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## THE USE OF PRICES AND OTHER MARKET INFORMATION IN THE MICHIGAN POTATO INDUSTRY

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# THE USE OF PRICES AND OTHER MARKET INFORMATION IN THE MICHIGAN POTATO INDUSTRY

## INTRODUCTION

### A. Problem

In recent years the accuracy and quality of publicly provided statistics have been the subject of repeated concern. These expressions of concern have come from market participants, researchers, and government officials who use or provide these statistics.

The most frequent and difficult questions arise out of the growing problems of collecting data at the producer-first handler (buyer) level in many vegetable markets. Various market participants claim that current data are not adequate to the needs of decision makers. It is believed that many of the problems in data used for public and private decision making are caused by increasing heterogeneity of product and market structure and changes in exchange mechanisms at the grower/first buyer market level. This is especially true of price data. These changes in vegetable markets have frequently forced the locus of decision and hence, price and other transaction information up the market chain to the next level, i. e. to the processed market. Here new questions of property rights to information become acute. These matters bring into question the appropriateness of the present design of public information as well as that of the institutional systems for providing agricultural market information.

Given the changing structural characteristics of the processed potato industry and the changing agenda of policy and management issues, the first problem faced is one of obsolescence as it now impacts the data system and related analysis. This in turn raises questions about how well the industry is served by existing information.

The concern of this research is with the general issue of statistical obsolescence, an inherent problem of all information systems, and the implications for information systems operating in other vegetable markets as well as for statistically based information systems in general.

## B. Objectives

The Objectives of this study are:

1. To describe the structural characteristics and operations of exchange at the producer/first handler level in the Michigan potato industry.
2. To identify potato producer and processor uses of price data and other information, the sources of price data used by producers and processors, and the type of information used in making marketing decisions.
3. To evaluate the information supporting the firm's decisions by relating specific marketing decisions to specific types and sources of data.
4. To suggest improvements in the publicly supported statistical services provided the Michigan processed potato industry.

## C. Method and Procedure

Due to the lack of a proven theoretical framework for analyzing data and information problems, and especially the obsolescence of statistical information, the approach taken in this study is unorthodox.

The method developed in this study is a logical extension of an information system paradigm that provides a broad intellectual framework to guide the refining of the problem definition and in developing or identifying other concepts and frameworks that might be applicable to the analysis of information problems in agricultural markets. The Michigan potato processing industry at the grower/first handler level is used as a case study.<sup>1</sup> Because of the nature of its problem, much of the study is descriptive. ✓

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<sup>1</sup>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 Michigan potato growers and processors. As a result, the question of accessibility and cooperation from the industry 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 help and participation.

The first objective was fulfilled by analyzing responses to questions that described the producing firm and its marketing practices. For example, producers and processors were asked to identify the markets in which they sold or bought potatoes; the degree of functional alteration of the potato at the point of first sale, the price discovery mechanisms employed in marketing, the proportion of the crop sold or bought on a preseason contract, the size of the farm, etc. Survey data were supplemented with secondary data where possible.

The second objective was fulfilled by asking the producers and processors a series of questions about the information they use, the decisions in which they use price information, and where they acquire their price and other information. The purpose of these questions was to identify the types of information needed by producers and processors in decision making, the decisions deemed most important by these decision makers and the sources of needed data that they found useful.

An important element in accomplishing the third objective was obtaining a measure of the value producers and processors placed on various data used in decision making. Thus, scaling questions were included as a means of providing a measurement of the intensity of the decision maker's overall attitudes about price data and their sources of these data. A Likert, ordinal scale was employed to allow for a ranking of individual responses. In this type of scaling or attitude measurement the respondent is asked to choose among several response categories indicating various strengths of agreement or disagreement with the statement. By assigning a number to the categories, the respondent's attitude is measured by the total score and the responses may be ranked. However, it is important to note that this technique does not allow one to make any statements about how much stronger one response is than another (Moser and Kalton).

The completion of objectives 1, 2, and 3 will make it possible to suggest improvements in the publicly support statistical system. Given the premise that the nature of information and of the decision maker's need for information changes over different

market structures, a description of the market structure may suggest something about the distribution of costs and needs for different kinds of information among various market participants. Structural characteristics may be related to the question of the public versus private needs for and rights to various types of information in a market.

Data for this report was obtained from two major data collection efforts: first a mail survey was administered in 1978 to obtain data on the marketing and information uses of Michigan's potato producers and secondly, a direct personal interview survey was used in 1980 to obtain data on Michigan potato processors' marketing and information uses.

Grower Data. To obtain data from potato producers a questionnaire was mailed to a list of all Michigan potato producers, followed by telephone interviews with a random sample of the producers who did not respond to the mail questionnaire. The mail questionnaire had two major objectives: 1) to identify the structure of Michigan potato producing firms and the marketing arrangements current existing in the Michigan potato industry, and 2) to identify the types and sources of price data and information used in decision making by Michigan potato producers.

The Michigan Agricultural Reporting Service's list of potato producers in the state of Michigan was used as the population to be surveyed.<sup>2</sup> The mail questionnaire was sent to each of the 424 names on this list. This list is maintained principally for the purpose of estimating Michigan's total potato acreage and production. The present study excluded from its analysis those producers who produced less than five acres of potatoes and those farmers on the list who no longer produced potatoes inasmuch as they were assumed to be non-commercial producers and hence less likely to rely on price data in decision making. On this basis a total of 341 farmers were identified as comprising the population of Michigan commercial potato producers.

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<sup>2</sup>Because the list of potato producers is confidential, the Michigan Agricultural Reporting Service mailed the questionnaire and the followup letters to the producers.

Previous studies have shown that non-respondents differ in important characteristics from the response group. For example, respondents have been shown to be generally more highly educated than non-respondents, and response seems to be correlated with interest in the subject (Moser and Kalton). Thus, a telephone survey of a sample of the non-respondents was undertaken to identify systematic differences between respondent and non-respondent firms that might result in biased estimates of the Michigan potato market and its characteristics.

There were 167 respondents (130 useable schedules) to the mail survey and 257 non-respondents. A random sample of 20 percent (a total of 50) of the non-respondent potato producers in Michigan was undertaken. Important information was obtained on the structure of these firms. By treating the survey population as being made up of two sub-populations or strata (respondents and non-respondents) specific hypotheses were tested to compare the respondent and non-respondent firms to determine whether they derive from the same population.

Processor Data. To obtain data on the buyer side of the market, personal interviews with managers of processing plants were conducted to administer the survey schedule. The study's major data needs were: 1) structural characteristics, 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 types of data.

The target group for this portion of the 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. From this list personal interviews were obtained with all processing firms except one chipping firm that did not want to participate in the study.

The interviews were conducted in two stages. 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 used in selected marketing decisions. On average, the interviews lasted about one hour. A second round of interviews, each lasting about forty-five minutes, were conducted emphasizing elements of firm behavior as they related to procurement activities of potato processors.

The first section of this study provides a discussion of the information system paradigm and a review of selected research reports on market information systems.

The next section describes some structural characteristics of the Michigan potato industry and the operational exchange mechanisms at the grower/first handler level. This section is followed by a report of the mail survey of producers and the enumerative survey of processors designed to identify the current need of price and other data for use in potato growers and firm managers decisions. The concluding section identifies implications for modifications in the information system for potato prices.

