

## A SOCIOECONOMIC ANALYSIS OF MARKETING INFORMATION USAGE AMONG OHIO FRUIT PRODUCERS

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### Abstract

Farm producers attempt to mitigate risk and uncertainty by utilizing accurate and reliable information. This research attempts to identify sources of information used by Ohio fruit producers and then determine which of these sources are best meeting their information needs. Results are based on a logit analysis of Ohio fruit producers and several factors are shown to influence producers' evaluation of the "adequacy" of their marketing information. Among these factors are age, business size, education, type of enterprise, and types of information sources. Reported findings have implications for marketing efficiency, particularly if producers' evaluation of information as adequate is positively related to its efficient use.

**Key words:** marketing information, information adequacy, socioeconomic characteristics, information sources, marketing decisions

### INTRODUCTION

Recent concern about pesticide use on fruits caused considerable economic disruptions in the produce industry (Aylsworth; Buxton). Lower prices, diminished revenue and marketing inefficiency prompted the produce industry to increase information dissemination to producers, marketing specialists, and consumers (Buxton). This enhanced information dissemination, although prompted by misinformation or negative publicity, contributed to industry stability and marketing efficiency (Shimskey). Marketing efficiency, of course, is usually an underlying goal of most industries even when they are not faced with negative publicity (French 1977). Information can enhance efficiency if it is used to aid decisionmaking and management of risk (King and Sonka).

Farm producers often use information to minimize their risk exposure or increase their expected income (Bullock *et al.*). When faced with a choice of infor-

mation sources, producers are expected to select those sources that yield the highest marginal benefits. Hence, the objectives of this research were to (1) identify sources of information used by Ohio fruit producers and (2) determine which of these sources are best meeting the information needs of these producers. These objectives were pursued while controlling for differences in socioeconomic factors among producers. These factors were controlled because they are likely to influence the usefulness of information to respective users. Relevant socioeconomic characteristics of information users are expected to include educational attainment, farm size, attitudes toward growth and expansion, and perception of the value of information. This latter factor, user perception of the value of information, is a major focal point of this paper.

Producers' perception of the value of information was measured as a qualitative response to a question regarding the adequacy of information. Specifically, producers were asked to rate their marketing information as either "adequate" or "inadequate" for decisionmaking. Producers' responses are likely to reflect the quantity and quality of their marketing information. Producers applied their own performance standards in their evaluations. While producers probably used different measures of rigor in their evaluations, it is such individual evaluations that form the basis for decisions regarding information sources. Furthermore, an existing body of literature describes the relationship between the performance of management information systems and user attitudes and perceptions (Lucas 1973, 1974a, 1974b, 1975; Robey; Schultz and Slevin). Robey, in a study of an industrial sales force, concluded that user perceptions of system performance (system usefulness or adequacy) were highly correlated with actual information systems use. Thus, the objectives of this research should be attainable through the described measurement of producers' perception of information value.

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## DESCRIPTION OF DATA

Using a random sample, 200 Ohio fruit producers were surveyed regarding their usage of information for decisionmaking. Over one half (118) of the producers returned the survey questionnaire; 80 of the returned surveys were complete and usable. Of the 38 incomplete surveys, four producers refused to complete the questionnaire, and the remaining 34 were no longer producing fruit. Statistics described here pertain to the 80 usable surveys.

The primary commodities represented in the sample were apples, grapes, and peaches. No producer had more peach acreage than apple or grape acreage. Sample statistics for peaches and grapes compare favorably with statewide averages; those for apples are biased downward. Twelve percent of the state's apple producers were included in the sample, but they accounted for only 8.3 percent of the 1987 apple production. By contrast, 12.8 and 28.1 percent of peach and grape producers were included in the sample and they produced 12.3 and 26.3 percent of the state's 1987 production of these commodities, respectively. Large apple producers were under-represented in the sample because the sampling population was drawn from a 1982 population base that did not reflect an 80 percent increase in the largest class of apple producers between 1982 and 1987. Minor commodities included in the sample were blueberries, cherries, melons, nectarines, pears, plums, and strawberries.

Approximately 40 percent of Ohio fruit producers in the sample had obtained a college education, and a larger number (53 percent) had some high school education. Age ranged from 25 to 78 years, with the mean age being 54 years. Over 67 percent of these fruit producers planned to expand or maintain the current size of their fruit business, while 32 percent expected to reduce their current operation or retire from fruit production. Fruit production was the sole occupation of the majority of producers, but 42 percent were employed in occupations outside their fruit business.

