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Determining information sources used by crop producers: A case study of Gaziantep province in Turkey

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This study was conducted to search for crop producers' sources of soil operation, seed selection and seeding techniques, fertilizers and fertilizing, pest management, irrigation, input selection and product marketing information. Socioeconomic characteristics and information-seeking behavior influencing farmers' decisions to select their information sources was also the purpose of the study. Data were collected from a sample of 169 crop producers in Gaziantep province of Turkey. Results showed that crop producers use more information coming from traditional sources as compared to modern information sources. Contacts with extension service, educational level, use of printed materials and Internet had influence on their use of modern information sources for the practices covered in this study.

Key words: Information, agriculture, innovation, adoption, Gaziantep, Turkey.

INTRODUCTION

Agricultural and rural development for many developing countries depends on modern technologies and innovations which are developed by research institutes and universities, or imported by developed countries. Two key factors may play major role on the use of technology by farm operators; one of them is public and private organizations disseminating recent innovations to rural areas; and the other factor is farm operators' socioeconomic characteristics and information seeking behavior influencing their decisions for information sources. In order to survive in a competitive market and earn more stable income, farm operators need to know how to deal with various farming practices such as soil operations, seed selection and seeding techniques, fertilizing, pest management, irrigation, and harvesting and storing. In

addition, updated information on economic factors such as input prices and commodity marketing is inevitable. Farmers who are willing to adopt recent technology and innovations on these practices are assumed to increase their profits and to be able to sustain in a long term span. Those who resist to changes or are reluctant for adoption may have less chance of surviving in the market. "The critical element in this process is an effective system of market and non-market information linkage among farmers, public research institutions, private agricultural supply firms, and the market for products" (Hayami and Ruttan, 1971).

Large and more commercial farmers may hire professional employees who have contacts with public and private institutions, research centers, universities, and extension services. They can acquire updated information about farming practices and act as information exchange agents between these units and the farmers. Because conventional farmers have no power of hiring professional employees, they need to receive updated information by themselves and take care of all farming practices from production to marketing. This probably makes it more difficult for conventional farmers to have regular linkages with the above units which are assumed

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Abbreviations: FRS, Farmers registration system, DFEE, division of farmers' education and extension; MARA, ministry of agriculture and rural affairs.

to help them in their decision making process. Thus, use of updated information, especially coming from professional organizations and extension services may influence farmers to make better decisions on production and marketing issues; farmers who don't have this opportunity, on the other hand, may have less power of competition in the market.

The main source of farming information in Turkey is the Division of Farmers' Education and Extension (DFEE) of the Ministry of Agriculture and Rural Affairs (MARA) which is a public organization, primarily responsible for training farmers through various extension education programs. DFEE's goal is to update farmers' knowledge and skills on different agricultural and rural developmental issues, which ultimately aims to increase the quality of farm life in the long term. MARA is organized in every province and district as province and district directorates employing large numbers of agricultural engineers, veterinarians, and home economists. From these qualified personnel, the one who works for DFEE is called extension agent. Extension agents' duties can be described as identifying extension issues in rural areas; developing various programs which address these issues; implementing the programs; and finally evaluating the programs to determine whether or not sources are economically used (Boz, 2002; MARA, 2009; Atsan et al., 2009). Beside the DFEE, there are other organizations and/or individuals who provide farmers information regarding their farming practices. These are agricultural colleges, input providers, crop purchasers, professional employees, older family members, and neighbor farmers. Furthermore, some farmers receive farming information from mass media and even from the Internet. The degree of farmers providing information from each of these sources may depend on their socioeconomic characteristics and information-seeking behavior.

In the existing literature, there are studies dealing with sources of information related to different farming practices. Riesenbergh and Gor (1989) sought farmers' preferences for methods of receiving information on new or innovative farming practices in Nez Perce County Idaho, and found that farmers prefer interpersonal methods rather than mass media methods. Information preferences of commercial farmers were investigated in an Ohio study (Schnitkey et al., 1992), which showed that farmers prefer to receive information from printed information sources. Farm size, farm type, operator's age, and computer use were the significant variables having influence on information preferences. In an Atlanta study, Valamoff et al. (2002) investigated homeowners' choice of information sources about gardening, and found that radio, television, newspapers, magazines, and the Internet are the most important homeowner choices when searching for gardening information. There have been some studies in Turkey searching information sources used by farmers. One of the earliest studies was conducted in Lower Seyhan Project Area (Ozcatalbas