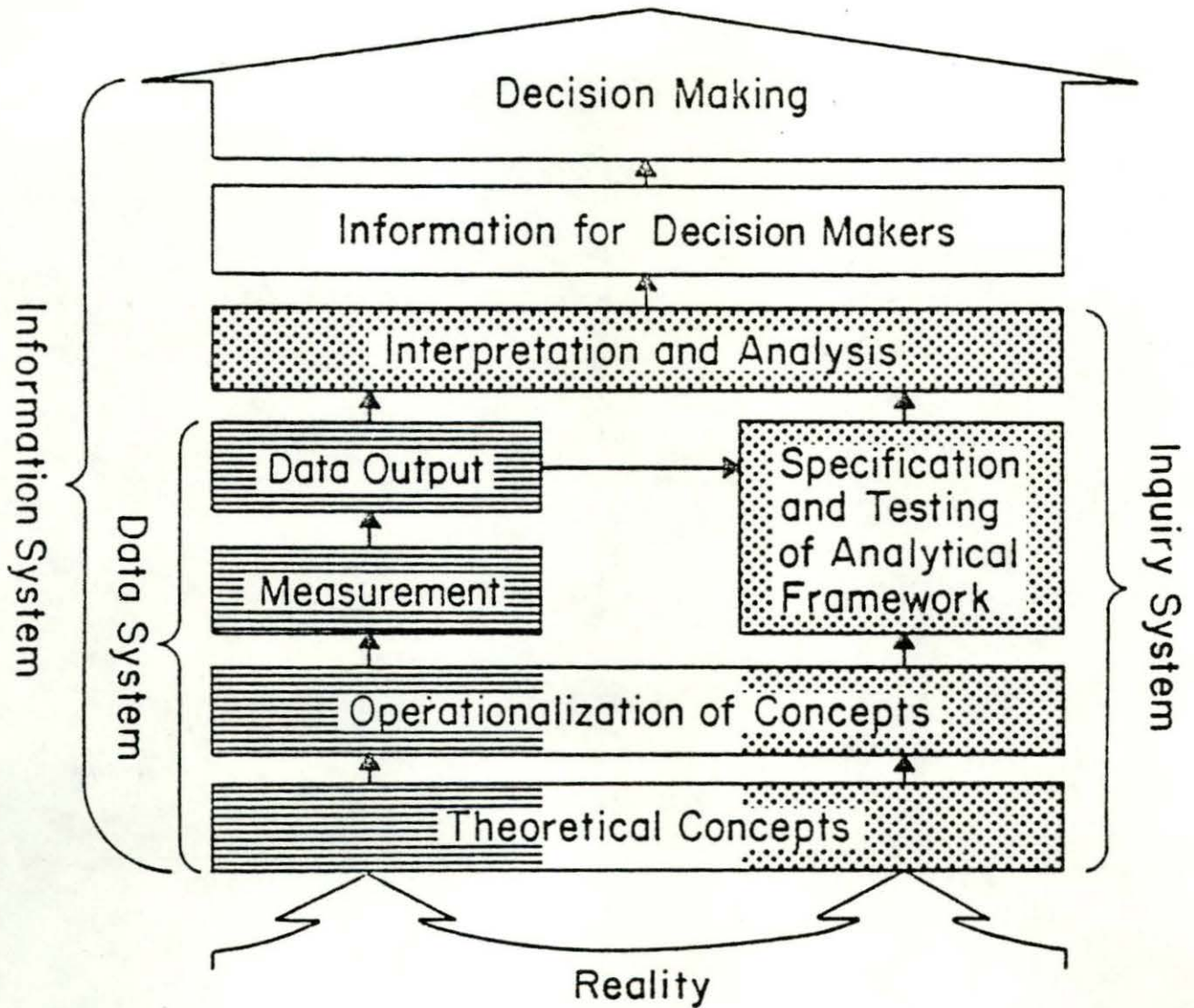
## **II. Theory and Review of Methods**

### **A. Information System Approach**

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 model 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 1). These are: 1) conceptualization, 2) operationalization of concepts, 3) measurement, 4) analysis and interpretation, and 5) decision making. Within an information system a data subsystem can be identified. The data system's function is to

Figure 1



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.

represent reality empirically by counting or measuring some empirical phenomena that 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 of the concept, and 3) reliability of measurement (Bonnen, 1975, p. 757-8).<sup>3</sup>

Conceptual obsolescence may arise when changes in reality, for example, the structure of a market, undermine the correspondence of a given concept with reality. It also occurs where changes in product or market structure result in a different decision agenda and thus different information needs. In this study the term, market structure, is used in its broad, descriptive sense and is not limited to its meaning in the structure-conduct-performance concepts of industrial organization theory.

Operational problems arise when, given a valid concept, the measurable real world variable selected to represent the concept, becomes outmoded because of changes in reality. For example, the price received by farmers as a return for their potatoes is conceptualized as the price at the point of sale to the first handler. When potato contracts shift some marketing functions and the associated costs from the first handler to the farmer, what will be measured is no longer just a return to potato production, but to potato production plus some marketing services. Much more complicating is the fact that if the change in contracts is not standard, this transaction now involves a much less homogeneous product. The value of the price information for this transaction declines with the decline in informational content of price. The appropriate uses of this data will have been changed without any change in the data system or its technology.

Measurement problems arise from the difficulty of accurately measuring an operationalized concept. An example of a measurement problem is the difficulty of accurately measuring a representative market price in thin markets. Measurement problems and measurement error are commonly called statistical error.

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<sup>3</sup>This distinction is attributed to L. V. Manderschied.

The information system underscores a useful and significant fact: Most data that are collected must be transformed - processed, formatted, analyzed or interpreted before it takes a form that is relevant for a specific decision. Following the logical flow of the paradigm, data become the product of the first three components. Ideally, the data system is managed by statisticians who have expertise in measuring observable phenomena in the society. The analytical system includes the data system but processes the data through a theoretical structure that provides additional meaning to the collected data. Economists, accountants, lawyers, policy analysts and many other disciplines are equipped with theoretical and analytical frameworks that often combine and transform data into more highly fabricated forms before it is used in decision making. Although the information system paradigm appears to be compartmentalized, the interdependence in development and management of the data base is the responsibility of all involved disciplines. Interdependence extends to the most basic level; despite vast differences in the degree of fabrication separating raw data and most information, there is no epistemological difference between data and information, since even raw data (inductive empirical measures) contain prior conceptual content derived from experience or consciously deduced from theory.

Explicit in 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.

#### B. Pragmatic User's Approach<sup>4</sup>

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. Nevertheless, the pragmatic user's approach contributes to the identification of issues, to the use and clarification of terminology and to a better

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<sup>4</sup>The pragmatic user's approach is also referred to as the scorer's approach. See Eisgruber's "Developments in the Economic Theory of Information," AJAE Vol. 60, No. 5, December 1978.

understanding of the nature of the data needed for decisions. In a sense, this approach is disciplinary in that potentially it 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 tests. Before one can select appropriate analytical procedures to quantify the relationship between information and decisions, one must complete the task of identifying and defining those relationships and developing a systematic conceptual framework.

The pragmatic user's approach can 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 National Academy of Sciences Panel on Methodology for Statistical Priorities concluded that benefit-cost analysis should be used consistently in all federal agencies in development of data plans. While deriving the cost of a 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 literature focused on the pragmatic user's methodology, employed in studies on information for agricultural markets, was searched. The USDA has completed a comprehensive study on market information uses in the cash grain market (Heifner, et. al.). This study was primarily concerned with assessing the market decision maker's evaluation of market information, and determining what implications the users' evaluation had for the design (in terms of improved accuracy) of the Agricultural Marketing Service's (AMS) 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 two market participants' evaluation of market information, a broad system perspective was not adopted; it only concerned itself with the informational needs of producers and processors. Therefore, trade-offs between various other users of information (elevators, brokers, retailers, 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 as an objective their decision needs.

To a great extent, the study took under consideration how market structure 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) and the decisions of managers 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 lies with linking structure and price discovery to the statistical design question, the latter issue deals with the relationship between the design of the statistical system and market performance (measured in terms of price dispersion).

A comprehensive study evaluating the potato price data base was completed in 1975 (Sjodin and Dahl). The authors sent a questionnaire to a random sample of 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 price discovery problems of the statistical agency nor does it account for public decision makers or other market participants. Here again the pragmatic user's 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 of 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 the cost of 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 performance dimensions (criteria for change) may offer an approach when dealing with design questions. Hence, this research concluded that further research efforts might be directed toward improving the organizational efficiency of the statistical agency. Furthermore, they recognized an alternative approach of linking changes in market structure and price mechanisms to 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 involve applications of one broad method -- the user's approach. This approach has several characteristics. First, it focuses on identifying the users of information provided by a 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. The other steps often include identifying appropriate measures that will improve the system, and applying decision rules (criteria) for allocating resources for the collection and distribution of information.

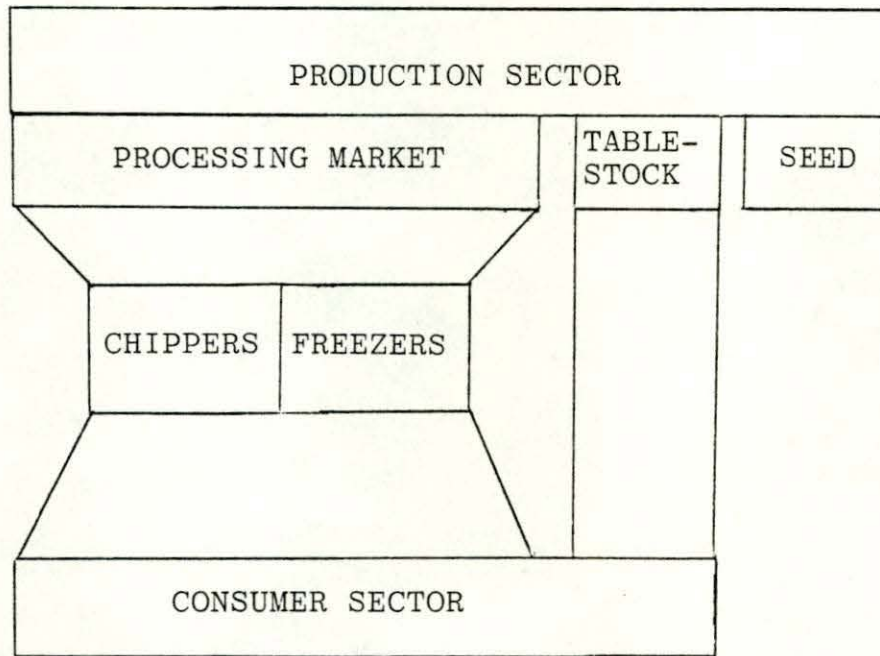
### **III. Some Structural Characteristics of the Michigan Potato Production and Processing Markets**

The Michigan Potato industry is made up of a series of interrelated markets: grower/first handler, processor/wholesaler, wholesale/retail, and retail/consumer. This section presents a description of the Michigan potato industry at the grower/first handler level.

A complete structural picture of the Michigan potato industry at the processing subsector would look much like that of an hour glass (see Figure 2). Starting with a highly competitive producer sector, one finds many growers producing a relatively homogeneous product that enters a concentrated processing sector characterized by a few firms who



Figure 2 Michigan Potato Marketing Channels



transform the raw production 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 producer-processor transaction level -- is the focus of this study.

#### A. Potato Producers

Production agriculture has several distinctive features that have implications for the food marketing system. In general, the structural characteristics of the producer side of the commodity markets that supply most food and fiber industries differentiate the problems of agricultural from non-agricultural industries. The raw product that enters the commodity market for purchase by processed potato plants or fresh potato shippers comes from hundreds of farmers who together produce (compared to nonagricultural markets) a fairly homogeneous product. The movement of this product to market is exceedingly difficult to predict or control; the product enters the market in accordance with weather and seasonal determinants that are not subject to management control. Therefore, the buyers of agricultural commodities such as potatoes are confronted with a special set of problems due to the uncertainty in supply of the raw product.