The survey instrument included several questions regarding the usefulness of information sources for fruit production and marketing decisions. Farmers were instructed to evaluate the usefulness of twenty-two information sources using the criteria VERY USEFUL, USEFUL, NOT USEFUL, and DO NOT RECEIVE/USE. Specialized Fruit Magazines and Other Fruit Producers were evaluated as USEFUL or VERY USEFUL by 88 and 84 percent of the producers, respectively. Other highly evaluated information sources included USA and Government Publications, Cooperative Extension Service, Ohio

Agricultural Statistics, and General Fruit Magazines. Information sources with very low evaluations included Computerized Information Services, National Newspapers, and Marketing Consultant Services. Indeed, most fruit producers do not use these latter sources.

## ADEQUACY OF MARKETING INFORMATION

The survey questionnaire asked fruit producers to evaluate the adequacy of their current information sources for decisionmaking. Four types of information were identified: marketing, production, financial, and weather. Producers were instructed to evaluate each of these as "adequate" or "inadequate." Producers' evaluations of these sources were expected to reflect their knowledge and perceptions of the usefulness of the information contents for decisionmaking. That is, it was hypothesized that the explicit dollar cost does not bias the evaluations. Survey results show that producers spent an average of \$217 for information products in 1987. Expenditures for computer hardware were excluded from this total, but software expenditures were included.

To the extent that expenditures for information sources are a measure of information gathering and selection from among information products, fruit producers' information purchases are consistent with Kihlstrom's corollary that there is little demand for expensive information products (p. 116). Also, the observed pattern of information acquisition seems consistent with the proposition that producers no longer subscribe to an information source whose net value (gross value less cost) has been assessed as inadequate. Only 56.9 percent of the producers evaluated their marketing information as "adequate." By contrast, production, weather, and financial information were evaluated as "adequate" by 83.6, 80.8, and 64.3 percent of producers, respectively.

## MODEL SPECIFICATION

Fruit producers evaluated their marketing information as either adequate or inadequate. These observations are coded "1" and "0," respectively, and used as the qualitative dependent variable in two logit regressions. Specifically, two logit models are specified and estimated using maximum likelihood procedures. The logit model is based on the cumulative distribution function and yields results that are not sensitive to the distribution of sample attributes. That is, the results are meaningful and appropriate whether the explanatory variables are (1) multivariate normally distributed, (2) independent and

dichotomous zero-one or (3) multivariate normal and dichotomous (Press and Wilson).

Other frequently used specifications for analyzing qualitative dependent variables are the linear probability and probit models (Miller and Hay; Capps and Kramer; Pindyck and Rubinfeld). Pindyck and Rubinfeld have shown that maximum likelihood estimation of the linear probability model can provide estimates quite similar to the maximum likelihood estimation of the probit and logit models. However, estimates from the linear probability model are generally biased, inefficient, and inconsistent with a unit prediction range. Both the probit and logit models can be specified to overcome these statistical problems. While there is little empirical basis for discriminating between the logit and probit models, this study is limited to the logit model because of its popular use in applied studies of agricultural economics.

Several factors were hypothesized to influence fruit producers' evaluation of their information adequacy. Among these are the type of marketing information sources utilized, size of fruit farm, ownership structure, employment characteristics, educational attainment, type of fruit farm, and age. As enumerated in Table 1, fruit producers obtain marketing information from five categories of information sources. These categories are defined as binary variables and used to explain producers' perception of their marketing information adequacy. Fruit producers were asked to identify which of the 22 information source categories were MOST VALUABLE, SECOND MOST VALUABLE, and THIRD MOST VALUABLE when making marketing decisions. The five binary variables for information categories were constructed from these responses. BROADCAST takes on a value of 1 if a broadcast information source (radio or television) was indicated in any of these three responses. Similarly, DAILY, PERIODIC, FRFARM, and PROF take on values of 1 if responses to any of the three questions corresponded to an information source in the named category. Thus, for an individual, as many as three (but as few as one) of these binary variables may take on values of one.

