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The Somewhat Flawed Theoretical Foundation of the Extension Service

Abstract
Innovation diffusion theory is the foundation of Extension agriculture outreach methods. The theory predicts that an innovation will initially be adopted by a small group of innovative farmers and later diffused to other farmers. Over the past 30 years, the theory has been criticized for favoring large wealthy farmers and increasing the inequities in rural areas. By utilizing innovation diffusion theory, have we caused harm to the population we serve? Because this theory has such an influence on our approach to outreach, why haven't we kept up with developments in the evolution of this theory? What can we change to make our application of this theory consistent with current knowledge?

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Introduction

A seemingly small event occurred in 1928 that provided the basis for a theory that has influenced how the Extension Service has conducted its programs for the past six decades. During that year, hybrid corn was released to farmers by the Iowa State Agricultural Experiment Station. With its yield advantages over traditional corn varieties and promotion by the Extension Service and commercial seed companies, the seed was adopted briskly. Between 1933 and 1939, the number of acres planted to hybrid corn increased from hundreds to thousands. By 1940, it had been adopted by most Iowa corn growers. (Ruttan, 1996).

In 1941, Bryce Ryan, a professor of rural sociology at Iowa State University, received funding to examine the spread of hybrid corn. He presumed that a better understanding of the hybrid corn diffusion process would help disseminate other innovations developed by the station (Ruttan, 1996). The resulting classic study by Ryan and Gross (1943) revealed:

- The adoption process began with a small number of farmers who adopted hybrid corn soon after it was released. From these farmers, the innovation diffused to other farmers.
- The most influential source of information on this innovation was neighbors. When farmers saw and interacted with farmers who had adopted hybrid corn, they adopted it too.

These findings implied that if innovative farmers were targeted to adopt innovations, other farmers would soon follow, speeding up the adoption of new agricultural practices. The idea was simple and compelling, and it provided the basis for a model of agricultural development that the Extension Service continues to use today.

By the 1950s, Extension staff were being trained in the application of this theory (North Central, 1952) and college-level Extension methods courses continue to include innovation diffusion theory (Lionberger & Gwin, 1991). A perusal of issues of the *Journal of Extension* indicates that the theory continues to be popular. Between 1984 and 2002, nearly 50 articles specifically cite innovation diffusion theory.

This article examines the history, influence, and impacts of innovation diffusion theory on the Extension Service in the U.S. It reviews some of the major developments in the literature related to the theory, examines its criticisms, and discusses the implications for Extension.

The First 30 Years of Research

The Ryan and Gross study was followed quickly by studies that examined various aspects of the innovation diffusion process. These studies and their subsequent improvements in theory are closely associated with the agriculture revolution in the United States. During this period, agriculture was undergoing rapid change to a system that relied on mechanization and synthetic inputs.

From the 1940s through the 1960s, researchers plotted mathematical curves representing the adoption of agricultural innovations, developed categories of adopters, catalogued the characteristics of adopters and innovations, and examined the influence of farmer interaction on the adoption process.

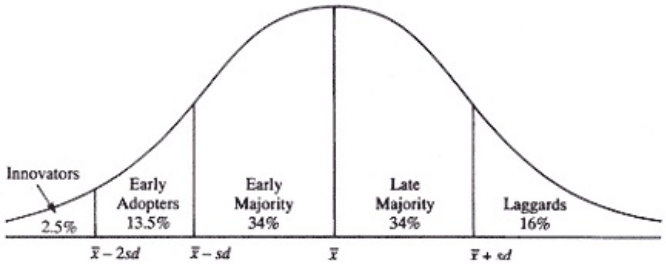
Adoption Curves

Ryan and Gross (1943) plotted the number of farmers adopting hybrid corn based on the year farmers adopted it. The data revealed a normal curve. Lionberger (1960) plotted the same type of data on a cumulative basis and revealed an S or growth curve. Both curves indicated a small number of farmers adopted an innovation initially, followed later by the majority of farmers.