While the potato variety and other product characteristics are of growing importance to the processor or retailer, the commodity can be standardized and graded for specific uses. Thus, the identity of the producer usually becomes an unimportant factor, after the first transaction particularly when potatoes are bought and sold on the open market.<sup>5</sup> The economic implications of this situation are significant. When products can be bought and sold by description, strong price competition usually exists. Price becomes market determined and subject to any number of exogenous factors that can 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.

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<sup>5</sup>"Open Market" is an expression used by processors that implies that the buyer (processor) purchases the product, usually for cash, without any contractual arrangements with the seller.

Finally, in any local production area the potato marketing season, as with many other vegetable crops, is relatively brief. Although potatoes can be stored, the seasonal participants in the market bring on to the local market, within the span of a few weeks, a crop that tends to depress prices during harvest -- unless the national market is in short supply. The growing and marketing season, of course, varies considerably over the nation, especially from north to south. Because of the number of producers and varieties of potatoes, the geographic dispersion of production, and the concentrated marketing season, the processing firm enters a complex marketing system for the purchase of raw commodities.

Michigan potato production has undergone substantial structural change in recent years. Between 1964 and 1974 the number of potato growers in Michigan declined from 3,154 to 860, while the average potato acreage per farm increased from 12 to 47 acres. By 1978 this was down to 662 potato farmers, but they average 65.9 acres of potatoes (Harrison). These figures understate the degree of change in the size of potato producing farms and the relative importance of large farms. Harrison reports that "in 1969 the 136 growers with farms of 500 acres or more (11.5 percent of all growers) produced about half of the total quantity of potatoes produced in Michigan."

Within Michigan, the western counties, such as Montcalm, Mecosta, Manistee, and Allegan produce principally for all three markets: frozen, chipping, and tablestock. Ore Ida, a frozen potato processing firm, has a plant located in Montcalm County and purchases most of its potatoes from growers in that area. Frito-Lay, a large chipping potato buyer, contracts for a substantial portion of its potato supplies with the Chief Wabasis Cooperative, which is also located in the Montcalm county area. In addition, there are some large tablestock growers in the area that produce and sell directly to stores in the western Michigan metropolitan areas. The eastern counties, such as Bay, Tuscola, and Monroe counties, sell to both tablestock and chipping markets, but not the frozen market. Upper peninsula counties sell principally to the tablestock market (Harrison).

Results of survey data reveal several important economic characteristics of Michigan potato production. Table 3.1 illustrates the degree of market specialization by the respondents to a mail survey of Michigan potato producers. Nearly half of the respondent growers sell exclusively in the tablestock market and two thirds sell more than half of their potatoes in the tablestock market. On the other hand, only 13% of the growers sell exclusively in the processing market and less than 25% sell over half of their potatoes in this market.

Processing potato farms are significantly larger than the tablestock farms (Table 3.2). In terms of acres planted and volume sold, the processing growers averaged nearly three times larger than the tablestock growers. The relative importance of the three markets varies with the method of representing each market (see Table 3.3). For example, processing growers represent approximately 30 percent of the respondent population, but they account for 44% for the acreage and 47% of the volume. Seed growers account for 28% of the population, and 8% of the acreage and production. The tablestock growers on the other hand, account for 82% of the growers and less than 50% of the potato output.

Grower Selling Arrangements. Nearly two-thirds of the tablestock growers and about 40% of the seed growers sold their potatoes through agents and brokers (based on the first point of delivery and when they receive payment for the potatoes (Table 3.4). On the other hand, about three fourths of processing growers deliver directly to the processor and are paid by the processing firm (Table 3.4).

The method of price discovery utilized by the Michigan potato producers is identified in Table 3.5. Nearly 90% of the tablestock growers and approximately 97% of the seed growers claim to discover market prices via individual negotiation.

Many processing growers, on the other hand, have organized formal group bargaining through the Michigan Agricultural Cooperative Marketing Association (MACMA). Thus in 1978 when the producer survey was taken, 39% of the processing growers reported that group bargaining was the method they used for discovering potato prices.

Table 3.1. Market Specialization by Michigan Potato Producers, Sales by Market, 1978.

Proportion of Firms Sales	Tablestock			Processing			Seed		
	Cumulative			Cumulative			Cumulative		
	No.	Per- cent	Per- cent	No.	Per- cent	Per- cent	No.	Per- cent	Per- cent
100%	59	45.4	45.4	17	13.1	13.1	1	.8	.8
50 - 99%	29	22.3	67.7	11	8.5	21.6	13	10.0	10.8
1 - 49%	19	14.6	82.3	10	7.7	29.4	22	16.9	27.7
None	23	17.7	100.0	92	70.8	100.1	94	72.3	100.0
TOTAL	130	100.0	--	130	100.	--	130	100.0	--

SOURCE: Mail Survey Respondents, (Klein).

Table 3.2. Average Acres, Volume, and Yield of Michigan Potato Farms by Market, 1978.

Market Sold in <sup>1/</sup>	1978 Acres Planted			Avg. Acres Planted Last Five Years			Volume Sold in an Average Year (cwt.)			Yield Per Acre (cwt.)
	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
Tablestock	96	0	750	91	4	700	22,378	65	200,000	245
Processing	250	60	1,400	252	60	1,500	68,020	2,500	300,000	270
Seed	47	6	85	42	8	80	11,066	16	25,000	266
Weighted Average	125			120			31,982			253

SOURCE: Mail Survey Respondents, (Klein).

<sup>1/</sup> Based on 50% or more of sales.

Table 3.3 The Michigan Potato Market: Producers, Acres, and Volume by Market, 1978.

Market	Producers		Acres Planted 1978		Volume Sold	
	No.	Percent	No.	Percent	No.	Percent
Tablestock	107	82.3	7302	48.0	1789.0	45.6
Processing	38	29.2	6752	44.3	1823.0	46.5
Seed	36	27.7	1174	7.7	312.3	8.0
TOTAL	181 <sup>1/</sup>	--	15228	100.0	3924.3	100.1

SOURCE: Mail survey respondents, (Klein).

<sup>1/</sup> The column adds to more than 130 because producers were allowed to make multiple responses, i.e., a response for each market in which they sold potatoes.

Table 3.4. First Buyers of Michigan Potatoes, 1978.

(a) What is the first point of destination beyond your operation for the major portion of the potatoes you sell?

Point of Destination	All Producers		Tablestock		Processing		Seed	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Wholesaler, Shipper, Agent/Broker	78	46.6	63	60.6	4	10.5	11	44.0
Processor	30	18.0	0	0	30	78.9	0	0
Cooperative or Cooperative Processor	5	3.0	1	1.0	4	10.5	0	0
Retail Store	40	24.0	40	38.5	0	0	0	0
Other (Grower)	14	8.4	0	0	0	0	14	56.0
TOTAL	167 <sup>1/</sup>	100.0	104	100.1	38	99.9	25	100.0

(b) From whom do you receive payment for the major portion of the potatoes you sell?

Source of Payment for Potatoes	All Producers		Tablestock		Processing		Seed	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Wholesaler, Shipper, Agent/Broker	79	50.3	64	65.3	7	18.9	8	36.4
Processor	26	16.6	0	0	26	70.3	0	0
Cooperative or Cooperative Processor	5	3.2	1	1.0	4	10.8	0	0
Retail Store	33	21.0	33	33.7	0	0	0	0
Other (Grower)	14	8.9	0	0	0	0	14	63.6
TOTAL	157 <sup>1/</sup>	100.0	98	100.0	37	100.0	22	100.0

SOURCE: Mail survey respondents, (Klein).

<sup>1/</sup>The column adds to more than 130 because producers were allowed to make multiple responses, i.e., a response for each market in which they sell potatoes.

Table 3.5. Price Discovery Mechanisms Utilized by Michigan Potato Producers, 1978.

(a) Which of the following approaches most nearly describes how you become aware of the price for the the potatoes you sell?

Price Discovery Mechanisms	Tablestock		Processing		Seed	
	No.	Percent	No.	Percent	No.	Percent
Individual Negotiation	79	88.8	22	61.1	28	96.6
Group Bargaining	0	0	14	38.9	0	0
Miscellaneous	10	11.2	0	0	1	3.4
TOTAL	89	100.0	36	100.0	29	100.0

(b) Which of the following best describes how you know the specific price you will receive for the major portion of the potatoes you sell?

Price Discovery Mechanisms	Tablestock		Processing		Seed	
	No.	Percent	No.	Percent	No.	Percent
Administered	44	48.9	8	24.2	10	47.6
Formula	17	18.9	17	51.5	3	14.3
Other (contract)	0	0	7	21.2	0	0
Other (Market report)	8	8.9	0	0	1	4.8
Auction	8	8.9	1	3.0	1	4.8
Other (Miscellaneous)	13	14.4	0	0	6	28.6
TOTAL	90	100.0	33	99.9	21	100.1 <sup>2/</sup>

SOURCE: Mail survey respondents, (Klein).

<sup>1/</sup>The percentages are calculated on the basis of those producers who responded to the question and claimed to sell any potatoes in each market.

<sup>2/</sup>Deviations from 100% are due to rounding errors.



On the basis of the results in Table 3.5, it appears that in 1978 the price discovery function was more centralized in the processing market -- centralized in the MACMA bargaining association and the Chief Wabasis Cooperative. On the other hand, the price discovery function is highly decentralized and individualistic at the grower level in the tablestock and seed markets.

Nearly half of both tablestock and seed respondents (49 percent and 48 percent respectively) felt that the prices were administered to them by the buyer (Table 3.5). This result is consistent with the perception on the part of farmers that they are price takers vis-a-vis buyers (administered was defined as a "take it or leave it" offer).

