

# AGRICULTURAL EXTENSION EDUCATION

## Diffusion and Adoption of Agricultural Innovations

Dr. B. B. Singh  
Professor and Head  
Dept. of Agricultural Communication  
College of Agriculture  
G.B. Pant University of Agriculture and Technology  
Pantnagar – 263145

Dr. O.P.Mishra  
Lecturer  
Dept. of Extension Education  
Institute of Agricultural Sciences  
Banaras Hindu University  
Varanasi- 221005

(5-9- 2007)

### **CONTENTS**

[Diffusion](#)

[Stages of Adoption](#)

[Adopter Categories](#)

[Change Agent](#)

[Characteristics of Innovation](#)

[Innovation-Decision Process](#)

[Strategies to Diffuse Innovations](#)

### **Keywords**

Innovation, decision process

## **Diffusion**

Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. There are four elements in diffusion process.

1. An innovation
2. Communication Channels
3. Time
4. Social system

**Innovation:** An innovation is an idea, practice or object perceived as new by an individual or other unit of adoption. Technology is a design for instrumental action that reduces the uncertainty in the cause effect relationship involved in achieving a desired outcome. The components of technology are: Hardware (physical) and Software (knowledge base).

A good innovation should have following five attributes:

- Relative advantage
- Compatibility
- Complexity
- Trialability
- Observability

Re-invention is the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation.

**Communication channel:** It is the means by which the messages get transferred from one individual to another. Mass media are good for creating awareness knowledge where as interpersonal channels are good for forming and changing attitude of the people towards technology.

**Social System:** It is a set of interrelated units that are engaged in joint problem solving to accomplish a common goal.

### **Components of a Social System**

1. Structure: It is patterned arrangement of the units.
2. Norms: These are the established behavior patterns. Opinion leaders exhibit the norms.

**(i)Heterophily:** It is the degree to which pairs of individuals who interact are different in certain attributes, such as beliefs, education, social status and the like.

**(ii)Homophily:** It is the degree to which pairs of individuals who interact are similar in certain attributes such as beliefs, education, social status and the like.

**Time:** It is involved in: Innovativeness, Innovation rate of adoption, Innovation Decision Process.

**(i)Innovation Decision Process:** It is the mental process through which an individual (or other decision making unit) passes from first knowledge of an innovation to forming an attitude towards the innovation, to a decision to adopt or reject, to implementation of the new idea and to confirmation of this decision.

The steps in Innovation Decision Process are:

1. Knowledge
2. Persuasion
3. Decision
4. Implementation
5. Confirmation

**(ii) Innovativeness:** It 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.

**(iii) Rate of Adoption:** It is the relative speed with which an innovation is adopted by members of a social system. Adoption is a decision to make full use of a new idea as the best course of action available.

**Rejection** is the decision not to adopt an innovation while **Discontinuance** is a decision to cease the use of an innovation after adopting it earlier. Discontinuance, then, is essentially adoption of an innovation, followed by rejection. Discontinuance is of two types:

1. Replacement: Replacement discontinuance is a decision to reject an idea in order to adopt a better idea that supersedes it.
2. Disenchantment: Disenchantment discontinuance is a decision to reject an idea as a result of dissatisfaction with its performance.

### **Stages of Adoption**

Adoption Process is the mental process through which an individual passes from first knowledge of an innovation to a decision to adopt or reject and to later confirmation of this decision.

Rogers (1983) has given following five stages of adoption process:

**1. Awareness:** At this stage an individual first hears about the innovation. This means that individual is exposed to an idea but lacking detailed information about it. This is somewhat like seeing something without attaching meaning to it.

**2. Interest:** At this stage an individual is motivated to find out more information about the new idea. An individual wants to know what it is, how it works and what its potential may be.

**3. Evaluation:** At this stage mental trial of new idea takes place. An individual considers the relative advantage of the new idea over other practices/alternatives.

**4. Trial:** At this stage an individual tests the innovation on a small scale for himself. An individual seeks information about technique and method of applying the new idea.

**5. Adoption:** If satisfied with trial an individual will decide to use the innovation on large scale in preference to old methods.

Duration and length of time between any two stages varies with each practice and individual. The rate at which different individuals go through the different stages varies with the personal characteristics of the individual and the nature of the group influences on him.

---

## Stages of Adoption Process as Used in Indian Researches

1. First information, most information and final adoption
2. Awareness, acquaintance and adoption
3. Awareness, trial and adoption
4. Awareness, knowledge, trial and adoption
5. Awareness, interest, evaluation, trial and adoption
6. Awareness, interest, trial, evaluation and adoption
7. Need, awareness, interest, deliberation, trial, evaluation and adoption

**Source:** Dasgupta, S. (1989) *Diffusion of Agricultural Innovation in Village India*. Willey Eastern Ltd., New Delhi

---

### Adopter Categories

Adopter categories are the classifications of members of a social system on the basis of innovativeness, the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system.

Rogers (1983) has suggested following standard set of adopter categories that is widely followed today.

