

Influence of Subjective Norms and Communication Preferences on Grain Farmers' Attitudes toward Organic and Non-Organic Farming

Kelsey Hall and Emily Rhoades

Abstract

Interpersonal communication and mass media can influence an individual's attitude or behavior. International and American studies have shown that interpersonal contacts have influenced farmers' decisions to adopt or not adopt organic farming while other studies have revealed the communication preferences can differ between organic and non-organic farmers. This study was unique as it combined components of the theory of planned behavior and diffusion of innovations to describe the role subjective norms and communication channels have on forming attitudes toward organic and non-organic farming by non-organic Midwestern grain farmers. Data were collected through a questionnaire sent to 320 members of the Ohio Corn Growers Association or the Ohio Wheat Growers Association. Respondents cared about the opinions of their subjective norms but did not feel pressure from these subjective norms to adopt organic farming. Ohio grain farmers in this study also indicated the importance of communication channels for influencing their decisions to adopt or not adopt farming practices. Interpersonal communication channels (demonstrations, other farmers, meetings, workshops, suppliers, Extension agents) were the most important. The researchers suggested that agricultural communicators and commodity organizations consider the purpose of their messages and select the most appropriate source for delivery. Recommendations were made for further research and teaching by agricultural communication faculty.

Introduction

Once considered a niche market sold in limited retail locations, organic food products are available in natural food supermarkets, farmers markets, club stores, and conventional supermarkets across the country. The United States reached \$1.7 billion in sales of organic food products, and Ohio reported \$25.6 million in organic product sales (United States Department of Agriculture, 2009). However, supply and demand are an issue since the organic agriculture industry has experienced a 20% increase in demand for raw materials each year, and farmers have increased supply of organic raw materials, especially soybeans and grains, by roughly 1% annually (Villagran, 2008).

Given the supply and demand issue for organic foods, it would be valuable to understand how communication channels influence non-organic farmers when forming attitudes, so communicators and educators will be better able to inform them of new farming practices. Previous studies have explored the types of interpersonal contacts that influenced farmers' decisions to adopt or not adopt organic farming (Darnhofer, Schneeberger, & Freyer, 2005; Midmore, Padel, McCalman, Isherwood,

Fowler, & Lampkin, 2001; Schneeberger, Darnhofer, & Eder, 2002). Other studies have revealed farmers' preference of communication channels when wanting information about organic and non-organic farming practices (Duram, 1999; Egri, 1999). Although these studies concentrated on either interpersonal contacts or communication sources used, there has not been a study that combined both areas to comprehensively describe how they play a role in determining attitudes toward organic and non-organic farming.

Theoretical Framework

This study applies concepts from the theory of planned behavior and diffusion of innovations. Ajzen (n.d.) developed the theory of planned behavior as a way to understand and predict individuals' behaviors that are involuntary (see Figure 1). One direct variable for determining an individual's intention to perform a behavior is subjective norms (Ajzen & Fishbein, 1980). Subjective norms apply social pressure on an individual to perform or not perform a specific behavior. When subjective norms were combined with an individual's attitude toward a behavior and their perceived behavioral control, the three components could help determine an individual's intention to perform the behavior. An individual's probability of engaging or not engaging in a behavior could derive from what important people or groups think the individual should do (Ajzen, n.d.). People who may exert this social pressure (intentionally or unintentionally) include a spouse, friends, peer groups, family, co-workers, community leaders, or celebrities. Normative beliefs, an indirect measure of an individual's subjective norms, are an individual's opinion of what other people or groups think the individual should do. Motivation to comply, an indirect measure of normative beliefs, measures how much someone cares what opinion leaders think should be done about the behavior.

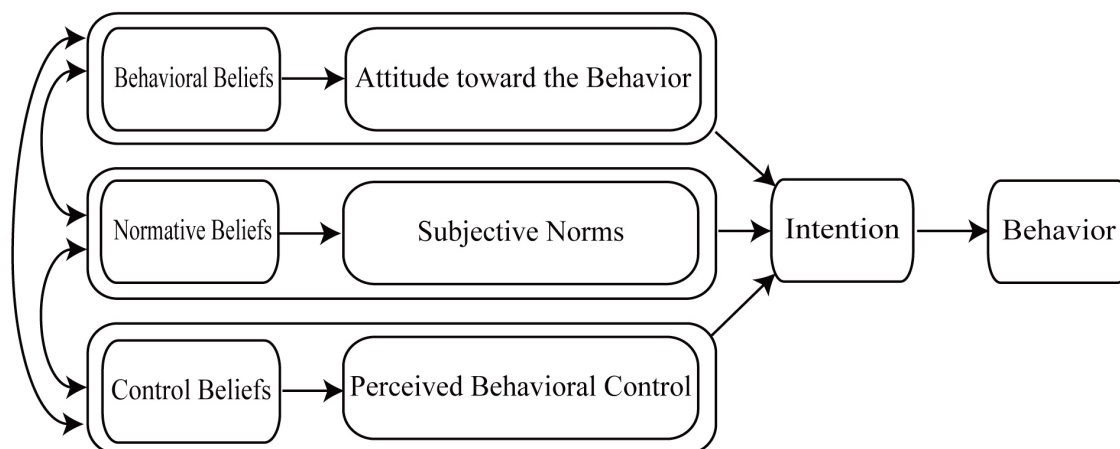


Figure 1. The Theory of Planned Behavior. (Ajzen, n.d.)