Since the enumerated sources are valuable marketing information sources for decisionmaking, it seemed plausible to hypothesize that each information category will have a positive and significant impact on marketing information adequacy. However, the relative impacts of these information sour-

ces should differ as the marginal value of some sources exceeds that of others. The relative value of these information categories may also vary by the type of fruit producer. For example, the information needs of Ohio apple producers are likely to differ from those of Ohio grape producers since Ohio apples are marketed predominately for fresh use and Ohio grapes are marketed predominately for processing (Ohio Agricultural Statistics). An enterprise specialization variable was included in the model to capture these differing information needs.

Risk and uncertainty were hypothesized to increase with farm size (sales). Such increases in production risk are likely to be somewhat offset by producers' ability to manage risk or their willingness to bear risk as size increases. That is, size is undoubtedly related to producers' past success in managing the operation. Additionally, risk is somewhat minimized by the marketing strategies utilized by larger fruit producers. For example, larger apple producers market through wholesalers, road-side markets, processors, and retailers (Uchida). Smaller apple producers, on the other hand, often rely entirely upon a single outlet. Since increased diversification and larger size typically require more and better information, larger producers are expected to spend more time developing an information system and thus to have higher adequacy evaluations of their marketing information.

Age was hypothesized to be positively related to the probability that producers evaluate their marketing information as adequate. Older producers are expected to have more time to develop a satisfactory marketing information system. Likewise, they accumulate many years of experience which partly substitute for external marketing information. Older producers may also have lower demand for information for risk-management reasons. Further, older producers often have more diversified operations. For example, older and more experienced apple producers in this survey typically used a larger number of marketing outlets (e.g., wholesale, retail, roadside) and produced a larger number of apple products (e.g., fresh, cider, juice, jelly). They also tended to be more highly diversified across fruit commodities.<sup>1</sup> Additionally, it seemed reasonable to conjecture that older and more experienced producers have better marketing relationships with commodity buyers. More specifically, forward contracting is likely to be positively correlated with age

<sup>1</sup> This diversification among marketing methods, commodity type, and product form should reduce both price and yield risk exposure, and thus may influence the individual's demand for information for risk management purposes.

Table 1. Information Sources Evaluated as Most, Second Most and Third Most Important for Marketing Decisions

Source	Most Valuable		Second Most Valuable		Third Most Valuable		Total Votes Cast	
	N	%	N	%	N	%	N	%
<b>Daily</b>								
Local Newspapers	14	19.7	2	2.8	4	5.8	20	9.4
National Newspapers	2	2.8	0	0.0	0	0.0	2	0.9
Computerized Info. Services	0	0.0	0	0.0	0	0.0	0	0.0
Total	16	22.5	2	2.8	4	5.8	22	10.3
<b>Broadcast</b>								
Radio Reports	0	0.0	3	4.2	1	1.4	4	1.9
Television Reports	0	0.0	1	1.4	3	4.5	4	1.9
Total	0	0.0	4	5.6	4	5.8	8	3.8
<b>Periodic</b>								
General Fruit Magazines	0	0.0	6	8.3	8	11.6	14	6.6
Specialized Fruit Magazines	16	22.5	8	11.1	7	10.1	31	14.6
USDA & Govt. Publications	1	1.4	8	11.1	1	1.4	10	4.7
Ohio Ag. Stat. Newsletter	5	7.0	5	6.9	6	8.7	16	7.5
Local Market Reports	4	5.6	3	4.2	1	1.4	8	3.8
Commercial Newsletters	1	1.4	6	8.3	9	13.0	16	7.5
Agricultural Newspapers	0	0.0	3	4.2	4	5.8	7	3.3
Total	27	38.0	39	54.2	36	52.2	102	48.1
<b>Other Fruit Producers</b>								
Total	13	18.3	19	26.4	4	5.8	36	17.0
<b>Professionals</b>								
Certified Public Accountant	2	2.8	0	0.0	2	2.9	4	1.9
Cooperative Ext. Service	10	14.1	6	8.3	13	18.8	29	13.7
Marketing Consultant Service	3	4.2	0	0.0	0	0.0	3	1.4
Salesmen	0	0.0	0	0.0	5	7.2	5	2.4
Insurance Agent	0	0.0	0	0.0	0	0.0	0	0.0
Lender	0	0.0	0	0.0	0	0.0	0	0.0
Brokerage Firm	0	0.0	1	1.4	0	0.0	1	0.5
Tax Preparer	0	0.0	0	0.0	1	1.4	1	0.5
Attorney	0	0.0	1	1.4	0	0.0	1	0.5
Total	15	21.1	8	11.1	21	30.4	44	20.8
<b>Total</b>	<b>71</b>	<b>99.9<sup>a</sup></b>	<b>72</b>	<b>100.1<sup>a</sup></b>	<b>69</b>	<b>100.0</b>	<b>212</b>	<b>100.0</b>

<sup>a</sup>Does not equal 1% due to rounding error.

and experience and, as a result, marketing price risk can be diminished for older producers.

