EVALUATING MARKET INFORMATION SYSTEMS BY FIRM DECISIONS: A MICHIGAN PROCESSED POTATO INDUSTRY CASE STUDY[1]

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Management's rating of the usefulness of different types and sources of market information available to them.

INTRODUCTION

In recent years there has been a growing concern about the accuracy and quality of publicly supported information. One of the major problems of information systems research is the lack of proven theory and methodology (Eisgruber). Several studies have applied the "users approach"[2] (Heifner, et al., Sjodin and Dahl, Riemenschneider, Klein). In most of the above studies, the decision makers were usually farmers or public officials. Few studies have evaluated the market information needs of food processors. Given their position in the market channel, processors are at the locus of information flows because they operate in several interrelated markets: (1) farm gate market outlets for farmers, (2) input wholesaler's market and (3) input retailers' market.

OBJECTIVES

The objectives of this study are as follows:

(1) To evaluate the information supporting Michigan processed potato firms' decisions by relating marketing decisions to types and sources of market data and,

(2) To suggest improvements in the publicly supported statistical services provided the Michigan processed potato industry.

PROCEDURE

The data were obtained from direct personal interviews with managers and buyers in Michigan's processed potato firms. The interviews were designed to obtain information on the nature of the decision environment of the firm, types and sources of information used by the firm and its perceived value for decision.

This procedure for evaluating information differs from the usual opinion poll approach in that the questions posed to each manager were placed in the context of that firm's decision environment rather than just rating an information source or type directly against a general qualitative variable. Managers were asked to rate the usefulness of different types and sources of information in the context

of how they were used in specific decisions of the firm. The Likert scaling method (Lansing and Morgan) is used to measure the degree of usefulness to processing firms of various types and sources of information for decision making. This analysis has as its primary premise that information can be valued only in the specific decision context (Bonnen).

TYPES OF INFORMATION USED BY POTATO PROCESSORS IN MAKING MARKETING DECISIONS

Table 1 presents the processor's evaluation of the usefulness of various types of information in making marketing decisions. Information is divided into four broad categories: price, supply, demand, and cost. An *a priori* list was first constructed from variables derived from published data, from economic theory, and from other studies. This list was then modified after directing an open ended question to plant managers.

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

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

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

Although 50 percent of the firms rated all types of demand information as "moderately useful," the actual usefulness of the types of information displayed in the question are possibly lower. Several reasons lead to this conclusion. First, only a few firms rated information demand types as "very useful." Second, firms for the most part employ a general market trial and error approach (market tested) in determining the demand for their products. Finally, information on population trends, income trends, and demand estimates are usually available in aggregates that do not apply to the

TABLE 1. USEFULNESS OF VARIOUS TYPES OF INFORMATION IN DECISION MAKING, ALL PROCESSORS

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

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

processor's relevant market. Also, demand information such as the type obtained from consumer profiles are a product of an analytical process the capacity for which many of the firms in the study do not possess.

SOURCES OF INFORMATION IN DECISION MAKING

Table 2 presents the results of processor's evaluations of the usefulness of various sources of price information in decision making. The list of price sources was developed *a priori* and modified via an open ended question posed to each firm manager. Over 90 percent of the processor's rated brokers/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., consultation with government or univer-

TABLE 2. USEFULNESS OF SOURCES OF PRICE INFORMATION IN DECISION MAKING, ALL PROCESSORS

Source of Information	Very Useful	Moderately Useful	Rarely Useful	Not Useful	Total
		(Absolute Frequency)			
Radio and T.V.	2	1	3	3	9
Newapapers	3	3	1	2	9
Magazines	0	4	2	3	9
University Publications	2	1	2	4	9
USDA Economic Publs.	3	4	1	1	9
USDA Crop Reports	3	3	1	2	9
Consultation with Persons in Gov't. or Univ.	0	1	6	2	9
Commercial Mktg. Serv.	1	3	2	3	9
Banks	0	0	6	3	9
Retail Stores	2	5	1	1	9
Dealers/Brokers	8	1	0	0	9
Other Processors	3	3	3	0	9

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

sity, 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 feel that these non-market sources transmit "stale information" but perhaps more importantly, the processor-decision maker has little recourse if the information obtained from the non-market source leads to a poor decision. The logic here does not suggest, for example, that USDA, a non-market source of information, must become a direct market participant in order to gain creditability as a useful source of information. But it may suggest to the non-market participants who wish to become a useful source of information, to build in feedback mechanisms so that the public statistical agencies can respond or modify the information source for better use in decision making.