Diffusion of Innovations

Much research on mass media and interpersonal communication influence has derived from the theory of diffusion of innovations (Lavergne, 2004; Parra-Lopez, De-Haro-Giménez, & Calatrava-Requena, 2007; Rogers, 1995). Diffusion is a communication process by which communication channels deliver information concerning new innovations to one or several individuals. Communication channels have different roles in bringing knowledge and persuading individuals to change their attitude toward adopting an innovation, such as organic farming (Rogers, 1995). Communication channels could be classified as either mass media or interpersonal. Mass media deliver messages by using a “mass medium” like newspapers, magazines, radio, or television. Mass media channels could increase knowledge by disseminating information to large audiences, which could then change weakly held attitudes and behaviors (Bryant & Thompson, 2002; Rogers, 1995). However, interpersonal channels are more effective in changing strongly held attitudes (Rogers, 1995). Fellow farmers, Extension agents, salesmen, and family members are examples of these interpersonal channels. According to Rogers (1995), diffusion studies indicated that scientific reports were less relevant than subjective reports from individuals who have already adopted innovations when individuals were deciding to adopt or not adopt new innovations. When individuals shared personal and social characteristics, the exchange of information would have a greater effect in gaining knowledge, developing an attitude, and changing an attitude or behavior.

Factors Influencing Adoption of Organic Farming Practices

In considering the components of the theory of planned behavior, research has been done on the subjective norms that influenced farmers to adopt or not adopt organic farming practices. Darnhofer et al. (2005) reported that agriculture organizations were social influencers that motivated Austrian farmers’ choice between organic and non-organic farming. Regarding organizational communication, farmers considering organic practices voiced criticism against the regulations and vague contract information imposed by agri-environmental programs and organic farmer associations. Organic farmers thought the information was insufficient, and the associations lacked the ability to keep them informed with up-to-date standards and regulations. Another study addressed the subjective norms that motivated Austrian cash-crop producers’ decisions to move toward organic practices (Schneeberger et al., 2002). Respondents were more concerned with resistance to organic farming within their families, more so than with friends.

Considering less studied social influencers, Midmore et al. (2001) designed a study to determine farmers’ attitudes toward organic farming and to explore what perceptual barriers to organic conversion existed. In this study, the spouse was one of the most important social influencers with respect to the decision to convert.

Communication Influence

While some research concentrated on subjective norms, other studies focused on communication sources organic and non-organic farmers used to learn about their production methods (Duram, 1999; Egri, 1999). Egri (1999) reported that preference for different communication sources helped explain strong differences in attitudes among organic and non-organic farmers in Canada. Roughly 32% of conventional farmers and 36% of organic farmers used television and radio as information sources. Conventional farmers in the study were dependent on government sources, whether through publications (79%), education courses (45.9%), or local Extension agents (78% reported at least

occasional contact). Only 43% of organic farmers referred to government publications, while 27% attended government education courses, and 45% had contact with agricultural Extension agents. Contractors and industrial suppliers of agricultural products and equipment were also major sources of information (61%) for conventional farmers. In contrast, organic farmers (17%) were less likely than conventional farmers to identify contractors or suppliers as sources.

Conventional farmers rarely searched for alternative agriculture information sources (either interpersonal or media). This study's finding demonstrated that conventional farmers' access sources that support and confirm pre-existing practices and biases (Egri, 1999). Conventional farmers paid less attention to sources that challenged conventional practices such as using synthetic agrichemicals.

The Canadian organic farmers in Egri's study (1999) referred to similar information sources as organic farmers in Colorado (Duram, 1999). Almost all of the organic farmers studied in Colorado (96%) said they frequently read various books and magazines, but only 14% primarily read traditional farm publications. Other sources of information included soil science and environmental books.

In contrast to previous studies, Colorado organic farmers did not find traditional sources such as university agricultural research and Extension offices as helpful (Duram, 1999). Many respondents thought more universities should switch research directions to sustainable agriculture. These organic farmers did not consider the land-grant universities' ideas about cutting back on chemicals as truly organic and thought land-grant universities misled conventional farmers.