Education was hypothesized to be negatively related to producers' evaluation of their marketing information adequacy. Education is a form of human capital that should serve to enhance producers' understanding of the complexities of the marketing system and lead them to demand improved marketing information. Ohio fruit growers, for example, have formed marketing and bargaining associations to increase their understanding of marketing and to negotiate prices, particularly with processors (Lockshin; Uchida). These organizations are typically

headed by the most informed (educated) and information is shared among members. Although this process allows for the accumulation of a wealth of information, producers generally suspect that firms have better information at their disposal than that which exists among themselves. It is of interest to note, however, that French (1987) concludes that farm prices negotiated through a bargaining association are likely to reflect those that would prevail in a perfectly competitive market.

Multiple ownership of fruit enterprises allows for management specialization and provides more management time in total to collect and interpret

data and information. As a consequence, this ownership structure was hypothesized to increase the probability that producers will evaluate their marketing information as adequate. By contrast, part-time employment outside the fruit enterprise is likely to constrain producers' available time for information assimilation and lead to lower evaluations of their information adequacy. Alternatively, producers with off-farm employment may face lower enterprise risk from inefficient marketing decisions and therefore may be less concerned about the overall quality of their marketing information.

All of the described relationships and variables are captured in two logit models, with one representing all fruit producers and a second one representing producers with specialized apple production. The second model differs from the first only by the exclusion of one variable. The common model is expressed as:

$$\text{LOG} \left( \frac{P}{1-P} \right) = B_0 + B_1 \text{ AGE} + B_2 \text{ SALES} \\ + B_3 \text{ DAILY} + B_4 \text{ PERIODIC} \\ + B_5 \text{ OFRPROD} + B_6 \text{ EDUCATE} \\ + B_7 \text{ PTIME} + B_8 \text{ MOWNER} \\ + B_9 \text{ BROADCAST} + B_{10} \text{ PROF} \\ + B_{11} \text{ GRAAPP} + U$$

where:

$$\text{Log} \left( \frac{P}{1-P} \right) = \text{Log of the probability (P) of a} \\ \text{marketing information ade-} \\ \text{quacy (MKTADEQ) ranking} \\ \text{relative to an inadequate} \\ \text{ranking,}$$

AGE	=	Age in years of the respondent,
SALES	=	Fruit sales measured in thousand of dollars,
DAILY	=	1 if daily information sources are important; 0 otherwise,
PERIODIC	=	1 if periodic sources are important; 0 otherwise,
OFRPROD	=	1 if other fruit farmers are important; 0 otherwise,
EDUCATE	=	1 if some college education; 0 otherwise,
PTIME	=	1 if employed outside fruit enterprise; 0 otherwise,
MOWNER	=	1 if multiple owners of fruit enterprise; 0 otherwise,

BROADCAST	=	1 if broadcast information sources are important; 0 otherwise,
PROF	=	1 if professional information sources are important; 0 otherwise,
GRAAPP	=	1 if grape acreage exceeds apple acreage; 0 otherwise, (variable is excluded from the second model), and
U	=	error term.

Maximum likelihood estimates are derived and these results are discussed in the next section.

## EMPIRICAL RESULTS

The maximum likelihood estimates of the two logit models are shown in Table 2. The discussion here is focused on the first model (all fruit producers), with limited discussion of the second model (specialized apple producers). Results from the second model are provided as a test of how well the specialization variable (GRAAPP) controls for differences between apple and grape producers.<sup>2</sup> A comparison of the two models shows two major differences. Specialized apple producers with part-time employment outside the fruit enterprise have a higher probability of evaluating their marketing information as inadequate than do other fruit producers. Secondly, multiple ownership of the fruit enterprise has a statistically insignificant impact on information evaluation for apple producers, but a positive and statistically significant impact on information evaluation for other producers.