Categories of Adopters

Researchers have often assigned titles to individuals based on their adoption behavior. The best-known scheme is from Rogers (1958). Since the adoption of an agricultural innovation followed a normal curve, he developed classifications of adopters by calculating the mean for the curve and then, by adding or subtracting the standard deviation, divided the curve into five segments. The segments were assigned these categories: Innovators, Early Adopters, Early Majority, Late Majority, and Laggards (Figure 1).

Figure 1.
The classic adoption curve indicating a small number of individuals adopting the innovation early (left tail), followed by the majority of adopters. Those adopting last form the right tail of the curve (after Rogers, 1958).



Characteristics of Adopters

The literature describes farmers who adopt an innovation early as being different from other farmers. Innovators are younger (Lionberger, 1960), more cosmopolitan (Coleman, 1957), have higher incomes than later adopters (Lionberger, 1960), and have the largest operations of all adopter categories (Coleman, 1957). In addition, adopter categories differ in their source of information on innovations, with innovators relying on primary sources and later adopters relying on word of mouth (Ryan & Gross, 1943).

Characteristics of Innovations

A key part of the adoption process is identifying the criteria used in decision making. To begin with, the new innovation has to have a relative advantage over the old practice (Rogers, 1971) and it has to be consistent with existing cultural patterns (Barnett, 1953).

In addition, researchers identified a number of other characteristics of innovations that relate to their adoption. Innovations that are less complex, are divisible, readily observable, low cost, and profitable are adopted quickly (Bohlen, 1961). Innovations that are congruent with previous innovations are also adopted quickly. For instance, hybrid sorghum was adopted at a dramatic rate where hybrid corn was already in general use (Brandner & Straus, 1959).

Stages of the Adoption Process

Beal, Rogers, and Bohlen (1957) developed a sequence of stages to describe the adoption process:

- **Awareness**-The farmer knows of the existence of the innovation but lacks details.
- **Information**-The farmer becomes interested in the innovation and seeks further information.
- **Evaluation**-The farmer takes the information about the innovation and weighs the alternatives regarding resources of land, labor, capital, and management ability.
- **Trial**-The farmer uses the innovation on a small-scale basis.
- **Adoption**-The farmer uses the innovation on a full-scale basis.

Communication/Interaction

Ryan and Gross (1943) documented the importance of interaction among farmers. "The very fact of acceptance by one or more farmers offers new stimulus to the remaining ones. The decision to adopt is a product of the influence and incentives brought to bear." Havens and Rogers (1961) identified what they termed the "interaction effect." This is the process through which individuals who have adopted an innovation influence those who have not. They contended this is the major factor influencing adoption of innovations.

Today, the theory that underlies much of our Extension programming is based largely on research from this era--the 1940s, '50s and '60s.

How Has the Theory Held Up During the Past 30 Years?

The 1970s to the 1990s were the heyday of international agricultural development. Efforts from that period yielded a rich literature on method and theory. This literature both supports and criticizes segments of innovation diffusion theory. Consequently, portions of the theory are still viable, while others are problematic.

The segments of the innovation diffusion literature that have maintained viability over the years are related to the characteristics of innovations, the stages of the adoption process, and the effect of interaction of farmers on adoption.

One area of research by social scientists involved in more recent agricultural development has focused on the decision-making process of farmers. This literature generally is consistent with the innovation diffusion literature as it relates to the characteristics of innovations and to the stages of the adoption process. For example, Vanclay's (1992) work, which identified barriers to adoption of innovations, is consistent with the work by Bohlen (1960) and Brandner and Straus (1959) discussed earlier. Further, Gladwin and Murtaugh (1980) and Gladwin (1980) identify stages of farmer decision-making that are largely consistent with Beal, Rogers, and Bohlen (1957) stages of the adoption process discussed earlier.

The importance of interaction among farmers is documented by Buttel, Larson, and Gillespie (1990); Stephenson (1980) in work related to the adoption of technology by fishermen; and Stephenson (2002) in documenting the adoption of conservation practices by horse farm owners.

The most controversial area has been the theory's focus on the most innovative farmers and the undesirable consequences of using this approach.

Criticism of the Theory

Criticisms of the theory began to appear in the late 1960s, when it was applied to international development. According to Ruttan (1996), initial criticism of the theory focused on methodological problems with the research, but interest in the theory declined as it began to be viewed as a source of inequity among farmers.