In a study using diffusion of innovations, researchers discovered the sources of information olive farmers in southern Spain used during the adoption process (Parra-Lopez, De-Haro-Giménez, & Calatrava-Requena, 2007). The study considered attendance at courses/conferences, talks with Extension professionals, membership in agricultural and non-agricultural organizations, books, and trips as sources of information. Findings reported that olive farmers in areas where organic farming was adopted had limited contact with agricultural Extension agents, did not attend courses/conferences, and did not read books. Contact with other farmers and local organic agricultural organizations were more valuable sources for these producers.

Purpose and Objectives

The purpose of this study was to explore and describe the social influencers of Ohio grain farmers' attitudes toward adopting organic farming by applying constructs from the theory of planned behavior and diffusion of innovation. By understanding farmers' influencers, commodity groups, communicators, and educators will have a better understanding of what channels to use when sharing new farming practices with farmers. The following objectives were developed to address this purpose:

- 1) To describe the demographic characteristics of Ohio grain farmers.
- 2) To explain the subjective norms that influence Ohio grain farmers' attitudes toward adopting organic farming.
- 3) To determine the importance of communication channels for influencing Ohio grain farmers' decisions to adopt or not adopt farming practices.
- 4) To describe the communication channels that relate to Ohio grain farmers' attitudes toward organic and non-organic farming.

Method

A random sample of 320 farmers out of a population of 1,907 was selected from the membership lists of the Ohio Corn Growers Association and Ohio Wheat Growers Association. These associations are significant to Ohio since the state was ranked 8th in corn production and 9th in winter wheat production nationally in 2005 (Ohio Office of U.S. Department of Agriculture's National Agricultural Statistics Service, 2005). Ohio was also ranked 6th for certified organic corn acreage and 16th for certified organic wheat acreage in 2005 (Greene, 2006).

The researchers developed a 29-item questionnaire that was adapted from previous studies (Egri, 1999; Fairweather, Campbell, Tomlinson, & Cook, 2001; Midmore et al., 2001; Niemeyer & Lombard, 2003; Schneeberger et al., 2002). Seven subjective norm items were directly measured on a 7-point Likert scale ranging from strongly disagree (1) to strongly agree (7). Respondents indicated their level of agreement or disagreement with six normative belief strength statements on a 7-point Likert scale (1=strongly disagree to 7=strongly agree). Motivation to comply, a component of normative beliefs, was measured using seven items on a 7-point Likert scale ranging from not at all to very much. There were 22 items measuring the importance of communication channels on a 5-point scale (1=not very important to 5=very important). After a panel of experts reviewed the questionnaire items to establish validity, the questionnaire was pilot tested by each association's board members. The researchers reported a Cronbach's alpha of .89 for the subjective norms scale. An alpha of .70 was calculated for the normative beliefs scale. For the motivation to comply scale, an alpha of .88 was calculated. The communication influence scale had an alpha of .94.

The researcher implemented survey procedures as described by Dillman's Tailored Design Method (Dillman, 2007). A total of 243 surveys out of 320 were returned for a response rate of 76%. The researcher handled non-response to the survey by comparing early to late respondents. No significant differences were found.

Results

Objective 1: To describe the demographic characteristics of Ohio grain farmers.

All respondents indicated that they farmed using non-organic methods. The majority of respondents ($n = 156$, 76.1%) indicated that they have never even considered organic production on their farms, while 42 respondents (20.5%) have considered organic production and did not adopt. The respondents were unevenly distributed by gender, with 98.5% ($n = 202$) male and 1.5% ($n = 3$) female. Respondents' age was also unevenly distributed with a slight majority, 28.9% ($n = 59$), older than 62 years; followed by 24% ($n = 49$) ranging in age from 52-56; 16.2% ($n = 33$) ranging from 47-51; and 12.3% ($n = 25$) ranging from 57-61. Eighteen (8.8%) respondents ranged in age from 42-46, and 10 respondents (4.9%) ranged in age from 37-41. Only 4.9% ($n = 10$) reported being 36 years or younger.

The majority, 55.9% ($n = 114$), earned a high school education, followed by 26.5% ($n = 54$) with a bachelor's degree, 11.8% ($n = 24$) with an associate's degree, and 5.4% ($n = 11$) with a master's degree. Only one individual obtained less than a high school education. The majority of bachelor's degree or graduate degree programs completed were in agricultural business and economics, agricultural education, agronomy, animal science, dairy science, or agricultural production.

Farming was the main occupation for 170 of the respondents (82.9%), while 35 respondents (17.1%) held other occupations off the farm. Roughly, 89% ($n = 183$) of the respondents had at least one of their parents who farmed.