Nineteen percent of the tablestock growers said the price was decided by a formula while 9 percent said auction, and 9 percent wrote in that a market report determined the price they would receive. It is likely that the formula and market report responses mean that these producers' price is determined by some reported price, which might be viewed as a form of formula pricing. In other words, it is probable that both the formula and the market report responses indicate that these growers deliver their potatoes to buyers, i.e., retail stores, and that the agreed upon price they receive is tied to a specific market report. Given this interpretation, it appears that 28 percent of the tablestock growers trade on a formula based price.

Over half of the processing growers said they know the specific price they will receive from a formula. In addition, 21 percent wrote in the response "contract." Thus, we conclude that about 73 percent of the processing growers receive a price based on a formula.

Table 3.6 presents some figures on the extent of preseason contracting on the part of Michigan potato producers. The respondent producers contracted 4,851 acres of potatoes, (approximately 72% of all processing potato acreage assuming that they answered on basis of the 1978 crop). This results in an average of 142.7 contracted acres for each of the 34 producers who contract. Of those producers claiming to contract some

Table 3.6. Production of Michigan Potatoes, in Pre-Season Contract,<sup>1/</sup> 1978.

Total Acres Contracted	Total Acres for Processing	Total Potato Acres	Proportion of Processing Acres Contracted <sup>2/</sup>	Proportion of Total Acres Contracted <sup>3/</sup>
4,850.6	6,752.0	15,228.0	72%	32%

SOURCE: Mail survey respondent, (Klein).

<sup>1/</sup> A pre-season contract was defined in the questionnaire as one that is agreed to prior to planting the potatoes.

<sup>2/</sup> Column 1 divided by column 2.

<sup>3/</sup> Column 1 divided by column 3.

of their crop, the average proportion contracted per farm is about 60 percent. Contracting also accounts for approximately 32 percent of the total acres reported by all respondents. The farmer decision on the portion of his crop to contract before the season is used by farmers to distribute market risk; this type of market exchange has implications for the type of information potato producers find useful in decision making. (See table 4.9 and discussion).

#### B. Potato Processors

The above characterization of the production of potatoes for the most part, approaches that of a competitive agricultural market. However, 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 those firms involved in potato processing. 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 pricing of the raw 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 effect location of plants, construction of storage facilities and inventory policies.

Potato chipping and freezing firms, the dominant forms of potato processing in Michigan, decide plant location on very different criteria. Potato chip firms have historically located their plants near urban areas. The national distribution of chipping plants by region supports this contention since the largest number of plants are located in heavily populated areas. 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 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 typically have been 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 believes that the industry as a whole would operate more efficiently with a smaller number of plants. The trend in new plants may be in that direction. However, most plants today still serve a limited market area and locale.

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 to distinguish between the nationally advertised brands and "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, processors of nationally advertised brands have an advantage over other processors in that they can command price premiums. This appears to be especially true of snack foods.

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.

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 3.7).

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 and 1970, there were approximately 23 potato processing firms in the state. In 1980, when this study survey was taken, only 14 processed potato firms were operating in Michigan. Only two of these were freezers; eight were chippers. The other four were very small freeze-dry processors. The largest change in number of firms occurred among the chip processors (see Table 3.7). The 1960's 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 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 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 1960's.

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 3.8), most plant managers indicated that they processed the optimum number of products given the size of their plants.

There is no horizontal integration among Michigan potato chippers and freezers. While chipping plants processed potatoes solely for chips, most also handled corn chips, cheese and other products. 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 present market conditions (technology, taste, and preferences of consumers). This makes economic concentration difficult to measure.

Table 3.7. 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, (Christy).

Table 3.8. Number of Products Processed Per Plant, 1980.

Type of Plant	Number of Products			
	1	2	3	4 or more
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, (Christy).

While there is little data on the concentration of the Michigan processed potato industry, it is sometimes possible to provide insights into the concentration of procurement of raw products by employing a measure for distance of procurement. Much like product sales, complete documentation on the degree of concentration of procurement in local processor-grower markets is difficult, often 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 oriented to the consumer market and therefore locate near urban areas. Table 3.9 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 in the plant, processors make extensive use of contracts with growers. Results of interviews with processors indicate that contractual exchange with growers is employed in procuring 68 percent of the raw product used by processors (Table 3.10). This is consistent with results from the producer survey (Table 3.4b). Brokers provide approximately 16 percent of the raw product processed by these firms, and 16 percent of the raw product was obtained via the 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.<sup>6</sup>

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.

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<sup>6</sup>The difference in producer and processor classifications of exchange arrangements can be explained by differences in the wording of the survey instruments. For example, the processor survey included a category "open market" and asked the processors to choose between "open market" and "contract purchases." In the producer survey there was not an equivalent category that clearly identified open market sales. In Tables 3.4a, 3.4b, and 3.5b, producer sales in the open market might occur through agents, directly with processors, or through cooperatives. Also, producers might feel "open market" prices are administered to them because of their market position as price takers.



Table 3.9. Share of Total Raw Product Procured Within Specified Distances from Michigan Potato Processing Plants, 1980.<sup>1/</sup>

	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, (Christy).

<sup>1/</sup>Weighted on basis of the average volume of potatoes handled in 1980.

Table 3.10. Operational Aspects of Exchange.<sup>1/</sup>

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

SOURCE: Data collected from personal interviews with Michigan processed potato plant managers, 1980, (Christy).

<sup>1/</sup>Weighted on basis of the average volume of potatoes handled in 1980.

\* Amounts are less than one percent.

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 need from other states after the potato storage season ends in Michigan.

Table 3.9 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.

Type 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 3.11). 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 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

Table 3.11. Type of Buyers for Processor's Output, 1980.

Type of Buyer	Freezer	Chipper	All
	(Percent)		
National retail food chains <sup>1/</sup>	19	72	48
Regional retail food chains <sup>1/</sup>	19	8	12
Local retail food chain <sup>1/</sup>	19	5	11
Cooperative wholesale buyers	4	6	5
Institutions <sup>2/</sup>	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, (Christy).

<sup>1/</sup> These various categories of food chains are terms in common usage which do not have clear, widely established definitions in the industry. In this absence, therefore, the respondent defined the concept.

<sup>2/</sup> Establishments such as restaurants, hotels, hospitals, and cafeterias.

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 chipper's 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 each buy about five percent of the freezers' and chipper's products.

This section has mapped out, in a general fashion, the major elements of market structure -- number and size of firms, concentration, product differentiation, and several lesser elements -- which make up the economic environment of the Michigan processed potato industry.

#### **IV. An Evaluation of Information in the Michigan Potato Industry at the Producer/Processor's Level**

This section presents an evaluation of the supporting information systems operating in the Michigan potato industry at the producer/first handler level. Potato producers and managers of potato processing plants 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 informants firm. Information derived in this manner differs from that of an opinion poll in that the questions posed to each manager were placed in the context of the firm's decision environment, rather than having the decision maker rate source or type of information directly against a general qualitative standard. Therefore, the analysis that follows has a primary premise: information can be valued only in a specific decision context.

This section is divided into five parts. Part A, B, and C present the results of survey data from Michigan potato producers and processors concerning their evaluation of the value of various types and sources of information for use in specific marketing decisions. Part D and E stratify the processing firms by firm type (freezer, chipper) and the producers by product use (processing, tablestock). This then allows one to compare the evaluations of market information by the producers who grow potatoes for processing markets against those of the potato processors.

#### A. Usefulness of Types of Information in Decision Making

Potato producers and processors were asked to identify the source and to evaluate the usefulness of various data they used in their decision making. In surveying producers and processors as to their evaluation of information used for decision making, a priori lists were developed from variables derived from published data, from economic theory and from other studies. The list was then modified after directing an open ended question to managers.<sup>7</sup> This section summarizes those results.

Potato price quotations are rated the most useful by producers. Of the respondents 47 percent rated price quotes as very useful and 83 percent rated price quotations as either very useful or moderately useful (Table 4.1). Potato price forecasts were rated as very useful by 33 percent of producers; 69 percent rated price forecasts as very useful or moderately useful. Only 16 percent of the potato producers said potato futures prices were very useful.

These results appear to be consistent with earlier studies which found that producers stress current prices and price outlook as the most frequently used information. The

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<sup>7</sup>A mail survey is not as flexible as personal interviews. Therefore it is more difficult to make changes in a priori lists as the survey is conducted. This problem was handled in the producer survey in two ways: First, the producer questionnaire was pre-tested on producers prior to its final use, and second, the final draft of the questionnaire included open ended questions to allow for additional responses on the part of respondents.

Table 4.1. Usefulness of Various Types of Information in Potato Producers Decision Making.

Types of Information	Very Useful		Moderately Useful		Rarely Useful		Do Not Use Because Not Useful Not Aware of It				Total <sup>1/</sup>
	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	
Potato Price Quotations	54	47.0	41	35.7	11	9.6	6	5.2	3	2.6	115
Prices of Other Crops	9	8.3	25	23.1	44	40.7	27	25.0	3	2.8	108
Potato Futures Prices	18	15.9	32	28.3	41	36.3	16	14.2	6	5.3	113
Report of Potato Prices for Past Years	9	8.1	28	25.2	49	44.1	22	19.8	3	2.7	111
Potato Price Forecasts	36	32.7	40	36.4	23	20.9	9	8.2	2	1.8	110
Estimates of Planting Intentions	27	24.1	34	30.4	31	27.7	19	17.0	1	.9	112
Estimates of Acres Planted Harvested & Yields	33	29.2	31	27.4	34	30.1	15	13.3	0	0.0	113
Volume of Potato Shipments	16	14.0	43	37.7	36	31.6	18	15.8	1	.9	114
Estimates of Stocks of Potatoes	28	24.6	49	43.0	20	17.5	17	14.9	0	0.0	114
Estimates of Production Costs	22	19.1	33	28.7	35	30.4	22	19.1	3	2.6	115
Transportation Costs	19	16.7	36	31.6	34	29.8	21	18.4	4	3.5	114
Wage Rates	19	16.7	29	25.4	42	36.8	21	18.4	3	2.6	114
Labor Availability	12	10.5	16	14.0	58	50.9	23	20.2	5	4.4	114
Demand Estimates	28	25.5	38	34.5	24	21.8	16	14.5	4	3.6	110

SOURCE: Mail survey respondents, (Klein).