USEFULNESS OF PRICE INFORMATION IN SPECIFIC DECISIONS MADE BY POTATO PROCESSORS

Table 3 presents the results of the processor's 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[3] so that a representative list or set of decisions can be identified. The approach in identifying this set of decisions is similar to that used in developing the lists of types and sources of information. First, an *a priori* list of decisions was

TABLE 3. USEFULNESS OF PRICE DATA FOR VARIOUS DECISIONS, ALL PROCESSORS

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

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

constructed. This list was compared with responses obtained from open ended questions posed to firm managers about their decision set. Inasmuch as the resulting list of decisions were not modified very much, this leads one to conclude that: 1) the *a priori* list adequately reflected the firm decision environment, or 2) open ended questions are perhaps not a good approach for acquiring knowledge about the firm's decision environment.

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

In general, price information was found to be very important among more than 50 percent of the processors in making the following decisions: 1) variety of potato to buy, 2) timing of purchases, 3) place or market to buy raw product, and 4) market in which to sell processed product. Several reasons may exist as to why price information is very important in the above decisions. With a number of different varieties of potatoes grown in Michigan and other varieties shipped in from other states, the processors demand for potatoes is fairly specialized. The finished product yield varies by variety of potato. Processors prefer the varieties that are known to have high potential product yeild. 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 markets are, of course, directly influenced by price.

Decisions in which price appears to have little impact as rated by processors

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

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

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

TYPES OF INFORMATION ACROSS FIRM TYPE

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

In general, freezers gave higher ratings to most types of information than did chippers (Table 4). Several interesting observations can be made on differences between freezers and chippers. With respect to price information, freezers consistently rated all types of price information (for both procurement and produce markets), except potato futures prices, as "moderately useful" to "very useful." Somewhat surprisingly, chippers rated contract price information at 2.857, which is slightly below "moderately useful." On the other hand, chippers viewed wholesale (product) price information as more than "moderately useful." Another major difference between freezers and chippers is in their evaluation of forecast (product) price information. Freezers rate this type of information as "very useful" to them when making decisions.

With non-price information, a similar comparison is made between the usefulness freezers and chippers place on various types of information. Here again, freezers generally rated all types of information more useful than did chippers. All supply type of information, planting intentions, crop estimates, volume shipments, and carry-over stocks were rated "moderately useful" to very useful" by freezers. Chippers rated supply type of information as "rarely useful" to "moderately useful." Demand and cost types of information were evaluated fairly consistently between types of firms with the exception of their evaluation of demand estimates. Freezers rated demand estimates as "very useful," while chippers felt that this information type was less than "moderately useful."

Some generalizations can be made about how the freezers and chippers rated the usefulness of various types of information. As noted above, freezers

TABLE 4. AVERAGE RANKING OF VARIOUS TYPES OF INFORMATION ACROSS FIRM TYPE[1]

Types of Information	All Firms	Freezers	Chippers
Prices			
Quotations	3.555	4.000	3.428
Contract	3.111	4.080	2.857
Wholesale	3.625	3.500	3.666
Retail	3.600	3.500	3.666
Futures	2.375	2.500	2.333
Past Year	3.222	3.500	3.142
Forecast	2.888	4.000	2.570
Other Inputs (Oil)	4.000	--	4.000
Supply			
Plt. Intentions	2.888	3.500	2.714
Crop Extimates	2.777	3.500	2.571
Vol. Shipments	2.875	3.500	2.666
Stocks	3.222	4.000	3.000
Demand			
Population Trends	2.500	2.500	2.500
Income Trends	2.875	2.500	3.000
Consumer Profile	3.250	3.500	3.166
Demand Estimates	3.000	4.000	2.666
Cost			
Production	3.444	4.000	3.285
Processing	3.888	4.000	3.857
Transportation	3.888	4.000	3.857
Labor (Wages)	3.333	3.500	3.285

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

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

generally rated most types of information higher than did chippers. For example, freezers rated contract price and all supply information as "very useful." Chippers generally rated product side information types as more useful. For example, they gave higher ratings to wholesale and retail price information than did freezers. Moreover, freezers rated information types that require more analysis (i.e., forecast price, demand estimates) higher than did chippers.