**(i) Innovators:** Innovators are also known as ‘venturesome’. Venturesome ness is the salient value of the innovator. Innovators are very eager to try new idea. They have more cosmopolite social relationship. They have ability to understand and apply complex technical knowledge. They have ability to cope with high degree of uncertainty about an innovation. They are risky, hazardous and daring in nature. They play gate keeping role in the social system. There are 2.5 percent innovators in a social system.

**(ii) Early Adopters:** Early Adopters are also known as ‘respectable’. They are localites and have opinion leadership. Members of the social system consider them as “the individual to check with” before using a new idea. Change agents consider them as “local missionary”. They hold “central position” in the communication structure of the system and are respected by peers. There are 13.5 percent Early Adopters in a social system.

**(iii) Early Majority:** Early Majority are also known as ‘deliberate’. They adopt new ideas just before the average member of a social system. They seldom hold leadership position. They provide “interconnectedness” in the system’s networks. Motto of early majority is- “Be not the first by which the new is tried, nor the last to lay the old aside”. There are 34 percent Early Majority in a social system.

**(iv) Late Majority:** Late Majority are also known as ‘skeptical’. They adopt new ideas just after the average member of a social system. They adopt an innovation when they feel that it is safe to adopt. There are 34 percent Late Majority in a social system.

(v) **Laggards:** Laggards are also known as ‘traditional’. They are the last in a social system to adopt an innovation. They are the most localities and isolates. They possess almost no opinion leadership. The point of reference for the laggards is the past. They interact with people having traditional values. They are suspicious of innovations and change agents. There are 16 percent Laggards in a social system.

### **Change Agent**

Change Agent is an individual who influences clients’ innovation decisions in a direction deemed desirable by a change agency. Teachers, consultants, public health workers, agricultural extension agents, development workers, sales people, and many others are examples of a change agent working in rural area.

**Roles of Change Agents:** In general change agents perform two main roles in diffusion of innovation.

1. They provide linkage between change agency and client system. They pass the innovations from change agency to ultimate users.
2. They identify clients’ needs and obtain feedback about changed programme, and feed it to change agency.

If one follows the process of introducing a single innovation in a client system, seven roles can be identified for change agent.

- Develops need for change
- Establishes an information-exchange relationship
- Diagnoses their problems
- Creates intent to change in the client
- Translates intent into action
- Stabilizes adoption and prevents discontinuances
- Achieves a terminal relationship

### **Factors in Change Agent Success:**

- **Change agent effort:** It is positively related to his success.
- **Change agent versus client orientation:** A change agent having client orientation is more successful.
- **Compatibility with clients’ needs:** If change agent efforts are compatible with clients’ needs he will be successful.
- **Change agent empathy:** It is also positively related to his success.
- **Homophily and change agent contact :** A change agent who is similar to his clients in certain aspects like age ,education, belief, values, background, etc. will be more successful than a heterophilous change agent.
- **Change agent credibility:** It is positively related to his success.

### **Characteristics of Innovation**

Among the members of a social system some innovations diffuse from first introduction to wide spread use in a few years where as others take more number of years. This is due to characteristics of innovation, that affect the rate at which they diffuse and are adopted. There are five perceived attributes of innovations in universal terms.

**1. Relative Advantage:** It is the degree to which an innovation is perceived as being better than the idea it supersedes. It is positively related to its rate of adoption. For example: a weedicide for wheat crop was earlier used as post emergence weedicide after that pre-emergence weedicide was invented. The use of pre-emergence weedicide was preferred as it did not allow the weeds to grow as compared to the post emergent weedicide, which is used after the emergence of weeds which has already incurred some loss to the crop.

**2. Compatibility:** It is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and the need of potential adopter. The compatibility of an innovation as perceived by members of a social system is positively related to its rate of adoption. Beef production lack compatibility with cultural values in India. Eating food with left hand lack compatibility with social norm as left hand is considered to be unclean. Piggery is a profitable enterprise but it is not adopted by Brahmins and Muslims as it is not compatible with their culture.

**3. Complexity:** It is the degree to which an innovation is perceived as relatively difficult to understand and use. The complexity of an innovation as perceived by members of a social system is negatively related to its rate of adoption. For example, change in variety of a particular crop is not that complex as change in total enterprise (e.g. shifting from crop production to poultry production).

**4. Trialability:** It is the degree to which an innovation may be experimented with on a limited basis. For example, new seeds or fertilizers can be tried on a small scale, but new machinery or a thing like cow dung gas plant can not be so tried. The trialability of an innovation as perceived by social system is positively related to its rate of adoption.

**5. Observability:** It is the degree to which the results of an innovation are visible to others. The observability of an innovation as perceived by members of a social system is positively related to its rate of adoption. For example, the results of some practices like application of nitrogenous fertilizers to the plants are easily observed while the results of some innovations like treatments of seeds and soil conservation measures are not easily observed.

On the basis of above traits it can be said that technologies which are relatively more advantageous; compatible with social values, past experiences, and the need of potential adopter; simple to understand and use; can be experimented on a small scale; and which results are visible to others are rapidly adopted by the members of a social system. Technologies which are lacking in these traits take more time to be adopted by the members of a social system.