Objective 2: To explain the subjective norms that influence Ohio grain farmers' attitudes toward adopting organic farming

The overall mean for subjective norms was 2.06 ($n = 198$, $SD = 1.03$). As seen in Table 1, Ohio grain farmers did not feel under pressure from farming neighbors to continue farming using non-organic methods ($M = 2.61$, $n = 196$, $SD = 1.68$), and indicated little pressure from consumers to adopt organic farming ($M = 2.47$, $n = 194$, $SD = 1.48$). Ohio grain farmers had the strongest disagreement with the statement, "I feel under pressure from members in my agricultural organizations to adopt organic farming," ($M = 1.74$, $n = 196$, $SD = 1.18$).

Table 1
Mean for Subjective Norms (7 Items)

Subjective Norm	n	Mean	SD
I feel under pressure from other farming neighbors to continue farming using non-organic methods.	196	2.61	1.68
I feel under pressure from consumers to adopt organic farming.	194	2.47	1.48
I feel under pressure from non-farming neighbors to adopt organic farming.	196	2.09	1.38
I feel under pressure from family to adopt organic farming.	129	1.84	1.18
I feel under pressure from county extension agents to adopt organic farming.	197	1.79	1.18
I feel under pressure from friends to adopt organic farming.	193	1.79	1.20
I feel under pressure from members in my agricultural organizations to adopt organic farming.	196	1.74	1.18
Overall Mean	198	2.06	1.03

Note. Scores based on Likert scale with 1 = strongly disagree and 7 = strongly agree.

Normative belief strength items measured subjective norms indirectly. Respondents indicated their level of agreement or disagreement with normative belief strength statements on a 7-point Likert-type scale. A low mean (1-3) was interpreted as disagreement with items, while a high mean (5-7) was interpreted as agreement. The overall mean for normative belief strength was 3.33 ($n = 204$, $SD = .79$) (see Table 2). Farmers in this study reported a mean of 4.53 ($n = 199$, $SD = 1.60$) for their agreement with the statement, "My county extension agent thinks that I should not adopt organic farming." Respondents agreed that friends ($M = 4.42$, $n = 203$, $SD = 1.88$) and neighboring farmers ($M = 4.04$, $n = 201$, $SD = 1.94$) thought that they should not adopt organic farming. It was strongly disagreed that family members thought respondents should adopt organic farming ($M = 1.93$, $n = 203$, $SD = 1.27$).

Motivation to comply, an indirect measure of normative beliefs, was measured using seven items on a 7-point Likert-type scale ranging from not at all to very much. Motivations to comply indicate how much the respondents care about the opinions of specific individuals. The overall mean for motivation to comply was 3.32 ($n = 200$, $SD = 1.33$). As seen in Table 3, respondents indicated that they care most for their family's opinions ($M = 4.41$, $n = 198$, $SD = 1.94$), followed by consumer opinions ($M = 3.89$, $n = 195$, $SD = 1.78$). Respondents indicated a mean of 3.26 ($n = 195$, $SD = 1.80$) in regards to how much they care about the opinions of members of their agricultural organizations.

Table 2
Mean for Normative Belief Strength (6 items)

Normative Belief Strength	n	Mean	SD
My county extension agent thinks that I should not adopt organic farming.	199	4.53	1.60
My friends think that I should not adopt organic farming.	203	4.42	1.88
Neighboring farmers think that I should not adopt organic farming.	201	4.04	1.94
My non-farming neighbors think that I should adopt organic farming.	199	2.84	1.50
The employees at the elevator where I sell my grain think that I should adopt organic farming.	200	2.31	1.45
My family members think that I should adopt organic farming.	203	1.93	1.27
Overall Mean	204	3.33	.79

Note. Scores based on Likert scale with 1 = strongly disagree and 7 = strongly agree.

Table 3
Mean for Motivation to Comply (7 Items)

Motivation to Comply	n	Mean	SD
How much do you care what your family thinks you should do?	198	4.41	1.94
How much do you care what consumers think you should do?	195	3.89	1.78
How much do you care what members in your agricultural organizations think you should do?	195	3.26	1.80
How much do you care what your friends think you should do?	198	2.99	1.67
How much do you care what county extension agents think you should do?	197	2.98	1.76
How much do you care what other farming neighbors think you should do?	194	2.93	1.64
How much do you care what non-farming neighbors think you should do?	189	2.63	1.56
Overall Mean	200	3.32	1.33

Note. Scores based on Likert scale with 1 = not at all and 7 = very much.

Objective 3: To determine the importance of communication channels for influencing Ohio grain farmers' decisions to adopt or not adopt farming practices.

Ohio grain farmers reported the importance of communication channels for influencing their decision to adopt or not adopt farming practices. There were 22 items on a 5-point scale ranging from not very important to very important. The overall mean for communication channels was 2.89 ($n = 203$, $SD = 0.69$), which indicates that mass media and interpersonal communication channels were not important influencers in the decision process.

