_____	_____	_____

-
7. From which of the sources above do you get most of your market information, rank first to last 1-6 (list letters)?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

8. Published or reported economic price data may be helpful in making many marketing decisions. Please indicate how useful the data you receive are when you make the following decisions. Check one category for each type of decision.

<u>Type of Decision</u>	<u>Very Useful</u>	<u>Moderately Useful</u>	<u>Rarely Useful</u>	<u>Not Useful</u>
Size of plant (expansion)	_____	_____	_____	_____
Number of plants (to build)	_____	_____	_____	_____
Variety of potato to buy	_____	_____	_____	_____
When to buy potatoes (timing of purchase)	_____	_____	_____	_____
Geographical market from which to buy potatoes (location)	_____	_____	_____	_____
Market in which to sell potatoes	_____	_____	_____	_____
Quality of raw product	_____	_____	_____	_____
Pricing of raw product	_____	_____	_____	_____
Pricing of processed product	_____	_____	_____	_____

9. Does your firm perform its own data analysis? _____ Yes _____ No
To what degree?

10. A processor and grower plan jointly their marketing strategies, coordinate price structures and exchange information between each other about their plans and goals.

Do you believe that it should be permitted?

_____ Yes _____ No _____ No opinion

Do such actions ever have desirable market consequences?

_____ Yes _____ No _____ No opinion

Cases such as this probably occur frequently.

_____ Strongly agree _____ Agree _____ No opinion

_____ Disagree _____ Strongly disagree

11. Two processing firms exchange information about sales plans and prices schedules.

Do you believe that it should be permitted?

_____ Yes _____ No _____ No opinion

Do such actions ever have desirable market consequences?

_____ Yes _____ No _____ No opinion

Cases such as this probably occur frequently.

_____ Strongly agree _____ Agree _____ No opinion

_____ Disagree _____ Strongly disagree

12. Is there a need to improve information in the processed potato industry? If so, what improvements in the information would you suggest relevant to your decision making needs?

13. For each of the statements given below, indicate by checking the most appropriate response given in front of each statements.

SA=strongly agree A=agree N= no opinion

D=disagree SD=strongly disagree

SA A N D SD

_____ _____ _____ _____ _____ Information is a major source of power in the market process.

_____ _____ _____ _____ _____ We could fully share information (on prices, production, costs, concerns and plans) which we have with growers and their organizations without putting us at a competitive disadvantage.

_____ _____ _____ _____ _____ We solicit such information (on prices, production, costs, concerns and plans) actively.

14a. Do you subscribe to any commercial marketing services? ____ Yes ____ No

b. If so, which ones?

15. Please list other marketing information that you pay for (such as University marketing newsletters, commodity newsletters, or farm magazines) and indicate whether they help you do a better job of marketing.

Name of newsletter, magazine, etc.	Annual cost	Help with marketing	
		Yes	No

SECTION III: Economic Behavior and the Contracting Process

1. Would you briefly describe the bargaining/contracting process between your firm and growers or grower organization.

2. How long has your firm been involved in contracting?

_____ years.

3. During this time, have new terms of trade been added to contracts?

1. _____ Yes

2. _____ No

4. For which of the following terms of trade do you currently contract. Which of these terms of trade do you believe contracting should take place?

_____ Price

_____ Time of payment

_____ Quality standards

_____ Quality measurements procedures

_____ Delivery schedules

_____ Provision of transportation

_____ Weighting procedures

_____ Raw product handling procedures

_____ Length of contract

_____ Responsibilities and rights during production

_____ Prices for provision on production inputs

_____ Spraying and dusting

_____ Planting time

_____ Harvesting time

_____ Use of irrigation equipment

_____ Other (please specify)

5. Who makes the final decision on whether to accept or reject terms of trade?

What process is involved here?

6. Is the price for which you bargain (raw product) ?

- ☐ A firm price
- ☐ Pegged to some market price
- ☐ Pegged to cost of production (grower's)
- ☐ Pegged to cost of processing (processor)
- ☐ A formula price dependent upon production levels
- ☐ Price lender dominate firm
- ☐ Other (please specify)

7. How would you characterize the bargaining process in terms of the relationship between grower and processor (you may check more than one).

- ☐ Adversary relationship with considerable conflict
- ☐ Tough, but with mutual respect and acceptance
- ☐ Dominated by processors
- ☐ Other (please specify)

8. What procedures and criteria you employ to ensure for product quality?

**QUESTIONNAIRE DIRECTED TO POTATO
SHIPPERS, DEALERS, AND BROKERS**

1. What percent of your shipments (potatoes) are marketed tablestock
____%, processed (chip ____% or frozen ____%)?
2. List processing firms in the state that you frequently deal with.

