
UNIT 11 DIFFUSION AND ADOPTION OF NEW TECHNOLOGIES

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11.0 AIMS AND OBJECTIVES

This unit deals with the importance of diffusion and adoption of new technologies in the development process. We shall talk about the history of diffusion of innovation and the concepts of new technologies. This module provides a systematic explanation about the diffusion and adoption of new communication innovations.

At the end of this unit, you will be able to:

- Describe history of diffusion of innovation;
- Explain the meanings and components of new technologies;
- Discuss the process of diffusion of new technologies;
- Analyse the significance of diffusion of new technologies in overall growth;
- Describe adoption process;
- Discuss categories of adopters; and
- Explain characteristics of innovations.

11.1 INTRODUCTION TO THE CONCEPT OF DIFFUSION OF INNOVATION

The concept of diffusion of innovation with references to technological advancement and ideas was identified by Everett Rogers (1962). He argued about significant role of communication in disseminating information for development. Interestingly, with passing of time the perspectives on diffusion of innovations theory have changed as initial concept was unable to explain development appropriately.

- As explained by Rogers (1962), ‘diffusion’ is the process through which an innovation is communicated via definite channels over time among the audiences of a social system.
- It is a special type of communication wherein the messages are specifically concerned with new ideas. We are aware that communication is a process for sharing information with one another for reaching a level of mutual understanding. Thus, communication is basically a process of convergence as two or more individuals are involved in exchanging information.
- Diffusion is a social process that occurs when people learn about an innovation. In its most basic form, diffusion involves an innovation that is communicated over time among members of a social system via specific channels. The time of adoption is a common dependent variable in diffusion. On the other hand, adoption occurs when a person does something different than they did previously, such as purchasing or using a new product or technology, learning and performing a new behaviour, etc. The key to adoption for the individual is to perceive the idea, behaviour, or product as novel or innovative. Diffusion is possible as a result of adoption to a great extent. Diffusion has very appropriately been defined as a kind of social change and the process through which adaptation follows in the structure and function of the social system. It is believed that when new ideas are invented and diffused, and is either adopted or rejected, they eventually lead towards certain consequences and at that point of time social change occurs. Well, there are possibilities that such change can take place in other ways too, for instance, through a socio-political revolution or through natural calamities. The word ‘diffusion’ includes adoption of both the strategic and the natural spread of new ideas.

11.2 INNOVATION

An innovation is basically as an idea, or object which is perceived as new by an individual, organization or any other unit of adoption. Interestingly, the perceived newness associated with the idea of the individual decides his or her reaction to it. If the idea appears new to the individual, it is considered

innovation. 'Newness' in an innovation need not necessarily just include new knowledge. The newness of an innovation could be conveyed in terms of knowledge, influence, or a decision to adopt. Well, it should not be presumed that the diffusion of all innovations including technologies are essentially desirable. In fact, there are some studies indicating towards harmful and uneconomic innovations which are generally not desired by the larger social system. An innovation always has two components – the hardware and the software. This is clear in the case of the computer where the machine (hardware) is useless without the programmes which instruct it what to do (software). It is also true for a plant variety where we have the plants (equivalent to hardware) and the techniques for growing them (equivalent to software). It is possible that the same software can be used for a new variety as for the old variety, but we often need new techniques also for cultivation, fertilizer application, etc to ensure optimal production by the new variety. Farmers often play an important role in developing the right kind of software. Scientists who develop new hardware in their research station should take into account the software which might be available to farmers. However, they often fail to do this. For example, they have developed many more techniques for irrigated agriculture although no irrigation is available for the last majority of farmers.

11.3 ADOPTION

It can be defined as the process through which a person can reach at the decision whether to accept or reject an innovation or idea after becoming aware of it. Rogers (2003) stressed on the role of mass media in creating awareness among the people and distinguishes that apart from the mass media, it is the personal interest and sources that eventually influence the adoption process of changes. The early diffusion research studies were precisely directed towards the role of mass media in creating awareness. Diffusion is a type of social change defined as the process by which a social system's structure and purpose change. New ideas are created, disseminated, and adopted or rejected, resulting in specific outcomes in social change. Of course, such change can also happen through other means, such as a political revolution or a natural disaster like a drought or an earthquake.