<sup>1/</sup>The failure of producers to respond to each item results in variations in total responses.

major difference between this study and the other studies of producer uses of price information lies in the current study's attempt to measure the intensity of feeling about the usefulness of price data as opposed to simply reporting the frequency of use.<sup>8</sup>

On the non-price types of information, estimates of stocks of potatoes were rated as either very useful or moderately useful by 68 percent of producers. Also, demand estimates; estimates of planting intentions; and estimates of acres planted, harvested and yields all were rated by over 50 percent of the respondents as very useful or moderately useful.

Producers gave the highest ratings to price information, supply information and demand information. Other types of information such as prices of other crops and labor availability were rated as much less useful.

In Table 4.2 the absolute number of processing firms responding in the survey to each data type is presented. 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 prices, including price quotations, wholesale prices 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

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<sup>8</sup>For a discussion to the results of earlier studies on price data see Klein, "An Information System Approach to the Study of Price Data: A Case Study of the Michigan Potato Industry" Pgs. 41-53.

Table 4.2. Usefulness of Various Types of Information in Decision Making, All Processors.

Types of Information	Very Useful		Moderately Useful		Rarely Useful		Not Useful		Total
	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	
<b>Prices</b>									
Quotations	6	66.7	2	22.2	1	11.1	0	0.0	9
Contracts	4	44.4	3	33.3	1	11.1	1	11.1	9
Wholesale	6	75.0	1	12.5	1	12.5	0	0.0	8
Retail	5	62.5	3	37.5	0	0	0	0.0	8
Futures	2	25.0	1	12.5	3	37.5	2	25.0	8
Past Year	3	33.3	5	55.6	1	11.1	0	0.0	9
Forecast	4	44.4	2	22.2	1	11.1	2	22.2	9
Other Inputs (Oil)	7	100.0	0	0.0	0	0.0	0	0.0	7
<b>Supply</b>									
Planting Intentions	4	44.4	2	22.2	1	11.1	2	22.2	9
Crop Estimates	4	44.4	2	22.2	0	0.0	3	33.3	9
Volume Shipped	2	25.0	4	50.0	1	12.5	1	12.5	8
Stocks (Storage)	4	44.4	3	33.3	2	22.2	0	0.0	9
<b>Demand</b>									
Population Trends	1	12.5	4	50.0	1	12.5	2	25.0	8
Income Trends	2	25.0	4	50.0	1	12.5	1	12.5	8
Consumer Profile	3	37.5	4	50.0	1	12.5	0	0.0	8
Demand Estimates	2	25.0	4	50.0	2	25.0	0	0.0	8
<b>Cost</b>									
Production	6	75.0	1	12.5	1	12.5	0	0.0	8
Processing	8	88.9	1	11.1	0	0.0	0	0.0	9
Transportation	8	88.9	1	11.1	0	0.0	0	0.0	9
Labor (Wages)	5	55.6	2	22.2	2	22.2	0	0.0	9

SOURCE: Data collected from personal interviews with Michigan processed potato plant managers, 1980, (Christy).



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 costs were given the highest ratings. 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 also received a high rating, 33 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 misleading.

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." In addition, 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 aggregate that do not apply to the processors'

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.

#### B. Usefulness of Sources of Price Information in Decision Making

Producers and processors were also asked to evaluate the usefulness of their sources of price information in decision making. The list of price sources was developed a priori and modified via open-ended personal interview questions posed to firm managers.

Producer evaluations of the usefulness of their sources of price information in decision making are presented in Table 4.3. In general, it does not appear that producers rate their sources of price data very highly. The source rated most frequently as very useful was the potato broker/dealer class, with 40.2 percent of the producers rating them as very useful. Industry newsletters were rated "very useful" by 31 percent of producers. Government publications were rated as very useful by only 24.5 percent of the producers.

Interestingly, only three sources were rated by a majority of producers as very useful or moderately useful: brokers/dealers by 74 percent; industry newsletters by 57 percent; and newspapers by 53 percent of the respondents. Government publications, neighbors, cooperatives, and farmer organizations were all rated similarly with 45 and 46 percent of producers rating them as moderately useful or very useful.

Table 4.4 presents the results of processors' evaluations of the usefulness of various sources of price information in decision making. Over 90 percent of the processors rated broker/dealers as a "very useful" source of 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.,

Table 4.3 Usefulness of Sources of Price Information in Potato Producers Decision Making.

Sources of Price Data	Very Useful		Moderately Useful		Rarely Useful		Not Useful		Total No. <sup>1/</sup>
	No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent	
Radio & T.V.	18	17.5	26	25.2	30	29.1	29	28.2	103
Newspaper	19	17.9	37	34.9	23	21.7	27	25.5	106
Magazines	4	3.8	27	26.0	29	27.9	44	42.3	104
University Publications	11	10.0	27	25.5	34	32.1	34	32.1	106
State & Federal Gov't. Publ.	26	24.5	24	22.6	32	30.2	24	22.6	106
Industry Newsletters	31	31.0	26	26.0	15	15.0	28	28.0	100
Bankers & Lending Institutions	2	1.9	6	5.7	38	35.8	60	56.6	106
Retail Stores	18	16.7	24	22.2	37	34.3	29	26.9	108
Potato brokers, dealers, shippers, etc.	43	40.2	36	33.6	16	15.0	12	11.2	107
Processors and Agents	13	12.4	26	24.8	30	28.6	36	34.3	105
Cooperatives and Farmer Organization	17	16.2	30	28.6	31	29.4	27	25.7	105
Neighbors	25	23.6	25	23.6	30	28.3	26	24.5	106

SOURCE: Mail Survey Respondents (Klein).

<sup>1/</sup>The failure of some producers to respond to each item results in variations in total responses.

Table 4.4. Usefulness of Sources of Price Information in Decision Making, All Processors.

Source of Information	Very Useful		Moderately Useful		Rarely Useful		Not Useful		Total
	No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent	
Radio and T.V.	2	22.2	1	11.1	3	33.3	3	33.3	9
Newspapers	3	33.3	3	33.3	1	11.1	2	22.2	9
Magazines	0	00.0	4	44.4	2	22.2	3	33.3	9
University Publications	2	22.2	1	11.1	2	22.2	4	44.4	9
USDA Economic Publications	3	33.3	4	44.4	1	11.1	1	11.1	9
USDA Crop Reports	3	33.3	3	33.3	1	11.1	2	22.2	9
Consultation with Persons in Government or University	0	00.0	1	11.1	6	66.7	2	22.2	9
Commercial Market Service	1	11.1	3	33.3	2	22.2	3	33.3	9
Banks	0	00.0	0	00.0	6	66.7	3	33.3	9
Retail Stores	2	22.2	5	55.6	1	11.1	1	11.1	9
Brokers/Dealers	8	88.9	1	11.1	0	00.0	0	00.0	9
Other Processors	3	33.3	3	33.3	3	33.3	0	00.0	9

SOURCE: Data collected from personal interviews with Michigan processed potato plant managers, 1980, (Christy).

consultation with government or university experts, 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. Broker/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 and producers feel that these non-market sources transmit "stale information" but, perhaps more importantly, the decision maker (producer or processor) 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, that they build in feedback mechanisms so that, for example, the public statistical agencies can respond by modifying the information source for better use in decision making, e.g. by making information available for on-line pickup the moment of release.

#### C. Usefulness of Price Data in Specific Decisions

This section presents the results of producers and 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 is similar to that used in developing the list 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 was not modified very much, one is led to conclude that the a priori list adequately reflected the firm decision environment. It is possible too that perhaps open ended questions addressed solely to firm managers are 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. Since no attempt was made to rank the list of decisions in terms of importance, it is assumed that all decisions are of equal importance.

Producers' evaluations of the usefulness of price data for making specific decisions is summarized in Table 4.5. In general, producers report price data has little value in decision making, which is consistent with the view that they have no control over prices and hence simply must take the price the market offers. Producers did not identify any decision for which price data received a rating of very useful or moderately useful by as many as half the respondents.

The rating of "very useful" was given to price data most frequently in the case of the producers decision on to whom to sell their potatoes, e.g., to a shipper, direct to retail, to a processor, etc. Twenty-one percent of the producers rated price data as very useful and 36 percent of the producers rated price data as very useful or moderately useful for this decision. Approximately 45% of the producers did rate price data as very useful or moderately useful when making decisions on the number of acres to plant and the timing of their sales -- decisions that directly impact on the firm's revenues. First, the decision on the number of acres to plant is a planning decision that determines the allocation of a critical resource for the upcoming production period. Hence, price forecasts would be useful to the manager. Second, once the decision on the number of

Table 4.5. Usefulness of Price Data for Specific Producers' Decisions by All Respondents.