Two variables, BROADCAST and PROF, were dropped<sup>3</sup> from the estimated results as shown in Table 2. Both variables had positive coefficients, but their standard errors greatly exceeded their coefficients. Also, a joint combination of the two variables was statistically insignificant in both models. Likewise, disaggregating the PROF variable into the Cooperative Extension Service (CES) and all other information sources (AOIS) revealed positive, but statistically insignificant estimates for both variables. Such results suggest that the marginal value of the information provided by BROADCAST, PROF, CES, and AOIS sources is low relative to that of other information sources.

As shown in Table 2, approximately 75 percent of the observations for all fruit producers are correctly predicted and all but two of the parameters are statistically significant at the .10 level or better (one

<sup>2</sup> Specialized apple or grape producer does not mean that the producer had just one commodity. It means the producer had more acreage of that commodity than any other commodity.

<sup>3</sup> It is recognized that dropping relevant variables could bias the parameter estimates. However, excluding these variables led to almost no change in the magnitude of the parameter estimates, but to significant reduction in their variances.

Table 2. Maximum Likelihood Estimates for Two Models of Marketing Information Adequacy

Variable	All Producers			Apple Producers		
	Estimate	Change in Probability <sup>a</sup>	Asymptotic t-value	Estimate	Change in Probability <sup>a</sup>	Asymptotic t-value
Age	.060557*	.0100977	1.868	.07204*	.014481	1.556
Sales	-.000003*	-.0000005	-1.369	-.00002*	-.000004	-1.830
Daily	-.78074	-.0999782	-1.067	-.67317	-.111614	-.568
Periodic	1.3344*	.2905224	1.387	2.2278*	.504137	1.449
Ofprod	1.4826*	.3275159	1.980	2.1369*	.487933	1.513
Educate	-.97858*	-.1173920	-1.418	-1.8425*	-.215870	-1.351
Ptime	-.96573	-.1163437	-1.242	-2.5784*	-.244138	-1.776
Mowner	1.4468*	.3185983	1.636	-.01350	-.002663	-.009
Graapp	1.3281*	.2889476	1.722	—	—	—
Constant	-4.2791*	—	-1.740	-3.2239	—	.978
McFadden R-Square		.2316			.4017	
Log-Likelihood		-41.879			-22.737	
Log-Likelihood Restricted		-32.179			-13.602	
Chi-Squared		19.401			18.270	
Correct Prediction (%)		75.4			84.8	
$\chi^2_{.025,9}$		19.02			—	
$\chi^2_{.025,8}$		—			17.53	

<sup>a</sup>Probability changes are calculated at means for the continuous variables, AGE and SALES. Probability changes for all binary variables are evaluated from 0 to 1.

\*Indicates significance at .10 level or better, one-tailed tests.

tailed t-tests). With grape producers excluded from the second model, the results show that 85 percent of the observations are correctly predicted and the Chi-square statistic is significant at the .025 level. Moreover, the McFadden  $R^2$ , which is defined as one minus the ratio of the restricted to nonrestricted log-likelihood function, is quite reasonable for both models (Pindyck and Rubinfeld, p. 301).

For all fruit producers as well as specialized apple producers, the probability of evaluating marketing information as adequate increases with age. Each year of increase in age leads to a change of .01 in the probability of an adequate evaluation for marketing information. Since producers generally become more risk-averse with age, this parameter estimate suggests that more and better information is probably acquired to diminish risk.

Sales have a negative and statistically significant impact on the probability of producers evaluating their marketing information as adequate. The negative sign is contrary to a *a priori* expectations and it suggests that the risk associated with increased production outweighs that which is offset by experience in managing risk. That is, rising sales may suggest more risk exposure (greater potential losses)

and a possible need for more accurate and reliable information. Assuming that such information is obtained through greater expenditures, it seems reasonable to expect larger producers to spend more on information sources. Implicit here is the assumption that the value of information can be inferred from information expenditures.

Assuming expenditures on information sources represent information gathering, several tests were conducted to see if any relationship existed between farm size and information expenditures. These tests included a simple correlation test between SALES and total information expenditures (TEXP), a t-test of mean differences for TEXP between larger and smaller producers, and an OLS regression of SALES on TEXP. All tests showed a positive but statistically insignificant relationship between the two variables, suggesting that information expenditures are not an appropriate measure of producers' demand for and use of information.

Fruit producers' evaluation of marketing information as adequate tended to be inversely related to their receipt of DAILY information sources, though the parameter estimate is statistically insignificant. These information sources lowered the probability

of an adequate evaluation by .09. This parameter estimate suggests that marketing information content of DAILY information sources is less relevant for marketing decisions obtained from other producers and that contained in periodic sources. The reasonable stability of fruit prices and product movement might be factors which diminish the use of DAILY sources for decisionmakers (Buxton).