11.4 HISTORY OF DIFFUSION OF INNOVATION

Since the 1940s and 1950s, study on the diffusion of innovations started taking place in sequences. It emphasized on the ability of media messages in creating knowledge about new ideas and practices. The theory of diffusions of innovations evolved as an indigenous agenda for modernization development and stressed on the role played by opinion leaders in persuading the target group in adopting the technological innovations in a society. This theory also emphasized on the role of communication process and communication effects. Researchers have studied the diffusion of innovation

from diverse perspectives. For example, educational scholars have studied innovation and adoption in the context of new pedagogical ideas while the rural sociologists have considered innovations in the context of adapting to agricultural advances in farming process. It is quite clear from the above statements that diffusion of innovation research had been studied in different contexts and disciplines based on their applicability and outputs. By looking at the work ‘The Passing of Traditional Society’ by Daniel Lerner (1958), we would be able to understand the communication perspective based on references and theories that are collectively assembled in diffusion paradigm. Daniel Lerner’s work “The Passing of Traditional Society - Modernizing the Middle East” is noted to be defining diffusion paradigm and at same time marking the introduction of development communication. This notable work by Lerner (1958) is deliberated as the architect of change from a traditional conservative society to a modern technological society possible via mass media.

The role of communication in the development process was acknowledged by experts and social scientists long back. In his famous treatise ‘The Passing of the Traditional Society’ by Lerner (1958) recognized the role of communication in the development process and that the evolution of mass media had been one of the three phases of democratic and political progress. Mass media has a significant role to play in the process of development. We are already aware of the way with which mass media had led directly to socio-economic and cultural improvements across the developing nations of the world. In this context, Schramm (1964) made an observation stating that mass media offers the vast scopes of new approaches of transforming and uplifting the lives of the deprived people. In other words, this phenomenon of information dissemination is termed as development communication by scholars.

Till the early 20th century, researchers studying diffusion of innovations theory differed on the question of whether an innovative idea developed autonomously according to different cultures or whether they were invented in one culture and diffused or adopted by another culture.

11.5 NEW TECHNOLOGIES

A technology can be defined as a design for contributory action that decreases the ambiguity in the cause-effect processes involved in attaining a desired result. In simpler words technology usually has two components – firstly hardware aspect that comprises of the tool that represents the technology as physical objects, and secondly the software aspect that consists of the information base for the physical tool. For instance, ‘computer hardware’ comprising of transistors, electrical connections, semiconductors, and the metal frame for protecting all these electronic components, and on the other hand we have ‘computer software’ comprising of the instructions and coded commands that allow us to use it to encompass human competences in

solving various problems. These two aspects of technological innovations make us understand the close interaction between a tool and the way it is being out to use. Even though the software constituent of a technology is often not so obvious to observation, it should be noted that ‘technology’ in its complete sense always signifies a mixture of both hardware and software aspects.

Technologies encompass conventional technologies to the most modern form of tools. The tools range from radio, television to telephones, mobile phones, computers and also Internet. Mostly modern technologies include all software systems, electronic networks, communication devices as well as applications that lead to increased information transmission within less time and low costs. It is made possible by modern technologies that we are able to communicate in real-time with others across the world using instant messaging, voice message, video-conferencing and much more. We all are experiencing it in our daily lives on a regular basis. It is undeniable that rapid innovations in the technological front are making communication technologies less expensive and easier to access, so in a way bringing its full potential within the reach of a bigger number of people. So, in summation it can be stated that most technological innovations are produced by scientific research activities, although they often are a result from are relationship of scientific method and practical setups.

Check Your Progress 1

Note: i) Use the space below for you answers.

ii) Compare your answers with those given at the end of this unit.

1) What is meant by innovation?

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2) Write in brief the significance of diffusion?

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11.6 ADOPTION OF NEW TECHNOLOGIES IN DEVELOPMENT PROCESS

There are a number of areas where technology adoption has led to tremendous development such as agriculture, medicine industry, finance, infrastructure, governance, education, etc. to count a few. There is a connection between technology and innovation. In simpler words, it can be said that the adoption of technology can result in innovation that eventually justifies the goal or objective of improvements by any institution, individual or the larger society. The contribution of new technology in overall growth can be realised only when and if it is widely disseminated and used. Diffusion occurs as a result of a series of individual decisions to begin using the new technology, decisions that are frequently the result of weighing the uncertain benefits of the new invention against the uncertain costs of adopting it. We can appropriately say that Rogers' 'diffusion of innovations theory' is the most suitable for examining the adoption of technology in various developmental sectors like higher education, agriculture, medical and more. In fact, much of the diffusion of innovation research involves technological innovations and hence both the words "technology" and "innovation" are largely used as synonyms. Generally, innovations that are perceived by audiences as having larger relative advantage, less complexity and compatibility would be adopted much rapidly than any other innovation. This statement lies appropriate for the technological adoptions.