Goss (1979) observed that the application of innovation diffusion theory in developing countries had undesirable consequences. These problems stemmed from the following.

- It is assumed that benefits resulting from the adoption of innovations spread and become homogeneous. But experience from Latin America showed the gap in inequities actually widened.
- Aggregate statistics for development projects may show improvement in elements like production, but commonly the farmers most in need of help received little benefit.
- Non-adopters are affected by the diffusion of innovations process because larger farmers increase production as a result of adopting an innovation, resulting in a decrease in prices received by all farmers.

Other criticism of innovation diffusion theory came from business and marketing perspectives. Downs and Mohr (1976) severely criticized the theory, contending it needs to be organized around attributes of both the innovations and the organizations adopting them. They tossed aside the notion of static categories of adopters, maintaining that anyone can be an innovator if innovations are matched with organizations targeted for adoption. Brown (1981), offering his market and infrastructure approach, points out that implementation of projects using innovation diffusion theory require focusing monetary and personnel resources on a small number of people, the category traditionally considered innovators. He recommends using marketing techniques to target appropriate innovations to specific segments of farmers.

Everett Rogers, the father of innovation diffusion theory, periodically summarizes the literature (1962; 1971; 1983; 1995). In the 1983 edition, he acknowledges criticisms of the theory, noting that the absence of critical viewpoints in the early development of the theory may have been a weakness in the long run. Had adjustments been made earlier through critique and debate, perhaps some of the current problems with the theory would have been avoided. Criticisms compiled in the most recent edition (1995) include:

1. A Pro-Innovation Bias

- There is the implication that an innovation should be diffused and adopted by all farmers.
- The act of innovating is considered positive and the act of rejecting an innovation is considered negative. Remember the categories of adopters: Innovators versus Laggards.

2. Individual-Blame Bias
   - The development agency is not blamed for its lack of response to the needs of farmers. Rather, the individuals who do not adopt the innovation are blamed for their lack of response.

3. Issue of Equality
   - The negative impacts of the theory are not considered. What are the consequences in terms of unemployment, migration of rural people, equitable distribution of incomes? Will the innovation widen or narrow socioeconomic gaps?

4. Bias in Favor of Larger and Wealthier Farmers
   - "Development agencies tend to provide assistance especially to their innovative, wealthy, educated, and information-seeking clients. Following this progressive, or ('easy to convince') diffusion strategy leads to a lower degree of equality. For example, more progressive farmers are eager for new ideas, and have the economic means to adopt; they can also more easily obtain credit if they need it. Because they have larger farms, the direct effect of their adoption on total agricultural production is also greater" (Rogers, 1995: 128-129). Consequently, the rich get richer and poor get poorer.

Implications

Considering the implications of what I've outlined here requires that we grapple with the following questions.

1. Given the criticisms of innovation diffusion theory, is it possible that we have caused harm in some way to the population we serve?
2. Since this theory has such an influence on our approach to outreach, why haven't we kept up with developments in the evolution of this theory?
3. What can we change to make our application of this theory consistent with current knowledge?

By Utilizing Innovation Diffusion Theory, Have we Caused Harm in Some Way to the Population We Serve?

In our zeal to find solutions to assist farmers, have we favored practices and technology that are accessible only to larger and wealthier farmers? Have we contributed to the loss of small and medium-size farms through our application of innovation diffusion theory?

A now famous critique of the land grant college system illustrates how this has occurred. Jim Hightower (1972) reviewed the development of a mechanical tomato harvester and the breeding of a tomato that could be mechanically harvested. Stimulated by the anticipated loss of farm labor through termination of the *Bracero* program and its supply of labor from Mexico, the development of these two innovations ultimately led to significant changes in who grew tomatoes, where they were grown, and who picked them.

Although some shortcomings of Hightower's claims have been pointed out by Buttel (1985), the fact remains that the tomato harvester was large and expensive, and its purchase was limited to large farmers who had the necessary financial resources. Ultimately, several years after its release, 600 large growers controlled tomato production where previously there had been 4,000. In addition, the machines displaced thousands of American farm workers (Schmitz & Seckler, 1970).