Demonstrations/field days were considered the most important communication channel with a mean of 3.68 ($n = 199$, $SD = 1.00$), followed by talks with other farmers ($M = 3.59$, $n = 198$, $SD = 0.89$), farming publications ($M = 3.45$, $n = 201$, $SD = 0.94$), and meetings ($M = 3.40$, $n = 201$, $SD = 0.99$) (see Table 4). The least important communication channels were government agency publications ($M = 2.78$, $n = 200$, $SD = 1.08$), newspapers ($M = 2.29$, $n = 202$, $SD = 1.04$), radio ($M = 2.24$, $n = 199$, $SD = 0.98$), and television ($M = 2.18$, $n = 203$, $SD = 1.03$).

Table 4
Mean for Importance of Communication Channels (22 Items)

Communication Channel	n	Mean	SD
Demonstrations/Field Days	199	3.68	1.00
Talks with Farmers	198	3.59	0.89
Farming Publications	201	3.45	0.94
Meetings	201	3.40	0.99
Workshops	201	3.27	1.11
Talks with Suppliers	202	3.17	1.04
Newsletters	200	3.12	1.12
Talks with Extension Agents	198	3.04	1.09
Talks with Family Friends	203	2.96	1.04
Contact with Statewide Commodity Organizations	199	2.88	1.01
Contact National Commodity Organizations	202	2.87	0.99
Books	202	2.86	1.06
Internet	200	2.82	1.20
Talks with University Professors	202	2.79	1.11
Government Agency Publications	200	2.78	1.08
Data Transmission Network	198	2.69	1.20
Contact with Environmental Organizations	200	2.37	1.01
Newspapers	202	2.29	1.04
Radio	199	2.24	0.98
Television	203	2.18	1.03
Talks with Non-Farming Neighbors	201	2.12	0.95
Overall Mean	203	2.89	0.69

Note. Scores based on Likert scale with 1 = not very important and 5 = very important.

Objective 4: To describe the communication channels that relate to Ohio grain farmers' attitudes toward organic and non-organic farming.

Further data analysis explored the relationship between communication channels and attitude. A Spearman's rho showed a relationship between attitude toward organic farming and specific channels of communication. At the .05 level, a Spearman's rho showed a low significant relationship between attitude toward organic farming and radio ($r = .152$). There is a significant, yet low, relationship at the .01 level between attitude toward organic farming and talks with non-farming neighbors ($r = .197$), talks with university professors ($r = .192$), and contact with environmental organizations ($r = .190$). There was a low and negative relationship ($r = -.143$) between attitude toward non-organic farming and books at the .05 level of significance.

Conclusions

Past research has indicated that Austrian cash-crop producers were concerned with the opinions of family members more than friends, regarding their resistance to adopting organic farming (Schneeberger et al., 2002). This study also provides insight into the subjective norms that influence Ohio grain farmers to adopt or not adopt organic farming practices. Ohio grain farmers did not feel under pressure from family, friends, county Extension agents, members of agricultural organizations, consumers, farming neighbors, non-farming neighbors, and employees at grain elevators to adopt organic farming practices. Family members might not pressure respondents to adopt organic farming if they are satisfied with using non-organic farming practices, or these individuals are not interested or knowledgeable in organic farming. Findings about these subjective norms in this study could be explained by the sources that Ohio grain farmers consider important. Farming neighbors and suppliers who were considered important sources of information regarding the adoption or non-adoption of farming practices might not have interest or knowledge in organic farming. Organic farming can have higher production costs because of labor, specialized equipment, non-synthetic chemicals, organic seed, fertilizer, storage, and transportation (Oberholtzer, Dimitri, & Greene, 2005). If these farmers would be responsible for these additional expenses, they might not care about the opinions of individuals who do not provide monetary assistance, such as non-farming and farming neighbors, and elevator employees. Hence, Ohio grain farmers might not feel pressure from them to adopt organic farming practices. Furthermore, Ohio grain farmers did not view contact with national or statewide commodity organizations, non-farming neighbors, and family friends as important sources of information related to organic farming. Pressure from these subjective norms to adopt organic farming might be irrelevant since Ohio grain farmers did not view them as important. This finding does not mean respondents are wasting their time talking to members or staff of commodity organizations. While statewide and national commodity organizations can provide information, they might not currently discuss the adoption of new farming practices, and thus farmers do not see them as a source for this specific type of information.

The analysis of communication channels used indicated that Ohio grain farmers referred to many of the same sources of information mentioned in previous studies, such as radio, television, books, farm publications, Extension agents, farmers, educational workshops, and demonstrations/field days (Duram, 1999; Egri, 1999). While 32% of conventional farmers in Canada used television and radio as information sources, Ohio grain farmers did not consider radio and television as important as other sources of information. Mainstream television and radio stations in the United States might have fewer programs targeting farmers.

