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Assessing Probable Success: Applying Rogers' "Diffusion of Innovations" Theory to Agroforestry

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ABSTRACT

"Diffusion of Innovations," E.M. Rogers' theory on the process of adoption of new ideas and technology, has served as a basis of successful extension strategies in agricultural development for many years. This paper discusses this theory and applies it to agroforestry as an innovation. This application provides insights into agroforestry extension strategies and approaches.

Key Words: Diffusion of Innovations; E.M. Rogers; Agroforestry; Extension

INTRODUCTION

Changes to improve the quality of lives among rural populations have long been the concern and goal of extension efforts around the world. Improved technologies, more efficient and effective methods of production practices are just a few of the innovations that extensionists have promoted in rural areas to enhance standards of living in developing countries (Van den Ban & Hawkins, 1996; Marsh & Pannell, 1998; Temu *et al.,* 2003). An ever present concern of extensionists is finding strategies that encourage adoption of innovations. This paper discusses one theory of adoption of innovations, how this theory is applied to development of extension strategies and how it can be used in agroforestry extension efforts.

Adoption/Diffusion theory. The adoption of innovations, such as growing trees with traditional crops or grazing land, has been the subject of extensive study to determine how and why populations accept new or different ideas or technologies. Perhaps the most influential and widely applied theory is E.M. Rogers' "Diffusion of Innovations". Rogers' theory focuses upon the communications aspects of innovation adoption and views the adoption process as being composed of three parts:

Invention. The process by which new ideas are created or developed;

Diffusion. The process by which ideas are communicated to the members of a given social system and

Consequences. The changes that occur within the social system as a result of the adoption or rejection (Rogers & Shoemaker, 1971; Rogers, 1983). The second part, diffusion, is of particular interest in the context of this discussion.

Several authors like Rogers and Shoemaker (1971), Rogers (1983), Burch (1984, 1994), Lamble and Seaman (1994) define the significant elements in Rogers's process in the diffusion stage as being:

The change agent. The resource professionals seeking to implement the policies--encourage adoption of agroforestry schemes;

The innovation. The change being recommended for adoption-- in our discussion, agroforestry schemes;

The means of innovation dissemination. The methods and approaches used in informing local populations of possible agroforestry systems;

The opinion leader. An individual in the adopter community whose judgment is trusted and whose opinions are often sought, and;

The adopters. Those members of society who adopt or reject the innovation at varying rates.

According to Rogers (1983) the interaction of each of the preceding elements determines the rate of adoption. Therefore, it is critical to examine the characteristics of these elements to determine what factors or combinations of factors will be the goal in attempting to encourage innovation adoption through extension efforts. Most of the research on diffusion to date concentrates on the characteristics of potential adopters (Burch, 1984, 1994; Lamble & Seaman, 1994; Whiteman, 1995).

Rogers classifies adopters into five categories on the basis of innovativeness. Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system (Rogers & Shoemaker, 1971; Rogers, 1983). These categories and their characteristics are:

Innovators

1. Venturesome
2. Contacts outside of local peer networks
3. Cosmopolite social relationships
4. Contact with other innovators
5. Control of adequate financial resources to absorb possible

losses incurred due to adoption of an innovation
6. The ability to understand and apply complex technical knowledge
7. Can cope well with uncertainty
8. Not necessarily respected or well integrated into the local social system
9. Serve role of innovation "gatekeeper" for the local society

Early Adopters

1. More integrated in local social system than innovators
2. More "localites" than "cosmopolites"
3. Have highest degree of opinion leadership
4. Opinions are generally respected by other villagers and serve as role models
5. Discriminating and judicious in making decisions about innovation
6. Powerful group to spearhead any innovation adoption efforts

Early Majority

1. Adopt new ideas just before the average member of a social system
2. Interact freely with other society members but seldom are leaders
3. Follow with "deliberate" willingness in adopting innovations

Late majority

1. Adopt new ideas just after the average member of a social system
2. Adoption might be finally out of financial necessity or as a response to network pressures
3. Pressure of peers is necessary to convince this group of innovation's utility
4. Due to more limited resources almost all uncertainty must be removed for innovation to be accepted by this cadre
5. Skeptical