Decisions	Very Useful		Moderately Useful		Rarely Useful		Not Useful		Total <sup>1</sup>
	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.
To Plant or Not to Plant Potatoes	6	5.5	31	28.2	37	33.6	36	32.7	110
Number of Acres to Plant	12	11.1	36	33.3	30	27.8	30	27.8	108
Variety of Potatoes to Plant	10	9.2	31	28.4	30	27.5	38	34.9	109
When to Sell Potatoes (timing of Sales)	15	13.8	36	33.0	26	23.9	32	29.4	109
To Bargain for Pre-season Contract	19	17.4	17	15.6	24	22.0	49	45.0	109
To Join Other Producers in Selling & Mkting	5	4.6	18	16.5	33	30.3	53	48.6	109
The Market in Which to Sell Potatoes	13	11.9	23	21.1	27	24.8	46	42.2	109
Geographical Area in Which to sell Potatoes	9	8.3	18	16.5	33	30.3	49	45.0	109
Size & Type of Container to Use	8	7.5	29	27.1	32	29.9	38	35.5	109
To Whom to Sell Potatoes	23	21.5	15	14.0	30	28.0	39	36.4	107

SOURCE: Mail survey respondents, (Klein).

<sup>1</sup>The failure of some producers to respond to each item results in variations in total responses.

acres to plant has been made, the manager's attention turns to the marketing decision of when to sell so as to maximize revenues from a given production volume.

Table 4.6 presents the results of the processors' evaluations of the usefulness of price information in making specific decisions. In general, price information was found to be useful by approximately 50 percent of the processors in making the following 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 with additional varieties shipped in from other states, the processors demand for potatoes is fairly specialized. The yield of finished product 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 greater time horizon and 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 67 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. Thus, pricing and quality decisions are made separately: some processors stated that they would not accept raw product of poor quality for a lower price while other processors were willing



Table 4.6. Usefulness of Price Data for Various Decisions, All Processors.

Type of Decision	Very Useful		Moderately Useful		Rarely Useful		Not Useful		Total
	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	
	Size of Plant (Expansion)	1	11.1	3	33.3	3	33.3	2	
Number of Plants (Build)	1	11.1	4	44.4	3	33.3	1	11.1	9
Variety of Potato To Buy	4	44.4	2	22.2	2	22.2	1	11.1	9
When to Buy Potatoes (timing of Purchase)	5	55.6	4	44.4	0	00.0	0	00.0	9
Geographical Market in Which to Buy Potatoes	7	77.8	2	22.2	0	00.0	0	00.0	9
Market in Which to Sell Processed Product	5	55.6	3	33.3	1	11.1	0	00.0	9
Quality of Raw Product	1	11.1	2	22.2	4	44.4	2	22.2	9

SOURCE: Data collected from personal interviews with Michigan processed potato plant managers, 1980, (Christy).

to make some limited trade-offs between price and quality. This evidence suggests that there may be opportunities to improve potato grades and standards.

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. A finding that is of major interest here, suggests processors believe that price transmits little information about the quality of the raw product.

#### D. Sources of Price Data: Producer and Processor Rankings by Type of Market

When looking at all potato producers, the sources of price data that producers find useful varied (Table 4.7). The potato broker/dealer category was given a very useful to moderately useful rating by all producers whereas all other sources were given ratings of moderately useful to rarely useful.

The processing growers, on the other hand, gave essentially the same ranking to three sources: (1) broker/dealer, (2) cooperatives and (3) processors and their agents. Processors then rated industry newsletters, other farmers, and government publication, as the next most useful sources of price information.

Thus, the ultimate buyer of the potatoes, i.e., the processor, is considered one of the more useful sources of price information available to the processing potato grower. Also, the results from this section are consistent with results of other studies in finding that the broker/dealer group is an important source of price data in commercial agricultural markets (Heifner, Pelsue).

An important difference between the producers' evaluation of the sources of price data is that government publications are rated as more useful to other types of growers (tablestock and seed) than to processing growers. Processing growers ranked government

Table 4.7. Average Ranking of Sources of Price Data Across Markets and Firm Type.<sup>1/</sup>

Source of Information	All Potato Growers	Processing Growers	All Processing Firms	Freezers	Chippers
Radio and T.V.	2.680	2.870	2.777	3.000	2.714
Newspapers	2.547	2.864	2.222	3.000	2.000
Magazines	3.115	3.227	2.888	3.000	2.857
University Publications	2.858	2.739	2.888	2.500	3.000
Government Publications	2.509	2.667	2.000	1.500	2.142
Banks	3.472	3.417	3.111	2.500	3.285
Retail Stores	2.713	3.208	1.888	2.000	1.857
Brokers, Dealers	1.972	2.120	1.111	1.000	1.142
(Other) Processors	2.848	2.125	2.000	1.000	2.285
Other Farmers	2.538	2.545	NA <sup>2/</sup>	NA	NA
Cooperatives and Farmer Org.	2.648	2.120	NA	NA	NA
Industry Newsletters	2.400	2.304	NA	NA	NA

SOURCE: Personal interviews with Michigan processed potato plant managers, (Christy).  
Mail survey respondents, (Klein).

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

<sup>2/</sup>Not applicable.

publications as the sixth most useful source to them whereas all producers ranked these sources as the third most useful.

This result is also consistent with the responses producers gave when directly questioned about the usefulness of USDA price data. In spite of the fact that a higher proportion of processing growers are familiar with USDA price data (Table 4.8), a higher proportion of the processing growers feel that USDA prices are not useful to them than the tablestock and seed growers (Table 4.9).

The differential evaluation of USDA price data by processing and all other growers is most likely related to differences in the time frame for the type of decisions the managers must make in these markets, and the type of price data provided by the government statistical agencies. In general the Agricultural Marketing Service (AMS) provides timely data that is more appropriate for short run decision making, and it is unlikely that these data would be as useful to processing growers, who sell a large proportion of their crop on forward contracts, as they would be to tablestock growers who sell their crop as it is harvested or sell from storage.

Much like potato producers, freezers and chippers both rated brokers as the most useful source of price information. Freezers also gave a "very useful" rating to other processors as a source of price information. USDA economic publications and retail firms were rated the next most useful sources of information with a "moderately useful" rating. Chippers, on the other hand, rated newspapers and retail the next most useful stores as sources of information following brokers with a "moderately useful" rating. 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 for decision making.

It is interesting that the processing firms rated government publications as a more useful source of information than did producers who grew potatoes for processed markets. Moreover, while both producer and processor rated brokers as their most useful source of price information, processors tended to give brokers a higher rating as indicated by the

Table 4.8. Number and Proportion of Respondent Michigan Potato Producers Familiar with USDA Prices.

Market	Yes		No		Total No.
	No.	Percent	No.	Percent	
Tablestock	50	68	23	32	73
Processing	20	77	6	23	26
Seed	9	75	3	25	12
TOTAL (ALL)	79	71	32	29	111

SOURCE: Mail Survey Respondents, (Klein).

Table 4.9. Number and Proportion of Respondents Finding USDA Prices Useful.

Market	Yes		No		Total No.
	No.	Percent	No.	Percent	
Tablestock	36	69	16	31	52
Processing	9	47	10	53	19
Seed	8	89	1	11	9
TOTAL (ALL)	53	66	27	34	80

SOURCE: Mail Survey Respondents, (Klein).

Likert score of 1.1 (very useful) as compared to the 2.1 (moderately useful) average given brokers by processed potato growers.

E. Usefulness of Price Data in Decision Making: Producer and Processor Rankings by Type of Firm and Market.

The results of the scaling question that asked producers and processors to rate the usefulness of price data for specific decisions is presented in Table 4.10. In general, the average ratings for all potato producers are quite low as none of the decisions received a rating below the mean of 2.5 -- (over a scale from 1 (very useful) to 4 (not useful)). In other words, producers reported that price data in general are rarely useful in making these decisions. On the other hand, processors rated price information higher than producers in making most decisions.

Substantial differences exist among producers' use of price data. Processing growers indicated that price data was the most useful (a "moderately useful" rating) when making decisions on whether or not to bargain for preseason contracts. Further, the processing growers find price data more useful for the decision of whether or not to join other growers in marketing potatoes than do producers in the tablestock and seed markets. Thus it appears that processing growers are more oriented to group action in marketing than other types of potato producers.

The use of price data in decisions on the timing of sales was given a relatively high evaluation by all producers, although it is probable that the relevant time frame is different between the tablestock and processing growers. To processing growers, the timing of sales most likely means the choice of signing a preplanting contract versus not signing the contract and thus selling the potatoes at the market price during harvest time. It should also be noted that processing growers gave a lower rating to the decision of to whom to sell the potatoes. This might be expected inasmuch as processing growers have fewer alternative outlets. Many of these growers deal directly with only one buyer.

Potato processor's perceptions of the usefulness of price information in making specific types of decisions differ across firm type. Price information was given the highest rating ("very useful") by freezers in deciding the market in which to sell the final product, when to buy raw product, and from which geographical market to buy the raw product. For chippers, price information rated the highest when deciding in which geographical market to buy. Both chippers and freezers rated price information low (rarely useful) when deciding quality/price trade-offs. Chippers also rated price information low ("rarely useful") when making decisions on the size of plant and in making a decision on the number of plants to operate.

Producers' perceptions of the usefulness of price data in making specific marketing decisions differ from those of processors (Table 4.10). In general, producers ranked price information low as an input into their decision making processes while processors generally gave price information a higher rating. Neither producer nor processor however, rated price information very useful in making decisions on the size of their operations. Processors, as compared to producers, found price information more useful in making transaction (buy/sell) type decisions; they appear to be more perceptive of the role of price information in the exchange function. Processors rated price information higher than producers did for transaction decisions involving choices between different geographic markets and between different market outlets. Price information was of limited use to producers and processors in making decisions about the variety of potatoes.

#### **V. Summary and Conclusions**

The basic question posed in this study was "How well does the current public data system meet the decision needs of Michigan potato producers and processors at the first transaction point in the market?" The basic premise of this study was that information attains its value only in the context of a specific decision. Therefore, the various types and sources of information used in the Michigan potato industry had to be evaluated against the decision needs of its producers and processors.

