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Characteristics of Innovations: Lessons Learned From a Statewide Mandatory Implementation of the Animal Health Network

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Abstract: *The Animal Health Network is designed to connect state veterinarians with Extension partners and local feed retailers to deliver timely, relevant animal disease-related information to non-commercial livestock and poultry owners. The study reported here explored perceptions of key opinion leaders related to the characteristics of the Network as an innovation. Qualitative interviews conducted with 13 stakeholders involved in the implementation of the Network revealed that the relative advantage, complexity, and compatibility of the Network were readily apparent to participants, while trialability and observability were not as pervasive. Findings can assist those attempting to diffuse a concept or idea with similar characteristics.*

Introduction

The delivery of timely, relevant animal disease-related information is important for the protection of our nation's agricultural infrastructure. The Animal Health Network is an innovation that aims to address that need. Understanding the perceptions of key stakeholders regarding this innovation can affect its diffusion and adoption. The study of the diffusion and adoption of agricultural innovations is not a new field of study. In fact, "diffusion research was begun by Extension Service program evaluators" (Rogers, 1963, p. 17).

Various facets of the agricultural industry, such as aquaculture (Swann & Einstein, 2000), organically grown foods (Middendorf, 2007), and forestry (Bardon, Hazel, & Miller, 2007) have examined how to best communicate timely information to targeted populations. Studies have examined the diffusion of information through various types of information networks (Harder & Lindner, 2008; Shuffstall, Alter, Bridger, & Sager, 2007; Swann & Einstein, 2000). Networks can consist of individuals or organizations that share information, ideas, resources, and/or services to facilitate goal accomplishment (Jackson & Maddy, n.d.).

The Animal Health Network

The Animal Health Network is "a state-adaptable, local network communication conduit for the state veterinarian to distribute vital animal disease alerts to non-commercial livestock and poultry owners through local feed retailers and county Extension educators" (Animal Health Network, 2012). This concept is an innovation that evolved from a 2006 needs assessment conducted in three regions of the United States by the National Center for Foreign Animal and Zoonotic Disease Defense (FAZD Center). The needs assessment identified the primary source of animal

disease-related information for non-commercial livestock and poultry owners (NLPO) as word of mouth from trusted individuals, such as feed retail owners and local Extension educators. Results of the needs assessment recommended the creation of an emergency education and communications network utilizing the existing state Extension system and local feed retailers to deliver timely and accurate animal disease-related alerts and information from the state veterinarian to NLPO. Implementing such a network would contribute to the protection of the nation's agricultural infrastructure by reducing the potential negative impact of animal disease outbreaks such as the 2003 Exotic Newcastle Disease outbreak in Southern California, which existed in backyard flocks for nearly 6 months before detection.

Theoretical Framework

The theoretical framework for the study reported here was rooted in the first element within Rogers Diffusion of Innovations theory (1995), the innovation. His diffusion model included four elements: the innovation, communication channels, time, and the social system (Rogers, 1995). According to Rogers (1995) there are five perceived characteristics of innovations that help explain the rate at which innovations are adopted: relative advantage, compatibility, complexity, trialability, observability. Historical evidence shows that these are valuable when determining the adoption rate of an innovation (Rogers, 1995).

Relative advantage is "the degree to which an innovation is perceived as better than the idea it supersedes" (Rogers, 1995, p. 15). Innovations are adopted faster if users perceive them to be better than what they currently have. Compatibility is "the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 1995, p. 15). Innovations that are consistent with social system values and norms will be adopted at faster rates than innovations that are incompatible with existing values and norms.

The complexity of an innovation is based on one's perception of how much effort will be required to use and understand the innovation (Rogers, 1995). Innovations that are more complicated and difficult to learn will be adopted more slowly than less complicated innovations. Rogers (1995) defined the fourth characteristic of trialability as "the degree to which an innovation may be experimented with on a limited basis" (p. 16). Innovations that can be tried before committing to a full adoption are adopted at faster rates than innovations that require a commitment to full adoption from the onset. Finally, Rogers (1995) defined the innovations

"observability" (p. 16) based on visibility of results. Individuals adopt innovations for which they can quickly and readily see the results from use rather than innovations for which results are not readily seen. In summary, if individuals believe that an innovation will have greater relative advantage, compatibility, trialability, and observability, and less complexity, they will adopt that innovation more quickly (Rogers, 1995).

As Harder (2009) stated,

It is possible to enhance our opportunities for success in Extension by focusing on factors related to diffusion. Studying the characteristics of an innovation may help us determine what to highlight in our marketing, such as when an innovation is less expensive, increases profit, or is compatible with community values. (p. 3)

Purpose

In December 2009, one North Central state initiated a mandatory statewide implementation of the Animal Health Network. The purpose of the study was to explore key opinion leaders perceptions of the characteristics of the Animal Health Network as an innovation implemented in the state in order to: 1) improve Web resources created to support Network adoption and 2) identify best practices to encourage diffusion of the Network concept in other states.