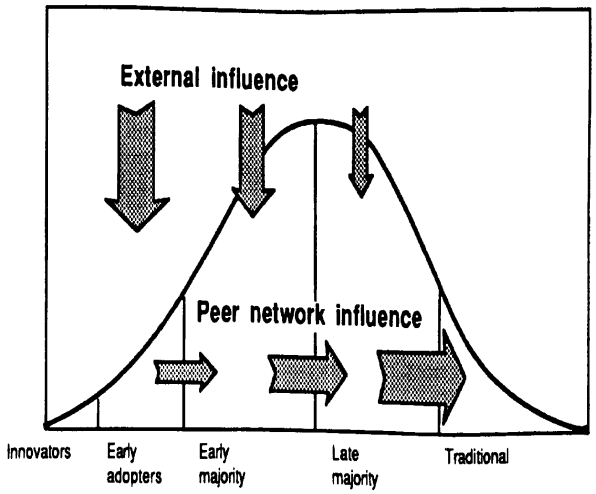
Laggards

1. The last in the social system to accept an innovation
2. Traditional
3. Possess almost no opinion leadership
4. The most "localite" of all the categories
5. Often isolated in the social network
6. Point of reference is the past
7. Decisions made based upon what has been done in the past
8. Tend to be suspicious of innovations and change agents
9. Generally financial status forces extreme caution in accepting innovations

Opinion leaders, both formal and informal, generally fall within the early adopter groups and, therefore, this classification system is useful in identifying target groups within a population for agroforestry and other extension efforts.

Bunnell (1988) theorizes a second process that occurs as adoption among Rogers' five groups takes place. Over the course of innovation adoption, the relative importance of external influences such as change agents diminishes and that of internal peer networks such as local leaderships

Fig. 1. Distribution of individuals with respect to rate of adopting innovations. The relative importance of external and peer influence for each group is indicated by the thickness of the arrows (Bunnell, 1988)



increases as shown by Fig. 1.

In addition to the characteristics of the target population such as the numbers of individuals in each of Rogers's adoption categories and the persuasiveness of opinion leaders, Roger's model examines the characteristics of the extension mechanism including the change agent and the extension methodologies. These two factors are critical elements in facilitating a rural population through the proces s of innovation adoption (Lamble & Seaman, 1994; Whiteman, 1995; Baig *et al.,* 1999 a, b).

The change agent role includes: 1) developing/identifying a need for change; 2) establishing an information exchange relationship; 3) diagnosing potential adopter problems; 4) creating intent to change in the adopters; 5) translating intent into action; 6) stabilizing adoption and preventing discontinuances and; 7) achieving a final relationship (Rogers & Shoemaker, 1971; Rogers, 1983).

The effectiveness of the change agent in facilitating this process is also dependent upon the extension methodology that he/she employs. Those methodologies that heighten the sense of ownership among the target population tend to be the most successful in the long run (Lamble & Seaman, 1994; Whiteman, 1995).

The adoption of agroforestry in different cultural and geographic settings can be analyzed by using the preceding framework. Identifying the target groups like the opinion leaders and the members of the rural population most likely to be early adopters are just two of the ways of examining adopter characteristics through the theory that could be used in developing extension strategies. Examining proposed extension agents and methodologies within the framework of Rogers' model could also indicate how effective an

agroforestry program might be and/or how it could be improved, given the interpersonal skills, technical expertise and experience of a particular agent. Finally, Rogers' theory also provides insight into the probable success of agroforestry adoption by examining agroforestry systems as an innovation.

Rogers and Shoemaker (1971), and Rogers (1983) provide a list of criteria by which to examine the adoptability of an innovation. These include:

Relative advantage. The degree to which an innovation is perceived as better than the idea it supersedes;

Compatibility. The degree to which an innovation is perceived as being consistent with last experiences/existing values/needs of potential adopters;

Complexity. The degree to which an innovation is perceived as difficult to understand and use;

Trialability. The degree to which an innovation may be experimented with on a limited basis and;

Observability. The degree to which the results of an innovation are visible to others.