RESULTS AND CONCLUSIONS

This study was premised on the notion that information attains its value only in the context of a special decision. Therefore, this study was concerned with the specification of decisions made by potato processing firms. The need to study the decision agenda was found not only necessary to illustrate obsolescence in the supporting information systems, but it was also necessary to indicate

the relative value of different types and sources of information available to decision makers.

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

It should first of all be noted that USDA's statistical agencies were not designed directly to serve the informational needs of food processors, the focal group in this study. In fact, the informational needs of this group of processing firms are perhaps inherently a lower priority on their statistical agenda than are producer decision needs. But the reality of the situation, the problem of statistical obsolescence, makes it possible for one to draw some inferences from this study for the public statistical system whose primary mission developed some years ago and has not fundamentally changed. Increasingly, the decisions made by processors affect the entire food system and thus the activities of processors impact the public statistical agencies. With the tremendous change in market organization, new types of problems arise, and therefore, the need for information for both private and public decisions increase.

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

Because of inflationary pressures, the cost of marketing has risen rapidly in recent years. Many marketing services are in fact becoming more costly than the per unit value of the raw product. Marketing data, in most cases, are not reported by the public statistical agencies, despite their importance to the food system. For example, transportation makes up ten percent of all food marketing costs. Data published on food transportation is reported by the Interstate Commerce Commission. Cost information on transportation of processed food would be of value to the industry as well as the public sector.

Improved information on another area that would be of value to both private and public sector decisions involves grades and standards in the potato indus-

try. Research on this problem area can perhaps best be performed by Agricultural Marketing Service with the Statistical Reporting Service cooperating. Consistent grades and standards tailored to processing uses would greatly enhance the exchange of products between producers and processors.

FOOTNOTES

[1]This paper is adopted from Ralph Christy, "The Michigan Processed Potato Industry: An Information System Case Study" unpublished Ph.D. Thesis, Michigan State University, 1980.

[2]Eisgruber refers to this method as the "scoring approach" in "Developments in the Economic Theory of Information" A.J.A.E., December, 1978.

[3]See William Lazer Marketing Management: A Systems Perspective, New York: John Wiley and Sons, Inc., 1971 for a discussion of the firm's decision making environment.

REFERENCES

Bonnen, James, T. "Improving Information on Agriculture and Rural," American Journal of Agricultural Economics, Vol. 57, No. 5, December 1975.

Christy, Ralph D. "The Michigan Processed Potato Industry: An Information System Case Study," Ph.D. Thesis, Michigan State University, 1980.

Eisgruber, Ludwig M. "Developments in the Economic Theory of Information," American Journal of Agricultural Economics, Vol. 60, No. 5, December 1978.

Heifner, R.; Driscoll, J.; Helmuth, J.; Leath, M.; Nieroberger, F.; and Wright, B. "The U.S. Cash Grain Trade in 1974: Participants, Transactions, and Information Sources," Economic Research Service/United States Department of Agriculture/ Agricultural Economic Report No. 386, September 1977.

Klein, Marvin L. "An Information System Approach to the Study of Price Data: A Case Study of the Michigan Potato Industry," Ph.D. Thesis, Michigan State University, 1979.

Lansing, John B. and Morgan, James N. Economic Survey Methods, Institute for Social Research, The University of Michigan, Ann Arbor, 1971.

Riemenschneider, Charles H. "An Information Systems Analysis of USDA Farm Income Data," Ph.D. Thesis, Michigan State University, 1978.

Sjodin, Keith E. and Dahl, Dale C. "Potato Price Reporting Procedures and Practices in the Red River Valley," Unpublished paper, University of Minnesota, St. Paul, May 1975.