and Gurgen, 1992) which sought information sources of maize growers. The study found that farmers' own-personal experiences and other farmers were the most important sources of technical information whereas input providers and crop purchasers were the most important sources of economic information. Another study conducted in the same region (Akbay and Yurdakul, 1993) found that pesticides suppliers were the most important source of pest management information. The study conducted by Boz (2002) found that neighbor farmers, and farmers' own family members were the most important source of soil preparation, seeding techniques, pest management, irrigation, fertilizing, and harvesting information among Kahramanmaras maize producers. As farmers convert their production systems and/or become members of farmers' associations or unions, they may tend to change their sources of information. The first case was studied by Demiryurek (2000) and found that hazelnut farmers, who converted their production system from conventional to organic production in the black sea region, changed their information systems which made it possible for them to acquire proper knowledge and skills regarding their new production system. They also used the information sources more frequently and more actively as compared to conventional hazelnut producers. The second case by Demiryurek et al. (2008) compared dairy farmers in terms of being members or non-members of dairy cattle associations, and found that those who are members have more contacts with university researchers, association experts, and medicine suppliers. They also had more access to agricultural manuals, personal computers, and to the Internet.

In order to make more specific generalizations on farmers' sources of information, two studies were conducted by Boz et al. (2004) and Yalcin and Boz (2007), with field cropping farmers in Kahramanmaras province, and with greenhouse vegetable growers in Kumluca District of Antalya province, respectively. Both studies divided farmers' sources of information in two sections such as information acquired from modern sources and information acquired from traditional sources. Modern sources included public extension services, agricultural faculties, farmer unions and associations, input dealers, mass media, and the Internet.

Traditional sources, on the other hand, included information coming from farmers' own-personal experiences, own family members, and neighbor farmers. Results of these two studies showed that dealing with a more capital intensive production facility, greenhouse vegetable growers acquire more information coming from modern sources while field crop producers acquire more information coming from traditional sources. Similar results, especially with the second study, obtained by Akca et al. (2008) who found that farmers operating in Tokat province of Turkey gave more importance to their own-personal experience when making decision on the use of seed, fertilizer, and pesticides. This study found

weak coordination between farmers and other farming information providers such as agricultural faculties, agro-based industries, research institutes, and extension organizations.

Another study yielding similar results was conducted in Iran (Rezvanfar et al., 2007) and found that the most preferred communication sources for farm women related to dairy farming and home management were friends, husbands, and neighbors. These sources of information were followed by radio and television, educated people, extension personnel, opinion leaders, personal experience, and written materials. Gaining adequate insight from the previous work, the current study was designed considering two main sources of information, as modern and traditional sources. The difference with the earlier studies is that the present study used an econometric model to analyze what factors influenced farmers' decision on choosing their sources of information. The specific objectives were:

1. To determine socioeconomic characteristics and information - seeking behaviors of crop producers.
2. To determine where crop producers acquire information for their farming practices.
3. To determine the extent to which selected socioeconomic characteristics and information - seeking behavior influence farmers' decision to select information sources to be used.

MATERIALS AND METHODS

Nine villages from Nurdagi and Islahiye districts of Gaziantep province were selected considering the distance from the district center, agricultural potential, population intensity, and socioeconomic characteristics of the villages. The majority of names and farm sizes of 1780 farmers from these villages were received from Farmers Registration System (FRS). We could not reach the FRS data for some villages; therefore we obtained their farmers' lists conducting preliminary interviews with the headmen of the villages. The total list was the accessible population of the study. Taking farm size as the criteria, and using Yamane (2001)'s stratified sample size determination formula, 169 farmers were drawn as the data collection sample. A questionnaire was developed and validated by panel of experts. Data collection was completed in spring 2008. Descriptive statistics including means and standard deviations were used to achieve the first two objectives of the study. Stepwise linear regression model was used to achieve the third objective of the study (Norusis, 1990). For this purpose, farmers' information sources for eight selected practices were divided in two categories as traditional sources and modern sources. From the data collected, it was analyzed that the rate of each farmer's use of modern information sources took values from 10.0 to 70.0% with a mean of 36.9% and standard deviation of 14.4%. Because the continuous nature of the dependent variable multiple regression analysis was the best model to use. In order to determine the order in which the explanatory variables entered into the model, stepwise entry of the variables was selected. The explanatory variables were socioeconomic characteristics and information-seeking behavior mostly selected from Rogers (1995)' generalizations on diffusion of innovations.