Methodology

Qualitative interviews (Cresswell, 1998; McCracken, 1988) were conducted with 13 purposively selected stakeholders involved in the implementation of the Animal Health Network. The 13 participants consisted of three Department of Agriculture personnel, three Extension administration personnel, and seven county Extension agents. Prior to the interviews, participants were provided with an interview protocol that included overall interview goals and a list of potential questions. Questions included, "What factors have influenced the adoption of the Network?" and "Do you view the Animal Health Network as having value for your state? Why or why not?." All interviews were conducted over a 2-day period, and each interview lasted between 30 minutes and 1 hour. Detailed notes were taken during each interview.

Following the conclusion of all interviews, interview notes were reviewed for accuracy by the research team. Member checking was utilized to establish credibility of the findings. This was accomplished by requesting participants to review the interview notes for accuracy and respond with any changes or additions. Data triangulation

was addressed by having two researchers present at each interview. Peer debriefings were held with the entire research team prior to data analysis to "refine and ... redirect the inquiry process" (Erlandson, Harris, Skipper, & Allen, 1993, p. 31) and again following data analysis.

After all transcripts were verified, names were replaced with a code. Researchers assigned each participant a unique code reflecting his or her organizational affiliation: Department of Agriculture (DA); Extension Administration (ExA); and County Extension Agents (CEA). A number was randomly assigned with the code. Confidentiality coding was addressed by randomly assigning numbers as codes. The order of the interview was not used in the coding to ensure anonymity of the participants.

Data from the interview transcripts were analyzed using deductive content analysis. The transcripts were analyzed according to an existing framework (Patton, 2002); in this case, Rogers (1995) characteristics of innovations. According to Fraenkel and Wallen (2009), the determination of themes based on previous knowledge, theory, and/or experience, prior to data analysis is an acceptable procedure used in content analysis studies.

Data were unitized such that only one of the five key themes was found within each unit of data (Erlandson et al., 1993). Two members of the research team coded the responses collectively to ensure consistency of coding. Codes and themes were utilized to organize the content and arrive at a narrative description of the findings (Fraenkel & Wallen, 2009). Trustworthiness was established in the study through prolonged engagement, member checks, peer debriefings, and data triangulation.

Results

Content analysis revealed participants could describe the Animal Health Network in terms of its relative advantage, compatibility, complexity, trialability, and observability. While all five characteristics were identified within participant interviews, due to the mandated nature of the state-wide adoption and relatively early stage of the Network in the adoption process, the trialability and observability characteristics were not as pervasive as the other characteristics and did not yield noteworthy findings. Therefore, the relative advantage, compatibility, and complexity characteristics are discussed in-depth below. Coding that was assigned during data collection was noted with findings to allow for the reader to understand the origination of each concept.

Relative Advantage

There is a need for a mechanism to distribute critical animal disease-related information to non-commercial livestock and poultry owners. Small scale farms do not go through formal licensing procedures (DA01), are not accessible through the same venues as commercial groups (DA01, DA02), and have the potential to be missed or overlooked during a crisis (CEA04). Thus, the relative advantage of the Animal Health Network was communicated as being strong.

Respondents indicated that the Network had value (CEA01), provides a linkage between communities and Extension (CEA02, CEA05, CEA07), and encourages partnerships between retailers and Extension (CEA03). It was also communicated that the Network allows one to "do more with less" (CEA06), indicating that the Network can reach the intended target audience of non-commercial producers. Additional elements related to relative advantage included the important role that Extension plays in the diffusion. Respondents shared that regulatory agencies such as Departments of Agriculture were not the appropriate venue for sharing of information due to concerns of trust with clientele (DA01); thus, a strong element of the Network is the involvement of Extension in the process. Relative advantage is further enhanced through current involvement in the community by Extension (DA03).

Complexity

Respondents overwhelmingly indicated that the Network concept itself needs to be "easy" to understand (CEA01, CEA05, CEA06). In fact, it was shared that the simplicity of the Network concept could actually confuse participants (ExA02). While the concept of sharing animal disease-related information is a straightforward process, it is critical that those receiving the animal disease-related information recognize that the information is coming from a recognized and reliable source (CEA04).

Issues related to complexity included: importance of keeping the Network on the radar of participants (CEA03); providing a clear understanding of the goal of the Network (CEA03); keeping regulation separate from alerts (CEA04); locating accurate contact information for feed retailers (CEA06); dealing with issues related to large chain retail stores (CEA07, DA01); and appropriate use of technology to make contacts (ExA02). The characteristic of "complexity" is one that changes depending on the individual and his or her perceptions. The importance of clear communication and accountability was communicated as being critical by

respondents.

Compatibility

The Network was communicated by respondents to have aspects that were in some ways compatible and in other ways in conflict. One respondent indicated that feed retailers might not be comfortable being a part of the Network (CEA01). "People in agriculture in general may be more resistant to being on a list, statewide or nationwide. They think if they say something, someone is going to show up at their farm as a regulator" (CEA01). Thus it was shared that the Network should be used for only animal disease-related emergencies and not as a way to communicate non-emergency information (CEA03).