Agroforestry as an innovation generally ranks well against the criteria of relative advantage--most potential adopters can see how an agroforestry system could provide benefits that are greater than those provided in an existing agricultural/forest system. The works of Marsh (1998), Baig *et al.* (1998), Baig *et al.* (1999a, b & c) and (1999 a, b & c), Straquadine *et al.* (1999) and also the conclusions drawn from the empirical studies suggest that profitability of an innovation has significant influence on the adoption process. Marsh 1998 reviewed the reports of various economists believing that a very large part of “relative advantage is determined by the relative profit resulted by adopting an innovation compared to the alternative.

Agroforestry is also generally compatible because it is flexible enough often to be developed around existing values, past experiences and the needs of potential adopters. Agroforestry systems of some type have traditionally been used in many underdeveloped societies with varying levels of success. Further, the concept of agroforestry is not so complex as to prevent its adaptation and adoption by traditional rural societies. Thus, the adoption of agroforestry should not be greatly hindered by its level of complexity (Ehrenreich, 1995; Whiteman, 1995). However, Marsh 1998 considers that compatibility is also strongly linked with relative advantage. He further states that an innovation that is compatible with the already known ideas, beliefs values and needs would be quickly assessed and adopted. He also states that innovations that are less complex are easier to learn, understand and put into practice by the farmers for their livelihood.

Agroforestry does not meet the adoption standards as well as might be desired in the areas of trialability and observability, however. Implementing an agroforestry system generally requires enough space and a combination of species to constitute a "system". This entails committing resources to the project to a greater degree than might be desired by a rural population suspicious of the innovation of agroforestry. Having to commit more time, scarce resources and labor to a project with yet-to-be-shown tangible benefits may be a gamble in a risk-averse, subsistence economy and could be an obstacle to the adoption of agroforestry. A successful agroforestry system may require a larger than desired scale and may serve to deter adoption of the innovation. However, agroforestry projects could be scaled down to address this concern. Smaller scale agroforestry projects might be more appropriate in instances where perceived risk is too high for large scale projects. If small scale trials are not possible or not enlightening for some reasons, the chances of mass scale adoption are greatly diminished (Ehrenreich, 1995; Whiteman, 1995; Marsh 1998).

Agroforestry as an innovation does not rate well, in general, against the criterion of observability. Potential adopters need be able to determine the advantages of the system through observation. Pannell (1998) notes that if an innovation generates observable results in a short span, it is easier to learn about the worth of innovation and its application by the individual farmer. In general, meaningful agroforestry system assessments and evaluations cannot be made for quite some time. Tree crops require a much longer timeframe per rotation than do annual crops. Again opportunity cost becomes an issue. When resources are being expended on a production system that requires more time to yield tangible benefits, scarce and valuable resources are being pulled away from other productive uses (Ehrenreich, 1995; Whiteman, 1995).

While Rogers' theory has been widely acclaimed and merits the preceding explanation, its application raises several critical issues. Application of this extension theory is largely dependent upon highly skilled, highly motivated, effective change agents. This implies that extensionists must be very well trained (Ehrenreich, 1995; Whiteman, 1995).

Further, the methodological approaches emerging from Rogers' framework entail working closely and effectively with local populations and making these populations aware of unfelt needs or to reprioritize felt needs and persuade them to adopt a pre-determined innovation. In other words, the approach can be very top-down. If such an approach is to result in adoption of an innovation, change agents must be sensitive and skilled enough to inculcate a sense of local ownership in the innovation. This may be a tall order in extension bureaucracies where agents may not be adequately trained to work with local populations or do not view members of these populations as equals (Ehrenreich, 1995; Whiteman, 1995).

CONCLUSIONS

Rogers' "Diffusion of Innovations" provides a useful theoretical structure which to promote adoption of agroforestry. It suggests a process that entails looking at the

structure of the society targeted with the innovation of agroforestry. This examination reveals to whom efforts should best be addressed. The study of the role of extension agent reveals that agroforestry promoters need to ensure that they use extensionists with the skills needed to work effectively with rural populations and establish a working partnership that will result in a sense of ownership in agroforestry endeavors. The examination of agroforestry as an innovation provides information useful to developing adoption strategies that address its weaknesses in the areas of trialability and observability and/or that enhance its strengths to supersede these weaknesses.

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