### **Innovation–Decision Process**

The innovation-decision process is the process through which an individual (or other decision making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision.

Rogers (1983) has proposed following five stages of Innovation-Decision Process.

**1. Knowledge:** At this stage an individual (or other decision-making unit) is exposed to the innovations existence and gains some understanding of how it functions.

**2. Persuasion:** At this stage an individual (or other decision-making unit) forms a favorable or unfavorable attitude towards the innovation.

**3. Decision:** At this stage an individual engages himself in activities that lead to a choice to adopt or reject the innovation.

**4. Implementation:** At this stage an individual puts an innovation into use.

**5. Confirmation:** At this stage an individual seeks reinforcement for an innovation-decision already made, but he or she may reverse this decision if exposed to conflicting messages about the innovation.

Rogers indicates that there is clear evidence for the 'knowledge' and 'decision' stages, but evidence for the other stages is much less certain. Perhaps persuasion and implementation can happen at different moments in the adoption process. Persuasion can occur after the decision to adopt, which sometimes is taken without careful consideration of the possible consequences. Implementation, which is a serious consideration of how the farmers will change their farm management by adopting this innovation, can take place partly before the decision is taken. Implementation often implies that the innovation is modified to suit more closely the need of the farmer who adopts it. People often gather additional information after they have adopted an innovation to confirm they have made the right decision.

### **Strategies to Diffuse Innovations among Resource Poor Farmers**

#### **1. Farming System Research/Extension (FSR/E)**

FSR is an approach to agricultural research and development that views the whole farm as a system and focuses on (i) The interdependencies between the components under the control of members of the household, and (ii) How these components interact with the physical, biological and socioeconomic factors not under the household's control (Shaner et al, 1982).

**Evolution of FSR:** This approach was developed in the 1970s in response to the observation that groups of small scale farm families were not benefiting from the mainstream agricultural research.

**Characteristics of FSR:** According to Shaner et al (1982) core characteristics of FSR are:

- It is holistic
- It is farmer participatory
- It is problem solving
- It is gender sensitive
- It is interdisciplinary
- It is interactive and iterative
- It emphasizes extensive on farm activities

- It complements experiment station research
- It acknowledges the location specificity of technical solutions
- It recognizes interdependencies among multiple clients
- It emphasizes feedback

**FSR/E Activities:** FSR is a process which involves a set of interrelated activities, which according to Shaner et.al (1982) are as follows:

- Target and research area selection
- Problem diagnosis and development of research agenda
- Planning and designing of on-farm research
- Farmer participatory on-farm research and its analysis
- Extension of research results.

## **2. Farmer-Back-to-Farmer Extension (FBF)**

According to Rhodes and Booth (1982) Farmer-back-to farmer extension model is associated with farming system research. Basic philosophy behind this model is that successful agricultural research and development must begin and end with the farmer. Applied agricultural research cannot begin in isolation on an experimental station. Research must strive to close the circle, from proper identification of the problem to farmer's acceptance or rejection. The purpose of diagnosis is to arrive at the widest possible consensus between farmers, social scientists and technologists on the definition of the problem to be solved.

**Different Stages of FBF Model:** Following three stages are involved in this model:

1. Identification of problems and resources is done by scientists in consultation with farmers.
2. Development of technology is done by the scientists that fit to the local conditions. Here, farmer will act as an advisor.
3. Actual evaluation and use of technology is done by the farmer under his conditions, resources and management.

If the technology is rejected, the entire process is repeated to determine the reasons and find the ways to overcome them.

## **3. Farmer- First- and- Last Model (FFL)**

According to Chamber and Ghildyal (1984) FFL model is almost similar to the previous model. It starts with holistic and interdisciplinary appraisal of the farm families, resources, needs and problems and continues with on-farm and with farmer R&D while the scientists, experiment stations and laboratories act in a consultancy and referred role. It fits the needs and opportunities of resource poor farmers' better than transfer of technology model. It promises a greater contribution from agricultural research in the eradication of rural poverty in the country.

## **References**

1. Balaguru, T. 1986. Farming Systems Research: Paradigm Shift in Agricultural Research. Course on Agricultural Research Project Management, May 26-June13.NAARM,Hyderabad.

2. Chambers,R. and Ghildyal, B.P.1984. Agricultural Research for Resource-Poor Farmers: The Farmers-First-and-Last Model. Paper Presented in the Workshop on NARP at NAARM, Hyderabad (Cited by T. Balaguru,1986).
3. Dasgupta, S. 1989. *Diffusion of Agricultural Innovations in Village India*. Wilay Eastern Limited, New Delhi.
4. Rhodes. R.E. and Booth, R.H. 1982. Farmer-Back-to-Farmer: A model for generating acceptable Agricultural Technology. *Agricultural Administration*, 11:127-137 (Cited by T. Balaguru,1986).
5. Rogers, E.M. 1983. *Diffusion of Innovations*. The Free Press, New York.
6. Shaner, W.W.; Philipp, P.F. and Schmehl, W.R.1982. *Farming Systems Research and Development: Guideline for Developing Countries*. Westview Press, Boulder, Colorado, USA.