The research hypotheses with socioeconomic characteristics

were that as farmers tend to be younger, have more years of formal education, larger farms, higher income, and become members of cooperatives they are expected to use modern information sources. Hypotheses with information-seeking behaviors, on the other hand, were that as farmers tend to use radio, television, newspaper, the Internet, and have more contacts with agricultural extension service; they are also expected to use modern information sources for their farming practices. With these hypotheses, the regression model used in this study included the following variables:

$$MIS = f (AGE, ED, FS, I, C, R, T, N, INT, EXT)$$

Where: MIS- Modern information source use rate (Continuous variable, took values from 10.0 to 70.0); AGE: Age of respondent (Continuous variable); ED: Formal years of education (Continuous variable, took values from 1 to 9); FS: Farm size (Continuous variable, took values from 8 to 370 decares); I: Income (High income category =1; 0 medium and lower income category); C: Cooperative membership (Member of cooperative =1; 0 not member of cooperative); R: Radio use (Use radio 2 - 3 times a week =1; 0 more seldom); T: Television use (Use television almost every day =1; 0 more seldom); RPM: Reading printed materials (Read printed materials at least once a week =1; 0 more seldom); INT: Use of the Internet (Use the Internet at least once a month =1; 0 more seldom); EXT: Contacts with extension services (Have contacts at least once a month =1; 0 more seldom).

The dummy codes were created considering the frequency distribution of the responses and results were presented in Table 1. Income levels of respondents were asked as low, medium, and high income levels. This was because of the difficulties of receiving exact amount of income information in Liras.

RESULTS

Objective one of the study was to describe socioeconomic characteristics and information - seeking behavior of crop producers. To accomplish this objective the selected socioeconomic variables were age of farmers, formal years of education, farm size, income level, and cooperative membership; information-seeking behavior variables were use of radio, use of television, reading printed materials, use of the Internet, and contacts with agricultural extension service. Findings related to socioeconomic characteristics showed that 54% of the respondents were younger than 47 years of age, which was calculated as the average age of the respondents. The mean value for formal year of education was 4.48 while the mean value for farm size was 67.85 decares. Twenty-seven percent of the respondents fell in the high income category while 31% were member of cooperatives.

In terms of information - seeking behavior, 66% of the respondents listened to radio 2 - 3 times a week; 82% watched television almost every day; 31% read printed materials at least once a week; 27% used the Internet at least once a month; and 34% had contacts with agricultural extension personnel at least once a month (Table 1). Objective two of the study was to determine the information sources of six selected farming practices and two selected economic subjects applied by crop producers.

Table 1. Definition of socioeconomic characteristics and Information-seeking behavior of crop producers.

Socioeconomic characteristics	Variable name	Mean	Std. Dev.
Age	AGE		
Continuous variable		47.36	15.60
Younger than 47 = 1; 0 otherwise		0.54	0.50
Formal year of education	ED		
Continuous variable		4.48	1.86
Farm size	FS		
Continuous variable		67.85	37.15
Income	I		
High income = 1; 0 otherwise		0.27	0.45
Cooperative membership	C		
Member of cooperative = 1; 0 otherwise		0.31	0.46
Information-seeking Behavior			
Use of Radio	R		
2 - 3 times a week =1; 0 more seldom		0.66	0.47
Use of television	T		
Almost every day = 1; 0 more seldom		0.82	0.39
Reading printed materials	RPM		
At least once a week = 1; 0 more seldom		0.31	0.46
Use of the Internet	INT		
At least once a month = 1; 0 more seldom		0.27	0.44
Contacts with extension and other agricultural professionals	EXT		
At least once a month = 1; 0 more seldom		0.34	0.47