3. Do you contract for raw potatoes? Please describe your contracting process (see Section III if yes).

4. Is the price for which you bargain

- ____ a firm price
- ____ pegged to some market price
- ____ pegged to the cost of production (grower)
- ____ a formula price
- ____ other (please specify)

5. Various types of information are available to aid managers in decision making. Please indicate how useful the following types of information are to you when you make marketing decisions. Check one category for each type of information.

Type of Information	<u>Very Useful</u>	<u>Moderately Useful</u>	<u>Rarely Useful</u>	<u>I do not use because Not Useful</u>	<u>Not Aware</u>
<u>Price Information</u>					
Potato price quotations	_____	_____	_____	_____	_____
Current contract prices	_____	_____	_____	_____	_____
Wholesale prices	_____	_____	_____	_____	_____
Retail prices	_____	_____	_____	_____	_____
Potato futures prices	_____	_____	_____	_____	_____
Reports of potato prices for past year	_____	_____	_____	_____	_____
Potato price forecasts	_____	_____	_____	_____	_____
<u>Supply Information</u>					
Intentions to plant	_____	_____	_____	_____	_____
Estimates of acres planted, harvested and yields	_____	_____	_____	_____	_____
Volume of potato shipments	_____	_____	_____	_____	_____
Estimates of stock (carryover)	_____	_____	_____	_____	_____
Grade-size distribution of potatoes delivered to processors	_____	_____	_____	_____	_____
<u>Demand Information</u>					
Population trends	_____	_____	_____	_____	_____
Income trends	_____	_____	_____	_____	_____
Consumer profile data	_____	_____	_____	_____	_____
Demand estimates	_____	_____	_____	_____	_____
<u>Cost Information</u>					
Cost of production	_____	_____	_____	_____	_____
Cost of processing by product	_____	_____	_____	_____	_____
Transportation cost by product	_____	_____	_____	_____	_____
Marketing cost by product	_____	_____	_____	_____	_____
<u>Labor</u>					
Wage rates	_____	_____	_____	_____	_____
Labor availability	_____	_____	_____	_____	_____

6. Price information can be secured from various sources. From the following list please indicate which sources of information you find to be useful to you in making marketing decisions.

<u>Source</u>	<u>Very Useful</u>	<u>Moderately Useful</u>	<u>Rarely Useful</u>	<u>Not Useful</u>
a. Radio and T.V.	_____	_____	_____	_____
b. Newspapers	_____	_____	_____	_____
c. Magazines	_____	_____	_____	_____
d. University publications	_____	_____	_____	_____
e. USDA economic publications	_____	_____	_____	_____
f. USDA crop reports	_____	_____	_____	_____
g. Consultation with persons in government or university	_____	_____	_____	_____
h. Commercial marketing services	_____	_____	_____	_____
i. Bankers and lending institutions	_____	_____	_____	_____
j. Retail stores	_____	_____	_____	_____
k. Potato dealers, brokers, shippers, etc.	_____	_____	_____	_____
l. Other processors	_____	_____	_____	_____
m. Other sources (specify)	_____	_____	_____	_____

-
7. From which of the sources above do you get most of your market information, rank first to last 1-6 (list letters)?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

APPENDIX B
List of Interviews

Date	Name of Organization	Individual(s) Interviewed	Location
Nov. 9	USDA-MSU	Larry Hamm	East Lansing
Nov. 15	MSU	Tom Pierson	East Lansing
Nov. 27	MSU	George Stackwick	East Lansing
Nov. 28	Michigan Potato Industry Commission	Roy Kaschyk	Lansing
Dec. 11	Michigan Potato Industry Commission	State Processors	Brighton
Feb. 14	National Potato Council	Dan LaPointe	Washington, D.C.
Feb. 15	USDA-Statistics	Robert H. Axvio, John Lange, and Bill Wilken	Washington, D.C.
March 28	Chief Wabasis Potato Growers Cooperative Association	Larry Jensen	McBride
April 1	Mid America Potato Co.		Grand Rapids
April 1	Mrs. Bees Potato Chip Co.		Grand Rapids
April 3	Ore-Ida		Greenville
April 9	Made Rite		Bay City
April 15	Be Mo		Kalamazoo
April 22	Better Made		Detroit
April 23	New Era		Detroit
April 23	Frito Lay		Allen Park
April 24	Superior		Detroit
May 15	Chief Wabasis Potato Growers Cooperative Association		McBride
May 20	Jack Mall		Bay City
May 20	Made Rite		Bay City
May 21	George Towne Produce		Six Lakes
May 21	Potato Market Service		Edmore
May 21	Robert McCrea Potato Shipper		Stanton
May 28	New Era		Detroit
May 28	Superior		Detroit
May 29	Better Made		Detroit
May 29	Frito Lay		Detroit

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