Periodic information sources, which consist of such publications as Specialized Fruit Magazines and Commercial Newsletters, raise producers' probability of evaluating their marketing information as adequate. As estimated, this probability is raised by .29 for all fruit producers and .50 for specialized apple producers. Periodic information sources as measured by probability changes, are shown to be most important for apple producers and second most important for all other producers. Likewise other fruit producers (OFRPROD) are second most important for apple producers and most important for all other producers. The high significance of OFRPROD could have been hypothesized because this information source is likely to be most relevant to the decision at hand than many of the listed information sources. Additionally, OFRPROD are likely to provide information that is more timely than that provided by the other information sources.

The probability of evaluating marketing information as adequate is shown to decline with education. It is lowered by .11 for college-educated versus noncollege-educated producers. This suggests that education raises producers' knowledge and awareness of the complexity of the marketing system and leads them to demand more accurate and reliable information. Producers with off-farm employment are revealed to have lower perceptions of their marketing information adequacy. Although the parameter estimate is statistically insignificant in the first model, its negative sign and statistical significance in the second model suggest that off-farm employment raises producers' opportunity cost of time and their subsequent demand for more useful information.

Multiple ownership of fruit operations is shown to be a positive and statistically significant parameter in the first model for all fruit producers. A reasonable interpretation is that multiple ownership means more total management time to devote to the information gathering process. However, even though multiple ownership of apple enterprises is equal to that for all producers (33 percent), this type of ownership structure does not influence apple producers' perceptions of their marketing information adequacy. These results suggest that apple marketing does not allow for the degree of informa-

tion specialization that is perhaps possible for other fruits. For example, multiple ownership of a grape vineyard might allow one owner to focus on information pertaining to marketing grapes for wines and another to focus on information pertaining to marketing grapes for juice and jelly.

The parameter estimate for GRAAPP shows that specialized grape producers with other fruit crops have a higher probability of evaluating their marketing information as adequate than do specialized apple producers with other fruit crops. This parameter estimate is likely to reflect the more diversified marketing channels for apples than for grapes. Most of Ohio grapes (73 percent) are sold to processors for making juice and jelly (Ohio Agricultural Statistics). The predominant share of this is sold to Welch and Coca Cola through contracts (Lockshin). Another 12 percent of Ohio grapes are sold for wine, with many of the wineries owning the grape vineyards. These marketing outlets facilitate marketing and should diminish the need for marketing information. By contrast, 75 percent of Ohio apples are marketed fresh, where price fluctuations and product movement are more volatile. This suggests a distinct difference in the marketing information needs of apple and grape producers. It is of interest to note, however, that the empirical results show other fruit producers and periodic information sources to be the most important information sources for both groups of producers.

## SUMMARY AND CONCLUSIONS

Analyses of survey results indicate substantial differences in the sources of information utilized by Ohio fruit producers. Thirteen of the twenty-two information sources were evaluated as either very useful or useful for decisionmaking by over half of the producers. Information sources most useful were Specialized Fruit Magazines and Other Fruit Producers. Least useful sources were Computerized Information Services and Brokerage Firms. These latter two sources suggest that fruit businesses are neither highly computerized nor very dependent on professionals (other than salesmen) for information. Kihlstrom's analyses would suggest that producers have low evaluations of computerized information because this technology is not perceived to contribute to effective decisionmaking. An extrapolation of Kihlstrom's analysis also suggests that fruit producers' relatively low evaluation of professionals is due to relative price differences between this source and other, more familiar sources.

The multivariate analyses show three categories of information to be insignificant in influencing the probability of producers' evaluating their marketing

information as adequate: DAILY, BROADCAST, PROF (the latter two dropped from reported results). It is concluded that DAILY sources are probably insignificant because fruit prices and product movement are not erratic enough to require daily marketing information. Indeed, the sample results showed that less than 14 percent of fruit producers obtain marketing information on a daily basis. BROADCAST information sources, as defined in the study, have characteristics similar to DAILY sources and are probably insignificant for the same reason. The insignificance of PROF sources, however, is more puzzling. A major provider of information in the PROF category is the Cooperative Extension Service and this information source is statistically insignificant even when it is expressed as a separate variable in the equation. A logical conclusion seems to be that other fruit producers and periodic information sources are more valuable than other information sources.