Table 4.10. Average Ranking of Price Data for Various Decisions Across Markets and Firm Type.<sup>1/</sup>

Decision	All Potato Growers	Processing	All Processors (9 firms)	Freezers (2 firms)	Chippers (7 firms)
Expansion of Plant Size	2.722	2.654	2.750	1.500	2.833
Variety of Potato	2.881	2.885	2.222	1.500	2.285
When to Buy/Sell (Timing of Transaction)	2.688	2.654	1.444	1.000	1.571
Geographical Market in Which to Buy/Sell	3.119	3.154	1.250	1.000	1.333
Market to Sell (outlet)	2.972	2.885	1.500	1.000	1.666
To Plant or Not to Plant Potatoes	2.936	2.962	NA	NA	NA
To Bargain for Pre- season Contracts	2.945	2.115	NA	NA	NA
To Join Other Producers in Selling & Marketing	3.229	2.885	NA	NA	NA
The Size & Type of Container to Use	2.935	3.346	NA	NA	NA
To Whom to Sell Potoates	2.794	2.960	NA	NA	NA
Number of Plants	NA <sup>2</sup>	NA	2.500	1.500	2.853
Quality of Raw Product	NA	NA	3.000	3.000	3.000

SOURCE: Mail survey respondents and telephone survey to nonrespondents, (Klein).  
Personal interviews with Michigan potato plant managers (Christy).

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

<sup>2/</sup>Not applicable.



On the basis of producers and processors ratings of the various types of information used in their decision making, it appears that non-price information is quite useful. The respondents gave high ratings to estimates of planting intentions, acres planted, acres harvested, yields, and stocks of potatoes. The informational content of price data is being reduced by a growing complexity in product specification and markets as well as by changes in market organization and pricing mechanisms. The ability of price to perform its signaling function so that resources are efficiently allocated has been eroded. 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 knowledge about a change in crop size.

When queried about USDA prices, producers generally mentioned the Market News Reports. This might be expected because of the wide distribution of these price reports and their focus upon providing current market price data and other information on the current market situation. Market News Reports were identified by producers in the pilot interviews and the open ended questions in the questionnaire as the source of USDA prices which they used. Producers have made little direct use of SRS price data, which we might expect given the SRS objective of reporting an average price concept to be used in determining the returns to agricultural production and hence income to farming. SRS prices are an important input in USDA and private sector forecasts, but farmers use forecasts without recognizing any of the basic data sources. Therefore, it is not surprising that producers generally gave a lower rating than processors to public price data.

While it is questionable whether or not public price data series can significantly alter the potato processing firm's behavior, results of this study indicate that public price data series, rank quite high in processor's evaluation of its usefulness in decision making. In addition, most of the benefits of these price reports still go unnoticed because public

information is easily reproduced and distributed by other institutions (brokers, media, private newsletters, etc.) without many market participants recognizing its original source.

With respect to sources of information, both producers and processors agreed that brokers were a very useful source of information. USDA (governmental) publications were rated as moderately useful to very useful by processors, whereas producers rated USDA sources as less than "moderately useful."

Potato producers stress two decisions for which they rely on price data. The decision on the number of acres to plant and the timing of sales were listed most frequently by potato producers. Despite the high ratings for price quotations and the use of price data for the decision on when to sell potatoes, it seems that USDA price reports are less useful in producer decision making than other sources of price information such as agents and brokers. This finding is consistent with other studies that have found USDA prices generally available too late to be useful in farmer decision making.

This problem may even be further aggravated by the finding that a smaller proportion of processing producers find USDA prices useful than growers in the other two markets. To the extent that forward contracting becomes more prominent in potato markets, it is probable that the short run, current market price data will become less useful vis-a-vis forward or forecasting price data.

Processors generally gave price information higher ratings than did producers in making marketing decisions. For certain types of decisions such as those that deal with expanding the size of the business, both producers and processors give price information a lower rating. Processors give price information higher ratings than did producers as it related to making exchange type decisions. Price information was of limited use to producers and processors in making decisions about the variety and quality of potatoes.

The problem addressed here has been specified as one of obsolescence of data. Given our concept of an information system, this fundamental problem is seen as

stemming from two sources: 1) changes in the policy or decision maker's agenda, and 2) changes in the reality being tracked by the information system (Bonnen, 1975).

Statistical systems become obsolete when fundamental changes occur in the market that make it more difficult for the statistical agency to collect data. Sometimes the change will not even be recognized if it evolves slowly. Within the processed potato industry, increased complexity of product and market structure are major factors contributing to statistical obsolescence and to shifts in the relative value of various types of information.

Perhaps the greatest change in the potato industry since World War II is the great shift away from fresh toward processed outlets in the potato market. To the extent that there is a positive relationship between the shift away from production for the tablestock market to production for the processing market, and thus the emergence of preseason contracting, there has been a change in market structure and price discovery that reduces the relevance and value of current market price data for tactical decisions. A high proportion of the potatoes for the processing market are in fact sold on a preseason contract, and preseason contracting diminishes the importance of timely AMS price data for making short-run marketing decisions. In other words, once the processing potato growers have signed a preseason contract for potatoes, the marketing decision has been made for that portion of their crop. It remains important, of course, for the rest of their crop and for the tablestock market.

Another 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 adequately 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?

Because of the statistical obsolescence problem confronting public statistical agencies, several institutional alternatives exist. Public statistical agencies must develop a mechanism whereby they can monitor changes in data user's needs. Users' workshops conducted by the Statistical Reporting Service (SRS), for example, are well suited for identifying the changes in marketing channels and the new statistical needs of an industry. Systematic studies of commodities or sectors experiencing major change are needed to assess objectively the implications of changing market and product structures. This is the type of feedback any statistical system should seek in order to retain credibility with its data users. The users' workshop mechanism provides "feedback" from the users of statistics to the managers of the statistical agency and, if anything, should evolve toward an informal, continuous intelligence network backed up by periodic research studies. When engaged in this effort, however, a statistical agency needs to develop criteria for deciding when to adopt changes in statistical programs 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.

Statistical agencies have often responded to the obsolescence problem by changing statistical concepts, the variable representing a concept, or its computation. SRS has, for

example, recently responded to the shifting of marketing functions in potatoes by examining a potential 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 the cost of any marketing functions performed by the grower. This would allow state and regional comparisons without the differential effects of the variation in marketing functions performed. 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 SRS price series designed for 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 appear to be 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 producers 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.

The results of this study do 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 whatever signaling ability the reported market determined price series may have. 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 hybrid concept with little meaning. The present extensive use of SRS prices in forecasting could be undermined. Moreover, subtracting out the cost of marketing functions could, especially in an inflationary period, could 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 SRS price data are to provide measures of market performance especially when combined with quantity sold to provide an estimate of income earned by farmers. In this use, a synthetic farm gate price could potentially understate farmer income and distort the measure of farmer welfare.

The results of the present research are limited to producers and processors use of information. The questions raised here suggest that further research might focus on the other market users and on non-market users of public price data to identify their needs, and to identify changes that should be made in the current system -- that is, different operational definitions of price for public reporting or changes in measurement techniques. By focusing on the various actors that use price data, research can identify, at least in general terms, who will receive the benefits, and who will bear the costs of changes in public price data reporting. In addition, inasmuch as the present study found evidence that the value of price data is related to the structure of production and marketing, it appears that further research might well include an investigation of market participants' evaluation of the value of various kinds of information under different market structures.

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## Appendix A

### Methodological Notes

The information systems paradigm suggests that information attains its value in the context of a specific decision. Producers and plant managers within the Michigan processed potato industry were asked to rate (evaluate) the usefulness of different types and sources of information in the context of their specific marketing decisions. To achieve this, it was necessary to identify the types of information used by processors in decision making, the sources of information used by processors, and the specific decisions made by producers and processing firms.

Obtaining an accurate characterization of the firm's decision environment is an essential aspect of any study that attempts to evaluate information in context of a specific decision. Lazer (1971) states that marketing decisions can be classified in many ways. Such decisions 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 on information about choices.

At least two methods exist to establish an appropriate set of decisions for evaluating information: 1) Selection on the basis of a defined set of criteria, or 2) attempt to obtain the decision set from a study of the target population. 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.

This approach suggests the following cross tabulation:

TxSxD

Statement 1

where

T = Type of information (i.e., price, supply)

S = Source of information (i.e., USDA, broker)

D = Decision

From this statement we derived the following permutations (presented in Tables 4.1 - 4.6 in the text of this report).

1. Usefulness of various types of information in decision making (T x D).
2. Usefulness of sources of information in decision making (S x D).
3. Usefulness of price data for various specific decisions (T x D).

Tables 4.7 and 4.8 extend Statement 1 and its derived permutations across dimensions of firm type (chipper, freezer) and market (producer, processor).

## Appendix B

Non-Respondents and Respondents to a  
Mail Survey of Michigan Potato Producers -- A Comparison<sup>1</sup>

To obtain a description of the nonrespondent Michigan potato producers, a random sample of 20 percent of the nonrespondents was surveyed by telephone. The telephone interviews were conducted to acquire information on the nonrespondent farms that might bias estimates of the characteristics of the Michigan potato market and the producers' evaluations of information.

Specific hypotheses were tested comparing the respondent and nonrespondent strata to determine whether they derive from the same population. These tests included inferences about the mean values of both populations (for example, the average size of the respondent and nonrespondent farms) and proportions of the two subpopulations exhibiting particular characteristics. Because the number derived from the respondent firms is based on a 100 percent sample of that population, the estimates derived from respondent firms do not have a standard error; thus, the hypothesis tests involved the known parameter value for the respondent stratum. The data from the telephone interviews of nonrespondents to the mail survey were then used to test the null hypothesis that the mean value (or proportion) of the nonrespondent stratum is equal to the known parameter mean value (or proportion) of the respondent stratum along the particular attribute.<sup>2</sup>

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<sup>1</sup>Adapted from Klein, M. L.; "Non-Response Bias in Economic Surveys: An Example Based on Michigan Potato Producers," North Central Journal of Agricultural Economics, July 1981, pp. 95-100.