11.7 ADOPTION PROCESSES

Research studies have clearly demonstrated the extensive delays that often occur between the time farmers first hear about favorable innovations and the time they adopt them. It takes four years on average for the majority of mid – Western US farmers to adopt recommended practices. Research workers have naturally have been to find out what happens during this time. The following stages are often used to analyze the diffusion process:

- 1) Awareness – One first hear about the innovation
- 2) Interest - Seek further information about it.
- 3) Evaluation – Weigh up the advantages and is advantages of using it.
- 4) Trial – Test the innovation on a small scale for yourself.
- 5) Adoption – Apply the innovation on a large scale in preference to old methods.

The adoption process does not always follow this requence in practice. For example, it is not feasible to test a new farm building on a small scale. Interest may precede awareness.

An identical stage to the above could be

- 1) Knowledge
- 2) Persuasion (forming & changing attitudes)
- 3) Decision (adoption or rejection)
- 4) Implementation
- 5) Confirmation

The mass media like newspapers, magazines, radio and television generally can play a role in the above processes.

11.7.1 Adopter Categories

It is understandable that not everyone adopts innovations at the same rate. Some people accept new ideas years before others. People are often divided into five categories according to their scores or an adoption index. These are: (in per cent)

- | | |
|-------------------|------|
| 1) Innovators | 2.5 |
| 2) Early adopters | 13.5 |
| 3) Early majority | 34.0 |
| 4) Late majority | 34.0 |
| 5) Laggards | 16.0 |

These percentages serve mainly to make findings from different studies comparable by using a uniform classification. It is more important for extension agents that a minority of farmers are either early adopters or laggards, and a minority of the early adopters are innovators.

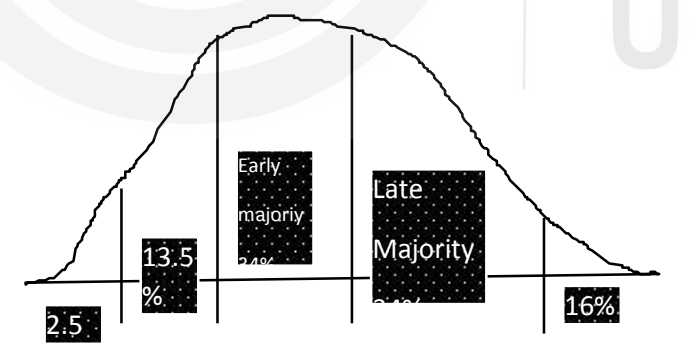


Fig. 6.1: The diffusion curve

11.8 ADOPTER CATEGORIZATION ON THE BASIS OF INNOVATIVENESS

- 1) Innovators – They are the first few to adopt a new idea or practice. They like to try out new ideas or practices. They are daring to take risk. They are also ambitious to achieve success. Normally, they are educated and have contact with sources of information out side the social systematic

make use of cosmopolite sources of information. They have control of substantial financial resources. They also have ability to understand and apply complex technical knowledge. However, they are deviant because they differ in many ways from the average farmers. They can not be role model for the average farmers.

- 2) Early adopters – (Respectable – respected by this peers) – They come next to innovators to adopt new idea or practice. Potential adopters look to early adopters for advice and information about the innovation. The early adopter is considered by many as “the man to check with” before using a new idea. Because early adopters are not too far, a head of the average individual in innovativeness, they serve as a role model for many other members of a social system.
- 3) Early majority – (Deliberate – considering carefully). They are the ones who adopt a new idea or practice a little earlier than the average person. The early majority may deliberate for sometime before completely adopting a new idea. “Be not the last to lay the old aside, nor the first by which the new is tried”, might be the motto of the early majority.
- 4) Late majority – (skeptical – doubting attitude). They are the ones who adopt innovations first after the average person. There are cautious and do not adopt until most others in their social system have done so. The pressure of peers is necessary to motivate adoption.
- 5) Laggards – (Traditional and conservative) laggards are the last to adopt an innovation. They are the most localite in their outlook and many are near isolates. Their point of reference is the past. Laggards tend to be frankly suspicious of innovations, innovators, and change agents.

11.9 IMPORTANCE OF OPINION LEADERS

Opinion leaders have considerable influence on the way in which people in their village think and farm. Farmers interact and learn more from friends, neighbours and relatives. They observe and learn from successful results of known farmers. They keep track of successful results of their neighbours and relatives and seek their advice. Some of these successful or progressive farmers are willing to share their experiences with other farmers. In this way they become opinion leaders in the village because they help other farmers solve problems. Farmers in an increasing number of villages like to know which new farm practices they should adopt and which they should not. People who are well informed about these practices tend to become opinion leaders. Different types of opinion leaders will emerge in these villages. An opinion leader will fulfil several of the following functions in his group with regard to innovations

- Pass on information from outside the group
- Interpret outside information on the basis of his own opinions and experience;

Sets an example for others to follow.