The results revealed differences in the evaluation of marketing information adequacy by type of fruit

enterprise. Specialized apple producers with other fruit enterprises besides grapes were more inclined to view part-time employment outside the fruit enterprise as a factor which constrained their available time for information assimilation. Moreover, multiple ownership of the fruit enterprise was not a significant factor in information evaluation for specialized apple producers with other fruit enterprises. Specialized grape producers with other fruit enterprises were more inclined to evaluate their marketing information as adequate for decisionmaking than were specialized apple producers. It is concluded that the concentrated marketing of grapes for processing might be a factor influencing the differing evaluations of information adequacy. Such results suggest that future research should address the issue of whether information needs of fruit producers are related to product type and marketing outlets. Unfortunately, the sample size for this study was not large enough to obtain separate estimates for producers by enterprise.

## REFERENCES

- Aylsworth, Jean. "Apple Sales Recovering." *Am. Fruit Grower*, April 1989, 16-17 and 40.
- Bullock, J.B., D. Ray, and B. Thabet. "Valuation of Crop and Livestock Reports: Methodological Issues and Questions." *So. J. Agr. Econ.*, 14(1982):13-19.
- Buxton, Boyd M. "Seasonal Farm Price Patterns for Selected U.S. Fruit Crops." *Fruit and Tree Nuts Situations and Outlook Report*, TFS-246. Washington, D.C., August, 1988.
- Capps, O. and R.A. Kramer. "Analysis of Food Stamp Participation Using Qualitative Choice Models." *Am. J. Agr. Econ.*, 67(1985):49-59.
- French, Ben C. "The Analysis of Productive Efficiency in Agricultural Marketing: Models, Methods and Progress." *A Survey of Agricultural Economics Literature*, Volume 1, Minneapolis: University of Minnesota Press, 1977, 94-206.
- French, Ben C. "Farm Price Estimation When There is Bargaining: The Case of Processed Fruit and Vegetables." *West J. Agr. Econ.*, 12(1987):17-26.
- Kihlstrom, R. "A Bayesian Model of Demand for Information About Product Quality." *Int. Econ. Rev.*, 15(1974):99-118.
- King, R. P. and S. T. Sonka. "Management Problems of Farm and Agricultural Firms." Discussion Paper 44, Strategic Management Research Center, University of Minnesota, November, 1985.
- Lockshin, Larry. "The Ohio Grape Industry." Department of Agricultural Economics and Rural Sociology Lecture, Ohio State University, May, 1990.
- Lucas, H.C. Jr. "Performance and the Use of an Information System." *Management Science*, 20(1975):908-919.
- Lucas, H.C. Jr. "Systems Quality, User Reactions and the Use of Information Systems." *Management Informatics*, 3(1974a):207-212.
- Lucas, H.C. Jr. "User Reactions and the Management of Information Sources." *Management Informatics*, 3(1973):165-172.
- Lucas, H.C. Jr. "User Reactions to Computer Operations." *Sloan Management Rev.*, 15(1974b):59-67.
- Miller, Jon R. and Michael J. Hay. "Determinants of Hunter Participation: Duck Hunting in the Mississippi Flyway." *Am. J. Agr. Econ.*, 63(1981):677-684.

- Ohio Agricultural Statistics Service. "1988 Annual Report." Ohio Agricultural Statistics and Ohio Department of Agriculture, February 1990.
- Pindyck, R.S. and D.L. Rubinfeld. *Econometric Models and Economic Forecasts*. 2nd ed. New York: McGraw-Hill, 1981.
- Press, S.J. and S. Wilson. "Choosing Between Logistic and Discriminant Analysis." *J. Am. Sta. Assoc.*, 73(1978):699-705.
- Robey, Daniel. "User Attitudes and Management Information Use." *Academy of Management Journal*, 22(3)(1979):527-538.
- Schultz, R.L. and D. P. Slevin. "Implementation and Organizational Validity: An Empirical Investigation." *Implementing Operations Research/Management Science*. R.L. Shultz and D.P. Slevin, eds. New York: American Elsevier, 1975, 153-182.
- Shimskey, Donna. "Industry Fights Back." *Am. Fruit Grower*, April 1989, 15-16.
- Uchida, Stanley Akira. *Ohio Fresh Apple Marketing*. M.S. Thesis, Ohio State University, 1984.