Farming practices were soil operations, seed selection and seeding techniques, fertilizers and fertilizing, pest management, irrigation, and harvesting and storing. Economic subjects were input prices and product marketing. Results showed that the majority of crop producers preferred traditional sources when seeking information about five selected farming practices and two selected economic subjects. The only farming practice for which respondents preferred modern information sources was pest management (67.46%). Of the six farming practices irrigation had the highest ratio in terms of using traditional sources (73.97%). This was followed by soil operations (68.64%), harvesting and storing (65.08%), seed selection and seeding techniques (57.98%) and fertilizers and fertilizing (56.21%). In terms of two selected economic subjects, respondents also preferred traditional sources of information. Their ratios were 58.58% in product marketing and 53.85% in input selection (Table 2). The most preferred traditional sources of information were own-personal experiences in soil operations, seed selection and seeding techniques, fertilizers and fertilizing, pest management, irrigation, and harvesting and storing; and neighbor farmers in input selection and product marketing. The most preferred modern

source of information was extension service in soil operations, seed providers in seed selection and seeding techniques, fertilizer providers in fertilizers and fertilizing, irrigation associations in irrigation, product purchasers in harvesting and storing, input providers in input selection, and crop purchasers in product marketing.

The second preferred traditional sources of information were own family members in soil operations, fertilizers and fertilizing, pest management, and irrigation; neighbor farmers in seed selection and seeding techniques, and harvesting and storing; and own-personal experience in input selection and product marketing. The second preferred modern sources of information were seed providers in soil operations; extension service in seed selection and seeding techniques, fertilizers and fertilizing, pest management, irrigation, and harvesting and storing. The second preferred modern information source for economic subjects was mass media. The third Objective of the study was to determine the extent to which selected socioeconomic characteristics and information-seeking behavior influenced farmers' decisions to select their information sources for farming practices and economic subjects. Stepwise regression procedure was used to accomplish this objective (Table 3). The dependent

Table 2. Information sources used by crop producers.

Farming practices and sources of information		Number	%	Total	%
Soil operations					
Traditional sources	Own-personal experience	71	42.02	116	68.64
	Own family members	24	14.20		
	Neighbor farmers	21	12.42		
Modern sources	Extension service	31	18.34	53	31.36
	Seed provider	22	13.02		
Seed selection and seeding techniques					
Traditional sources	Own-personal experience	36	21.30	98	57.98
	Neighbor farmers	30	17.75		
	Own family members	32	18.93		
Modern sources	Seed provider	37	21.89	71	42.01
	Extension service	31	18.34		
	Mass media	3	1.78		
Fertilizers and fertilizing					
Traditional sources	Own-personal experience	48	28.40	95	56.21
	Own family members	34	20.12		
	Neighbor farmers	13	7.69		
Modern sources	Fertilizer provider	60	35.50	74	43.79
	Extension service	14	8.28		
Pest management					
Traditional sources	Own-personal experience	25	14.79	55	32.54
	Own family members	18	10.65		
	Neighbor farmers	12	7.10		
Modern sources	Pesticides providers	80	47.34	114	67.46
	Extension service	28	16.56		
	Mass media	6	3.55		
Irrigation					
Traditional sources	Own-personal experience	56	33.14	125	73.97
	Own family members	35	20.71		
	Neighbor farmers	34	20.12		
Modern sources	Irrigation association	37	21.89	44	26.03
	Extension service	7	4.14		
Harvesting-storing					
Traditional sources	Own-personal experience	52	30.77	110	65.08
	Neighbor farmers	38	22.48		
	Own family members	20	11.83		
Modern sources	Product purchaser	37	21.89	59	34.92
	Extension service	17	10.06		
	Mass media	5	2.97		

Table 2. Cont'd

Input selection					
Traditional sources	Neighbor farmers	39	23.08	91	53.85
	Own-personal experience	28	16.57		
	Own family members	24	14.20		
Modern sources	Input providers	40	23.67	78	46.15
	Mass media	20	11.83		
	Extension service	18	10.65		
Product marketing					
Traditional sources	Neighbor farmers	45	26.63	99	58.58
	Own-personal experience	36	21.30		
	Own family members	18	10.65		
Modern sources	Crop purchasers	53	31.36	70	41.42
	Mass media	10	5.92		
	Extension service	7	4.14		

Table 3. Multiple regression analysis of factors influencing farmers' use of modern information sources¹.