Another aspect of compatibility related to chain stores (e.g., Tractor Supply). While it should be noted that chain stores are not intended to be a key component of the Network, several respondents indicated that feeds are purchased from these locations and that these stores should be considered. Given that these stores must report to corporate entities, it is harder for them to easily agree to distribute information (CEA03). Thus, the Network is not readily compatible with this type of situation without additional levels of approval.

The importance of "trust" (CEA04, CEA06) was articulated as a critical element of compatibility. As shared by one respondent, feed retailers should not be harassed for being a part of the Network (ExA02). Access to technology such as email and fax was also indicated as a potential barrier that could affect compatibility (DA02, CEA07). Based on respondent comments, face-to-face delivery of messages may be required in animal disease-related emergency situations in some cases. Overall, respondents indicated that the Network was compatible with getting the message to the intended audience (DA01); however, respondents noted that it is important to demonstrate the importance of the Network (DA02, ExA02).

Conclusions and Discussion

In considering the Animal Health Network as an innovation, it is important to recognize that buy-in is needed in order to facilitate adoption. An understanding of the characteristics of the innovation itself can help one develop strategies to improve the chance of adoption. The researchers were able to conclude that three of the five characteristics of innovations (Rogers, 1995) were most apparent to participants.

The Animal Health Network was perceived to have *relative advantage*, offering a solution to reach NLPO with vital animal disease-related information, and

implementation of the Network had the potential to strengthen ties between Extension and rural communities. However, while the Network is a very straightforward concept, there are aspects that create *complexity*. Given that the Network is a venue that is only to be used for animal disease-related emergencies, concern was shared regarding maintenance and recognition of the Network. Effective adoption will require efforts to provide Network visibility.

Another aspect of complexity relates to the importance of keeping "regulation" and "regulation entities" separate from the Network. Involvement of any regulatory entities in the implementation of the Network increases complexity and could create a negative response by participants and negatively affect adoption. Further, while feed retail chains were not intended to be included in the Network, the role these entities play in providing feeds to non-commercial livestock and poultry producers cannot be overlooked. Efforts must be made by Network administrators to inform and involve chain stores to ensure all appropriate venues are used in distributing animal disease-related emergency information, while at the same time mitigating issues that can arise through lower-level contact with these entities. This in turn could increase *compatibility* by addressing the concerns regarding the high use of chain stores by non-commercial owners and the need to reach clientele through these venues.

The issue of "regulation" was also found to be associated with *compatibility*. The concept of being "put on a list" is not readily compatible with individuals in rural communities. Thus, "trust" is a critical element of Network implementation. Access to technology such as fax or email was also found to be an element that could affect compatibility. Efforts must be made to overcome lack of technological access.

Evidence of *trialability* and *observability* was not as pervasive in the interviews as the other three characteristics of innovations. This is due, in part, to the mandatory adoption of the Network within the state examined for the study reported here. Furthermore, as a result of the study, the adoption process for the Animal Health Network was refined into three phases: (1) establishing, (2) testing, and (3) maintaining. The population described in the study pilot tested phases 1 and 2, but the results of the testing phase were not made available to the sample. Therefore, observability, too, was limited in scope. Participants did not participate in the Phase 3 process in which the Network is tested and monitored on an annual basis. Phase 3 was a result of the findings in the study. It is important during the diffusion process to provide visibility of the Network through promotion efforts focusing on the

benefits related to safety, health, and economics.

Implications for Practice and Future Research

The diffusion and adoption of concepts and ideas can be quite different than the diffusion and adoption of tangible goods or services. In this case, the idea is utilizing Extension personnel to provide emergency animal disease-related information to NLPO via feed retailers. Findings revealed that while the Network was perceived to have relative advantage, be compatible with current practices, and not overly complex, observability and trialability were not as readily apparent in the mandatory state-wide implementation of the Network studied.

As a result of these findings, current diffusion efforts have been able to be improved by making the Network more observable and increase its trialability in ways that do not detract from the overall purpose of providing emergency animal disease-related information. Similar studies involving current adopters who are utilizing the improved three-phase Network adoption process should be conducted to gather trialability and observability perceptions of the Animal Health Network as an innovation and help determine if the lessons learned from the present study resulted in improved diffusion of the Animal Health Network.

Implementation of the Animal Health Network requires continued commitment and buy-in at all levels of the network. This can be true when encouraging similar concepts and ideas. Key points revealed in the study included: not including regulatory agencies beyond those necessary, providing visibility without overuse for non-related purposes, building relationships and trust with those involved, and emphasizing the importance of the concept. The study reported here focused on the diffusion of a "Network," and it was critical that it be used to educate rather than regulate. Careful consideration of these points can assist others in the diffusion of similar concepts.

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