According to Duram (1999), Colorado organic farmers referred to books and farm publications rather than university agricultural research and Extension services. Very few (14%) of the Colorado organic farmers read farm publications. This was not the case with non-organic farmers' communication sources in this study. While Ohio grain farmers in this study viewed books as an unimportant source of information, farming publications were referred to when considering the adoption or non-adoption of farming practices. The higher importance placed on farming publications could be attributed to the non-organic topics covered in these publications. As noted earlier, non-organic farmers in Canada referred to communication sources that supported and confirmed their pre-existing practices and biases (Egri, 1999). This same concept could be applied to Ohio grain farmers.

Canadian non-organic farmers also considered government agency publications as an important source of information. Findings in this study did not concur. This study found that government agency publications were not important sources that influence decisions to adopt or not adopt farming practices. This finding could be due to the increasing incidence of government agencies that disseminate their reports on the Internet. Some farmers might have difficulty in searching for documents on government agency Web sites and downloading documents. Ohio grain farmers might also be unaware of government research on farming practices, and hence they would not seek information from this source. On the other hand, it could be argued that Ohio grain farmers do not use the Internet since, as indicated in this study, they consider it an unimportant source of information.

The finding that respondents did not consider the Internet as an important source of information might be supported by the fact that the majority of respondents were 62 years old or older. According to Fox (2004) with the Pew Internet & American Life Project, access to the Internet was available to only 22% of Americans older than 65. These farmers might be less familiar with search engines, media sites, and government or agribusiness Web sites that publish information. Others might question the truthfulness of information from the Internet since individuals, businesses, and government agencies can easily publish documents, audio, and video based on their own agendas. Web-based information might also be difficult to access for some Ohio grain farmers due to the availability of dial-up or broadband services in rural, Appalachian areas of the state. Other studies have also reported that computer technology is traditionally not preferred for delivering agricultural information (Maddox, Mustian, & Jenkins, 2003; Wood-Turley & Tucker, 2002). Agricultural producers in North Carolina ($n = 707$) preferred personal communication channels (62%) and printed materials (23%) when looking for agricultural information (Maddox et al., 2003). Computer based (6%) and electronic communication (2%) sources were least preferred. In a readership study exploring preference for agricultural media sources in Ohio, fewer than 25% of respondents reported a preference for electronic information (Wood-Turley & Tucker, 2002). While the Internet has seen wider adoption since these studies, it appears Ohio grain farmers still agree with the findings.

Canadian non-organic farmers depended on government sources, such as educational courses. Ohio grain farmers also considered demonstrations/field days, and workshops as important sources of information. This could be due to the numerous demonstrations that the Ohio Agricultural Research and Development Center (OARDC) and Extension services host throughout the state.

Non-organic Canadian and Ohio farmers also found talks with Extension agents as an important source of information. Ohio farmers might think Extension agents are important sources of information since the purpose of Extension is to interpret the research provided by OARDC and the land-grant university so Ohio farmers can use it. However, it was surprising that Ohio grain farmers did not care what their county Extension agents thought should be done on their farms. This finding

could be explained by the fact that Ohio grain farmers trust their Extension agents to provide them with farming information, but do not feel pressured to adopt their recommendations.

Research on communication sources used by conventional Canadian farmers indicated that contractors and industrial suppliers of agricultural products and equipment were also major sources of information (Egri, 1999). Similarly, this study found that talks with suppliers of agricultural products were important sources for Ohio grain farmers. This might indicate that non-organic farmers develop trust and loyalty with the individuals who sell seed, fertilizers, and equipment. If these farmers are willing to purchase products from suppliers, they then might consult them about farming practices.

Communication channels can influence the formation of attitude toward organic farming. The relationship between contact with environmental organizations and attitude toward organic farming was supported by previous research that showed organic farmers considered environmental organizations as important sources of information (Egri, 1999). Contact with environmental organizations could help form an attitude toward organic farming. Interpersonal communication sources deliver information that could help form attitudes and change behavior (Rogers, 1995). Therefore, interpersonal contact might explain why talks with non-farming neighbors ($r = .197$) and talks with university professors ($r = .180$) had low, yet positive relationships with respondents' attitude toward organic farming at the .05 level.

The researcher also reported the Spearman's rho between each communication channel and attitude toward non-organic farming. Books had a significant, but low and negative, correlation ($r = -.143$) with respondents' attitudes toward non-organic farming. Rogers (1995) wrote that mass media channels were used for gaining information and understanding about innovations. Books as a source for deciding whether to adopt or not adopt farming practices could influence respondents' attitudes toward non-organic farming.