Source of variation	Sum of squares	Degrees of freedom	Mean square	F - ratio	P - value	
Regression	11054.670	4	2763.667	18.928	≤0.01	
Residual	23945.330	164	146.008			
Total	35000.000	168				
Variables in the equation						
Variables	R ² cumulative	R ² change	F change	P change	Beta	
Contacts with extension or other agricultural professionals (EXT)	0.178	0.178	36.211	0.000	0.292	
Reading printed materials (RPM)	0.259	0.081	18.097	0.000	0.286	
Education level (ED)	0.291	0.032	7.556	0.007	0.188	
Use of the Internet (INT)	0.316	0.024	5.853	0.017	0.157	
Variables not in the equation						
Variables	Beta	t	Sig-t			
Farm size (FS)	0.084	1.256	0.211			
Age of respondents (AGE)	-0.124	-1.694	0.092			
Income level (I)	-0.059	-0.883	0.379			
Cooperative membership (C)	0.112	1.644	0.102			
Use of radio (R)	0.128	1.965	0.051			
Use of television (T)	0.081	1.195	0.234			

¹Dependent variable was continuous and took values from 10.0 to 70.0. Of the independent variables AGE, ED, and FS were entered into the model as continuous variables; the rest were entered as dummies as described in Table 1.

variable was the overall rate of each farmer's use of modern information sources for all of the 6 farming practices and 2 economic subjects included in this study. Five socioeconomic characteristics and 5 information-seeking behavior variables were the independent variables. Of these variables age of farmers, formal year of education, and farm size were entered the model as continuous variables while the rest were treated as dummies as was defined in Table 1. The model was

significant at 0.01 level of probability and all significant variables had the expected signs. One socioeconomic characteristic and three information-seeking behavior variables entered the model at 0.05 level of probability or better. The significant socioeconomic characteristic was formal year of education while significant communication behavior variables were contacts with extension service, reading printed materials, and use of the Internet. The first variable that entered the model was contacts with

extension service. This variable alone explained 17.8% of the variance in the model. Three additional variables explained a total of 13.7% variance in the model. These were formal year of education, reading printed materials, and use of the Internet. The four variables entered into the model explained a total of 31.6% variance. This finding verifies that as farmers tend to have more contacts with extension service, have more years of formal education, read printed materials and use the Internet more, they more likely prefer modern sources of information for the farming practices and economic subjects. The variables, which didn't enter the model, were farm size, age of respondents, income level, cooperative membership, use of radio, and use of television. This finding shows that all of these 6 variables have no influence on farmers' use of modern information sources for farming practices and economic subjects covered by this study.

Conclusions

It can be concluded from the findings of this study that crop producers among Gaziantep farmers use traditional information sources more than modern sources. The rate of using modern information sources for soil operations, seed selection and seeding techniques, fertilizing, pest management, irrigation, harvesting-storing, input selection, and product marketing was 36.9%. The same rate for similar practices was 35% in Ozcatalbas and Gurgun (1992)'s study which was conducted in South-eastern Anatolian project area, and 32% in Boz (2002)'s study which was conducted in Kahramanmaraş province. Even farmers' preferences of information sources may differ from region to region where socioeconomic characteristics and information-seeking behavior of farmers show variation, we must accept that there was no major gaps among the above studies. This may be due to socioeconomic and socio-cultural similarities in the regions where the studies were conducted.

The rates of usage of extension service and mass media were lower as compared to other modern sources. For each of the farming practices the immediate source of information was directly related to subject matter. For example, the most used modern information source was seed providers for seed selection and seeding techniques, fertilizer providers for fertilizers and fertilizing, and pesticides providers for pest management practice. This means that most of the farmers prefer information sources which is directly related to their farming practices. They may believe that these sources employ more qualified experts who can find better solutions to their problems. The only socioeconomic characteristic entered in the model was education, indicating that it has an influence on farmer's decision to use modern information sources for farming practices and economic decisions. Thus, increasing educational level of farmers should be an aim of public educational institutions. Three significant

information-seeking behavior variables were contacts with extension service, reading printed materials, and using the Internet. This findings are supported by Rogers (1995)' generalizations which indicate that as individuals have more contacts with extension services, make more use of mass media channels, and learn about most new ideas from these channels, they tend to be early adopters of innovations. Thus, it can be concluded that if farmers have more contacts with extension personnel, read printed materials such as newspapers, magazines, brochures, etc., and use the Internet, they are likely more innovative farmers, and this characteristic makes it possible for them to benefit from innovative technologies. Because crop producers in the research area receive more information coming from traditional sources, in order to provide farmers with modern information, research programs and extension programs must complement each other. Especially, public organizations such as Ministry of Agriculture and Rural Affairs and universities should make an effort for sustainable extension which is assumed to be a main contributor to sustainable rural development (Talug et al., 2004). Extension education programs should focus on farmers, especially those extensively using traditional information sources and have weak linkages with the society.

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