<sup>2</sup>Two points should be noted regarding the hypothesis tests. First, the response rate for the telephone interviews was appropriately 82 percent. Thus, it can be seen that the sample statistics based on the telephone interviews may also be subject to some nonresponse bias. Second, differences between the respondents and nonrespondents in this study are attributed solely to differences between the two groups. It should be noted that some of the differences might be a function of different measurement techniques, i.e., mail versus telephone. However, as pointed out in the text, Hochstim found evidence of little loss in data comparability when using different techniques. Thus, it was felt that for the purpose of this study the differences attributed to different techniques would not be sufficient to negate the results of the tests.

## Non-Respondent and Respondent Farm Size

One might expect differences in the size of the respondent and nonrespondent potato farm to affect the survey results. The importance of size of farm in predicting economic behavior has been documented in earlier studies.<sup>3</sup> Further, it might be reasonable to assume that a producer's interest in market information is positively related to the potential gains associated with accurate information. Therefore, it was hypothesized that the nonrespondent farms would be smaller than the farms of the producers that returned the mail questionnaire.

The results of the survey of nonrespondents confirmed this expectation. The average size of the respondent farms was 127 acres compared with 89 acres for nonrespondents. This difference is significant at the 0.05 level.

A further elaboration on this point is illustrated in Table 1, which gives the size of potato farms by acres planted. The proportion of nonrespondent farms planting ten acres or less and four acres or less of potatoes was greater than the proportion of respondent farms in the same categories. Approximately 14 percent of the nonrespondents' farms planted four acres or less, while only 4 percent of the respondent farms were this small. Also, approximately one-third of the nonrespondents planted ten acres or less of potatoes in 1978, while only 15 percent of the respondents were in this group. In both cases, the difference in the proportion producing the specified acres was significant at the .05 level.

The four-acre cutoff corresponds to the upper limit of Bureau of Census class VI farms.<sup>4</sup> In essence, this cutoff assumes that such producers do not sell potatoes, but

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<sup>3</sup>See, for example, Dixon, Hill, and Saffell.

<sup>4</sup>This assumes a selling price of \$2.50/cwt. for potatoes and 250 cwt. per acre yield. Because this study classified producers solely on the basis of potato acres, the Bureau of Census farm classifications are not technically relevant. In other words, the survey did not determine whether the farms produce crops in addition to potatoes. Thus, classifying the farms on the basis of the Census classification would assume that the farms all specialize in potatoes, which is unlikely.

Table 1. Proportions of Respondents and Nonrespondents Planting Specified Acreages of Potatoes

Acres of Potatoes Planted	Respondents		Nonrespondents	
	Number	Percent	Number	Percent
Four or fewer*	6	4.3	5	13.9
More than four	133	95.7	31	86.1
TOTAL	139	100.0	36	100.0
Ten or fewer	21	15.1	12	33.3
More than ten	118	84.9	24	66.7
TOTAL	139	100.0	36	100.0

SOURCE: Mail survey respondents, (Klein).

\*Class VI farms.

rather consume them. These producers may simply have little interest in potato price data and information. Four acres was also the point below which both respondent and nonrespondent producers said they sold no potatoes.

This finding on respondent and nonrespondents has important implications for inferences that might be drawn from the mail survey. First, inasmuch as respondents to the mail survey were found to represent larger potato farms, the results from the mail survey will not present an entirely accurate reading of producer data needs. Given the Michigan potato industry study's objective of evaluating the existing information system for all Michigan potato producers, generalizations based on only the respondent data will likely bias the producer evaluations in favor of the needs of the larger farms. A policy recommendation for changes in the information system for Michigan potato producers based only on the results of the mail survey would tend to represent the data interests of the larger producers vis-a-vis the smaller farmers.

Second, it should be noted that the Michigan study found evidence that producer evaluations of information were related to such factors as the market in which the potatoes are sold and the manner in which the farmer contracts to sell the potatoes. These marketing patterns were in turn related to the size of the potato producing farms (Klein).

#### **NONRESPONDENT AND RESPONDENT PRICE DISCOVERY METHODS**

Table 2 shows the proportion of respondents and nonrespondents that rely on other firms, or market participants, for the price discovery function. It was hypothesized that the proportion of nonrespondents and respondents would differ with regard to the price discovery mechanism utilized when selling potatoes. For example, one might expect information needs to be related to the manner in which firms engage in market surveillance. There may be differences related to whether a firm performs its own price discovery or whether the firm relies on other organizations for market surveillance.

Table 2. Organization Performing the Price Discovery Function, Michigan Potato Producers.

Price Discovery by <sup>a/</sup>	Respondents		Nonrespondents	
	Number	Percent	Number	Percent
All Producers				
Producer <sup>b/</sup>	73	46.5	12	42.9
Agent/Cooperative	84	53.5	16	57.1
Total	157 <sup>c/</sup>	100.0	28	100.0
More than Ten Acres				
Producer <sup>d/</sup>	45	39.8	6	27.3
Agent/Cooperative	68	60.2	16	72.7
Total	113	100.0	22	100.0

SOURCE: Mail survey respondents, (Klein).

<sup>a/</sup> Classified on the basis of the response to a question asking producers: "From whom do you receive payment for the major portion of the potatoes you sell?"

<sup>b/</sup> Producer is directly paid by retailer, processor, or another grower.

<sup>c/</sup> The number of respondents exceeds 139 since producers were allowed to check more than one category.

<sup>d/</sup> Proportions of respondents and nonrespondents were significantly different at the .25 level.

However, there was no significant difference between the two subpopulations when the price discovery mechanism is defined in terms of who pays the potato grower (Table 2).

The price discovery variable was also studied while controlling for the size of the respondent and nonrespondent farms. In the lower part of Table 3 the respondent and nonrespondent farms that produce more than ten acres of potatoes are compared according to which firm performs the discovery function. Again, the null hypothesis of no difference between the two groups cannot be rejected. On the basis of the findings in the nonrespondent interviews in this study, there does not seem to be much difference between respondents and nonrespondents in their choice of who performs the major price discovery functions for the farm. It should be noted, however, that when only those farms producing 10 acres of potatoes or more are considered, the difference between respondent and nonrespondent price discovery method is somewhat greater than when all respondent and nonrespondent producers are considered.

#### **NON-RESPONDENT AND RESPONDENT EVALUTION OF USDA PRICE DATA**

In the Michigan potato industry study there were significant differences between producer evaluations of USDA price data related to the manner in which the farm sold potatoes (Klein). It was expected that nonrespondents and respondents would differentially evaluate USDA price data for their utility in decision making. As Table 3 shows, respondent producers did give a higher rating to USDA price data than the nonrespondent producers. This difference was significant at the .05 level. The importance of this finding is further supported by the fact that for those farms growing more than ten acres of potatoes, the difference between respondent and nonrespondent proportions was significant at the .10 level.

On the basis of the present study, respondents to the mail survey evaluate USDA prices significantly different than nonrespondents. Thus, any recommendation for changes in the USDA data system to aid Michigan potato producers decision making must acquire



Table 3. Michigan Potato Producers Finding USDA Prices Useful.

Price Discovery by <sup>a/</sup>	Respondents		Nonrespondents	
	Number	Percent	Number	Percent
All Producers				
Yes <sup>b/</sup>	53	66.6	8	44.4
No	27	33.8	10	55.6
Total <sup>c/</sup>	80	100.0	18	100.0
More than Ten Acres				
Yes <sup>d/</sup>	52	67.5	8	47.1
No	25	32.5	9	52.9
Total	77	100.0	17	100.0

SOURCE: Mail survey respondents, (Klein).

<sup>a/</sup> Classified on the response to a question asking producer: "Do you feel these prices are useful to you?"

<sup>b/</sup> Significantly different at the .05 level.

<sup>c/</sup> The totals in this table are smaller than in earlier tables because of difficulties in obtaining a response to this question from the producers.

<sup>d/</sup> Proportions of respondents and nonrespondents were significantly different at the .10 level.

information on all producers. Improvements recommended on the basis of a mail survey would reflect the needs of the group of respondents, which are likely to differ significantly from the needs of the nonrespondent group.

### CONCLUSIONS

The results from the mail questionnaire in the Michigan study are subject to response bias because respondents differ significantly on important characteristics. A comparison of the respondent and nonrespondent strata found evidence that nonrespondent farms were smaller than the respondent farms. Therefore, generalizations from the mail survey data to the whole population of Michigan potato producers regarding their information needs for decision making would be biased in favor of the larger farms.

The results of the telephone survey also gave evidence of differences between respondents and nonrespondents in their evaluation of USDA prices for use in decision making. This difference between the two groups was also evident when the size of farms was controlled by comparing the large respondent farms with the large nonrespondent farms. Consequently, any attempt to set data priorities by agencies in the service of potato producers must consider potential differences between the type of producer in both the respondent and nonrespondent groups.

The findings in the study of Michigan potato producers show that predicting economic behavior based on responses to surveys may be biased because of significant nonrandom differences between firms in the respondent and nonrespondent strata. In reporting survey and research results that ignore possible bias introduced by nonresponse error, researchers may be unwittingly providing biased information to those who use research results as the basis for decision making. Additional research is needed to identify characteristics of nonrespondents that differ systematically from those of respondents and the potential interaction of such characteristics with variables under study. Such information can then be used to adjust, or weight survey results to offset response bias.