This case also illustrates another criticism of innovation diffusion theory related to how the use of aggregates can be misleading. The project is credited with saving the tomato industry in California. However, the production area moved from its traditional area to one with soil and weather conditions more suitable to the tomato variety bred for mechanical picking. So, although the industry stayed in California, there was seemingly no benefit to the original tomato growers who were worried about a labor shortage.

Why Haven't We Kept Up with Developments in Our Basic Theory?

As Extension has changed over the years, Extension social science positions have been eliminated. Most states now operate without a Community Development Program, once a mainstay of the Extension Service and home to staff who worked with rural development. There is less research conducted now on how Extension influences change and the potentially positive and negative affects of our efforts.

In addition, over the years issues surrounding agriculture and natural resource management have become contentious. There is significantly less agreement on the best way to do things. Now there exists more of an "us against them" mood, and many Extension staff perceive social scientists as "them." The result may be that the contributions and critiques by social scientists go unnoticed by Extension staff. Social scientists are guilty of too often criticizing without offering alternatives to improve the situation. Last, quite frankly, the Extension Service does not like to hear that it is doing anything wrong.

What Can We Change to Make Our Application of This Theory Consistent with Current Knowledge?

Based upon the extensive criticism of the negative consequences of innovation diffusion theory, it is time to reconsider how we use it in agricultural outreach. Most negative consequences of the theory ultimately lead to problems with economic inequalities among farmers. These inequalities and the resulting loss of farms will continue unless the Extension Service makes a special effort to prevent it. Consider the following.

A News Release Is Not Enough

Tailor communications to all categories of farmers to promote awareness and information (Rogers, 1995). This involves putting some thought into segmenting the farm population by type and size or other characteristics and directing programs specifically to these segments. This segmentation may also be based on who needs help. As previously mentioned, Brown's (1981) approach to innovation diffusion includes utilizing methods from marketing to enhance adoption. The development of small farm programs by Extension at the national and state levels is an example of a positive step.

Encourage Participation and Appropriate Technology

The success of less financially advantaged farms may be enhanced by involving them in developing technology and practices that are appropriate for their farm and financial scale. The formation of organizations such as cooperatives to enhance access to financial resources continues to be a good strategy (Rogers, 1995). Participation in developing technology is a key concept from international agriculture development that applies to the industrial world as well (Dlott, Altieri, & Masumoto, 1994; Wuest, McCool, Miller, & Veseth, 1999). In addition, Brown (1981) insists that change programs must have a financial support infrastructure for farmers in order to be successful.

Focus on the Tough Ones

Shifting our focus from working with wealthy innovative farmers to working with less financially advantaged farmers may require some fundamental changes. These farmers ". . . tend to place less credibility in professional change agents, and they seldom actively search for information from them. . . "(Rogers, 1995, p. 438).

This is a tougher audience to access and work with, perhaps because of a long history of neglect. They are also likely the farmers who would benefit the greatest. Greater risk protection, for both farmers and Extension staff, will encourage greater activity for and by this audience. Financial risk protection for farmers, particularly small farmers, will enhance their willingness to take risks. Extension staff may increase their willingness to risk a programmatic failure if they are protected from performance criticism by administrators.

Consider Consequences

Our audience is changing. Who do we represent nowadays? Farmers? Farm workers? Farm communities? Consumers? What are the impacts of our efforts on each of these groups?

The Extension Service has a long and successful engagement with people in rural areas. Our high client participation has been a means to this success. At the same time, the Extension Service is credited with having an elite bias (Rogers, 1988). We can change this by realizing that our methods can influence which farmers succeed and which farmers are excluded from success.

References

Barnett, H. (1953). *Innovation: The basis of culture change*. New York: McGraw Hill.

Beal, G., E. Rogers, & Bohlen, J. (1957). Validity of the concept of stages in the adoption process. *Rural Sociology* 22:166-168.

Bohlen, J. (1961). The adoption and diffusion of ideas in agriculture, in J. H. Copp, Editor, *Our changing rural society: Perspectives and trends*. Ames: Iowa State University Press.