Recommendations

The findings of this study must be taken as is, as they are not generalizable outside of the associations. However, they do offer insight into how Ohio farmers are gaining information and forming attitudes. This study could set a ground work for similar studies in other areas of the United States. Agricultural communication researchers should explore mass media and interpersonal communication sources that influence the decisions of adopting farming practices by other commodity organizations. Focus group research with members from different commodity organizations could help develop a list of communication sources for future informational campaigns. Furthermore, the focus group participants could indicate whether interpersonal communication or mass media channels are preferred for different types of information. Knowledge of the role of interpersonal communication and mass media channels would assist agricultural communication faculty and Extension educators in disseminating news, as farmers receive information through a variety of channels any given day. Further research exploring the influences of Extension agents might also be helpful for those agents charged with helping farmers adopt new farming technology. Research could describe or explore the role of commodity organizations in the farmers' perspective.

Demonstrations, field days, and meetings are educational tools frequently used for Extension programs. Findings indicate that this is a preferred information source, and researchers, educators, and communicators should continue to use these methods to reach traditional farmers.

Findings indicated that Ohio grain farmers preferred interpersonal communication sources when seeking information about adopting or not adopting farming practices, but did not care what these sources thought should be done on their farms. Agricultural communicators should consider their

messages' purpose such as informational, persuasive, or technical when selecting communication sources. Rogers (1995) stated that interpersonal communication sources are appropriate for persuading individuals whereas mass media is used for individuals to gain knowledge. Other farmers and suppliers might be more appropriate sources for persuading adoption of certain farming practices over other media sources. As an important interpersonal communication source, Extension agents could fulfill their information-filtering role that assists farmers in understanding innovations in agriculture.

Ohio grain farmers reported that radio, television, the Internet, and the Data Transmission Network (DTN) were unimportant sources in the decision process to adopt or not adopt farming practices. However, all of these communication channels have the ability to deliver timely, relevant information to large audiences. Agricultural communicators need to consider the urgency, timing, and content of their messages if they select radio, television, and Internet sources. This could be more important during planting and harvest when farmers would be away from access to digital and mass media. However, this preference should continue to be monitored as more access to these mediums are available to farmers on their tractors and cell phones.

Commodity organizations would benefit from knowing the communication sources that Ohio grain farmers consider important. If organizations want to inform their members about commodity news, membership information, or legislative actions, they might select a mass media channel like an organizational newsletter or magazine. Many commodity organizations conduct membership drives. Recruitment activities might be more effective when opinion leaders from the organizations deliver persuasive messages by telephone, face-to-face meetings, or letters.

Findings in this study might have implications on the curriculum agricultural communication faculty would teach. Previous studies have showed that the general population has turned to electronic communication channels for information (Stempel, Hargrove, & Bernt, 2000); however, this is not the preferred communication channel for receiving traditional agricultural news (Maddox et al., 2003). Agricultural communication faculty should make an effort to balance their teaching of electronic and print media as communication channels. There is still a need to teach publication design and writing for print media in the undergraduate curriculum. Findings in this study also show that Ohio grain farmers consider interpersonal communication sources important. Agricultural communication faculty might consider teaching about the importance of interpersonal communication in public speaking and public relations courses. Rogers (1995) said interpersonal communication sources are preferred when persuading individuals to adopt or not adopt innovations. Undergraduate students in agriculture could benefit from this skill when working in the industry. Agricultural communication faculty might also consider teaching program planning since demonstrations, meetings, and field days were identified as important sources of communication.

Keywords

theory of planned behavior, subjective norms, communication channels, organic farming, grain farmers, survey research, diffusion of innovations

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211. doi:10.1016/0749-5978(91)90020-T
- Ajzen, I. (n.d.). Icek Ajzen: Professor of psychology, University of Massachusetts. Retrieved from <http://www.people.umass.edu/aizen/>
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall Inc.
- Bryant, J., & Thompson, S. (2002). *Fundamentals of media effects*. New York, NY: McGraw Hill.
- Daberkow, S. G., & McBride, W. D. (2001, August). *Information and the adoption of precision farming technologies*. Paper presented at the meeting of the American Agricultural Economics Association, Chicago, IL. Retrieved from <http://ageconsearch.umn.edu/bitstream/20556/1/sp01da01.pdf>
- Darnhofer, I., Schneeberger, W., & Freyer, B. (2005). Converting or not converting to organic farming in Austria: Farmer types and their rationale. *Agriculture and Human Values*, 22(1), 39-52. doi:10.1007/s10460-004-7229-9
- Dillman, D. A. (2007). *Mail and Internet surveys: The tailored design method* (2nd ed.). Hoboken, NJ: John Wiley & Sons, Inc.
- Duram, L. (1999). Factors in organic farmers' decision making: Diversity, challenge, and obstacles. *American Journal of Alternative Agriculture*, 14(1), 2-10. doi:10.1017/S0889189300007955
- Egri, C. P. (1999). Attitudes, backgrounds and information preferences of Canadian organic and conventional farmers: Implications for organic farming advocacy and extension. *Journal of Sustainable Agriculture*, 13(3), 45-73. doi:10.1300/J064v13n03_05
- Fairweather, J. R., Campbell, H. R., Tomlinson, C. J., & Cook, A. J. (2001). Environmental beliefs and farm practices of New Zealand organic, conventional and GE intended farmers (Report No. 251). Canterbury, New Zealand: Lincoln University, Agribusiness and Economics Research Unit. Retrieved from http://researcharchive.lincoln.ac.nz/dspace/bitstream/10182/752/1/aeru_rr_251.pdf
- Fox, S. (2004, March). Older Americans and the Internet (Report No. 202-296-0019). Washington, DC: Pew Internet & American Life Project. Retrieved from http://www.pewinternet.org/PPF/r/117/report_display.asp
- Greene, C. (2006). *U.S. organic agriculture*. In K. Wiebe & N. Gollehon (Eds.), *Agricultural resources and environmental indicators* (pp. 159-168). Retrieved from United States Department of Agriculture, Economic Research Service website: <http://www.ers.usda.gov/publications/arei/eib16/Chapter4/4.9/>
- Lavergne, C. B. (2004). *Factors determining adoption or non-adoption of precision agriculture by producers across the cotton belt* (Master's thesis, Texas A&M University, College Station). Retrieved from <http://txspace.tamu.edu/handle/1969.1/3291>
- Licht, M., & Martin, R. A. (2007). Communication channel preferences of corn and soybean producers. *Journal of Extension*, 45(6). Retrieved from <http://www.joe.org/joe/2007december/rb2p.shtml>
- Maddox, S. J., Mustian, R. D., & Jenkins, D. M. (2003, February). *Agricultural information preferences of North Carolina farmers*. Paper presented at the meeting of Southern Association of Agricultural Scientists Agricultural Communications Section, Mobile, AL. Retrieved from <http://agnews.tamu.edu/saas/2003/maddox.htm>

- Midmore, P., Padel, S., McCalman, H., Isherwood, J., Fowler, S., & Lampkin, N. (2001). *Attitudes towards conversion to organic production systems: A study of farmers in England*. Wales, United Kingdom: University of Wales, Institute of Rural Studies. Retrieved from <http://orgprints.org/10817/>
- Niemeyer, K., & Lombard, J. (2003, October). Identifying problems and potential of the conversion to organic farming in South Africa. Paper presented at the meeting of the Agricultural Economic Association of South Africa, Pretoria, South Africa. Retrieved from <http://pur1.umn.edu/19082>
- Oberholtzer, L., Dimitri, C., & Greene, C. (2005). *Price premiums hold on as U.S. organic produce market expands*. Retrieved from U.S. Department of Agriculture, Economic Research Service website: <http://www.ers.usda.gov/publications/vgs/may05/vgs30801/vgs30801.pdf>
- Ohio Office of U.S. Department of Agriculture's National Agricultural Statistics Service. (2005). *2005 Ohio Department of Agriculture Annual Report and Statistics*. Reynoldsburg, OH: Author. Retrieved from www.nass.usda.gov/Statistics_by_State/Ohio/Publications/Annual_Statistical_Bulletin/agstat05.pdf
- Parra-Lopez, C., De-Haro-Giménez, T., & Calatrava-Requena, J. (2007). Diffusion and adoption of organic farming in the southern Spanish olive groves. *Journal of Sustainable Agriculture*, 30(1), 105-151. doi:10.1300/J064v30n01_09
- Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York, NY: The Free Press.
- Schneeberger, W., Darnhofer, I., & Eder, M. (2002). Barriers to the adoption of organic farming by cash-crop producers in Austria. *American Journal of Alternative Agriculture*, 17(1), 24-31. doi:10.1079/AJAA20017
- Stempel, G. H., Hargrove, T., & Bernt, J. P. (2000). Relation of growth of use of the Internet to changes in media use from 1995 to 1999. *Journalism and Mass Communication Quarterly*, 77(1), 71-79. Retrieved from http://www.aejmc.org/_scholarship/_publications/_journals/_jmcq/index.php
- United States Department of Agriculture. (2009). *2007 census of agriculture*. Retrieved from http://www.agcensus.usda.gov/Publications/2007/Full_Report/index.asp
- Villagran, L. (2008, January 29). Organic food industry faces a supply crunch as demand grows and farmers' can't keep up. *AP Wire*. Retrieved from <http://www.lexisnexis.com>
- Wood-Turley, S., & Tucker, M. (2002). Measuring preference for an agricultural college newsletter: A readership assessment of Missouri's Discover & Enlighten. *Proceedings of the National Agricultural Communicators in Education Conference*, 172-186.
- Zaller, J. (1991). Information, values, and opinion. *American Political Science Review*, 85(4), 1215-1237. Retrieved from <http://www.jstor.org/stable/1963943>