Brandner, L., & Straus, M. (1959). Congruence versus Profitability in the Diffusion of Hybrid Sorghum. *Rural Sociology* 24: 381-383.

Brown, L. A. (1981). *Innovation diffusion: A new perspective*. New York: Methuen.

Buttel, F. (1985). The land grant system: A sociological perspective on value conflicts and ethical issues. *Agriculture and Human Values* 2(2):78-95.

Buttel, F., Larson, O., & Gillespie, G. Jr. (1990). *The sociology of agriculture*. New York: Greenwood Press.

Coleman, J. (1957). The diffusion of innovations among physicians. *Sociometry* 20:253-270.

Dlott, J., Altieri, M., & Masumoto, M. (1994). Exploring the theory and practice of participatory research in US sustainable agriculture: A case study in insect pest management. *Agriculture and Human Val*ues. 11:126-139.

Downs, G., & Mohr, L. (1976). Conceptual issues in the study of innovation. *Administrative Science Quarterly* 21:700-714.

Gladwin, C. H. (1980). A theory of real-life choice: Applications to agricultural decisions, in P. Barlett (ed.), *Agricultural decision making, Anthropological contributions to rural development*, pp. 45-86. Orlando: Academic Press.

Gladwin, H., & Murtaugh, M. (1980). The attentive-preattentive distinction in agricultural decision making, in P. Barlett (ed.), *Agricultural decision making, Anthropological contributions to rural development*, pp. 115-136. Orlando: Academic Press.

Goss, K. F. (1979). Consequences of diffusion of innovations to rural population. *Rural Sociology* 44:754-772.

Havens, A. E., & Rogers, E. (1961). Adoption of hybrid corn: Profitability and the interaction effect. *Rural Sociology* 26:409-414.

Hightower, J. (1972). *Hard tomatoes, hard times: The failure of the land grant and college complex*. Schenkman: Cambridge, Massachusetts.

Lionberger, H. (1960). *Adoption of new ideas and practices.* Ames, Iowa State University Press.

Lionberger, H., & Gwin, P. (1991). *Technology transfer from researchers to users, A textbook of successful research extension strategies used to develop agriculture*. University of Missouri, Columbia.

North Central Regional Rural Sociology Subcommittee. (1952). *How farm people accept new ideas*. Iowa Agricultural Extension Service, Ames.

Rogers, E. (1958). Categorizing the adopters of agricultural practices. *Rural Sociology* 23:345-354.

Rogers, E. (1962). *Diffusion of innovations*. New York: Free Press.

Rogers, E., & Shoemaker, F. (1971). *Communication of innovations: A cross-cultural approach*. 2nd edition. New York: Free Press.

Rogers, E. (1983). *Diffusion of innovations*. 3rd edition. New York: Free Press.

Rogers, E. (1988). The intellectual foundation and history of the Agricultural Extension model. *Knowledge* 9:492-510.

Rogers, E. (1995). *Diffusion of innovations*, 4th edition. New York: Free Press

Ruttan, V. (1996). What happened to technology adoption diffusion research? *Sociologia Ruralis* 36:51-73.

Ryan, B., & Gross, N. C. (1943). The diffusion of hybrid seed corn in two Iowa communities. *Rural Sociology* 8:15-24.

Schmitz, A., & Seckler, D. (1970). Mechanized agriculture and social welfare: The case of the tomato harvester. *American Journal of Agricultural Economics* 52:569-577.

Stephenson, G. (1980). *Pushing for the highline: The diffusion of innovations in the Oregon trawl fishery*. Unpublished master's thesis. Department of Anthropology, Oregon State University.

Stephenson, G. (2002). *The adoption of management practices to improve watershed health by Oregon horse farmers*. Paper presented at the 62nd Annual Meeting of the Society for Applied Anthropology, Atlanta.

Vanclay, F. (1992). Barriers to adoption: A general overview of the issues. *Rural Society* 2: 47-53.

Wuest, S. B., McCool, D. K., Miller, B. C., & Veseth, R. J. (1999). Development of more effective

conservation farming systems through participatory on-farm research. *American Journal of Alternative Agriculture*. 14(3):98-102.