- “Legitimizes” or rejects changes that others want to carry out. That is to say, he gives his approval or disapproval for these changes; and
- Is influential in changing group norms. Not all opinion leaders will do all of these things.

Opinion leaders are able to solve many problems faced by their people. Hence, other villagers may follow their advice or example in the belief they will be successful as well. These leaders may exert influence on a wide range of topics in traditional societies. They may also have considerable power over collective decisions.

11.10 CHARACTERISTICS OF AN INNOVATION

- 1) Relative advantage – Does the innovation enable the farmer to achieve his goals better or at lower cost than he could previously ? This advantage can be influenced by giving incentives to the farmer, such as by providing seeds at subsidized rates. Such incentives may motivate farmers to try the innovation.
- 2) Compatibility with socio-cultural values and beliefs, with previously introduced ideas or with farmers felt needs. Clearly it is very difficult to introduce Pig husbandry among Muslims even if it is a very profitable enterprise. On the other hand, farmers who have received large yield increases by growing improved wheat varieties are likely to be very happy about accepting improved rice varieties as well. However, if an innovation fails after introduction it will be very difficult to get similar innovations adopted.
- 3) Complexity – Innovations often fail because they are not implemented correctly. Some require complex knowledge or skills. For example, it may be necessary to introduce a package of several relatively simple but related innovations. Each on its own is easy, but the relationship between them may be difficult to understand. Dairy cows with a higher genetic potential will produce more milk only if they have feed which is higher in protein and energy content. This in turn will require different crop husbandry practices.
- 4) Trialability – A farmer will be more inclined to adopt an innovation which he has tried first on a small scale on his own farm, and which proved to work better than an innovation he had to adopt immediately on a large scale. The latter involves too much risk. Trialability may be related to divisibility, as with fertilizers, for example. Although large machines cannot be divided; sometimes they can be rented before they are purchased.
- 5) Observability – A farmer can see a mile away that a colleague has changed from fodder beets to maize as cattle feed, but he might not know the book – keeping system used by his next door neighbour. Out of fear

for the “evil eye” a farmer might not show his improved cattle to his neighbours. Farmers learn much from observing and discussing their friends experiences. Their observations are often a reason to start these discussions.

Check Your Progress 2

Note: i) Use the space below for you answers.

ii) Compare your answers with those given at the end of this unit.

1) Discuss briefly the role of ICT in development.

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2) Do you think that technological innovations have uncertainty associated with it?

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11.11 LET US SUM UP

So, in summation we can say that diffusion is considered as a distinct type of communication, where the contents are concerned with a new idea or innovation. It is specifically this innovation of the idea in the message of communication which gives ‘diffusion’ its distinctive character. The newness also suggests that some level of uncertainty is involved in the diffusion of innovations. The concept of diffusion of innovation has been studied from different perspectives. Furthermore, the idea of adoption could also be defined from a different perspective as the after becoming aware of an invention or concept, the procedure through which a person might decide whether to embrace or reject it. The chief fundamentals in the diffusion of new ideas included an innovation or technology which is communicated through various channels among the members of a social structure. An innovation is defined an idea, practice, or object conceived as new and appropriate for adoption by an individual or other unit of the society. Almost all the ideas discussed in this module are about technological innovations. A technology is simply defined as an outline for instrumental action that decreases the uncertainty in the process involved in attaining a desired outcome. Most technologies have generally two components – hardware and software. This module also gave us an understanding about how technological diffusion in the existing processes of upliftment and

development in marginalised societies. We have also observed how any technological innovation also generates some level of ambiguity because of its originality to the individual. This is largely known as evaluation of diffusion of innovation and its subsequent consequences. This module also made it clear how diffusion of innovations research has occurred in recent years as a sole yet unified body of conceptions and overviews in social science, even though the studies are continued to be undertaken by researchers in numerous scientific disciplines as well.

11.11 KEYWORDS

Diffusion: Diffusion is the process by which an innovation is communicated to members of a social system over time through specific channels. It is a unique form of communication in that the messages are about new ideas.

Innovation: An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption.

ICT: Information and Communication Technologies (ICTs) is a broad term for Information Technology (IT), which encompasses all communication technologies such as the internet, wireless networks, cell phones, computers, software, middleware, video conferencing, social networking, and other media applications and services that allow users to access, retrieve, store, transmit, and manipulate data in a digital format.

Technology adoption: The successful integration of new technology into any firm or development process is known as technology adoption. Adoption entails more than simply putting technology to use.

11.12 SUGGESTED READINGS

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11.13 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

- 1) An idea, practise, or object that is perceived as novel by an individual or other unit of adoption is referred to as an innovation. In terms of human behaviour, whether or not an idea is 'objectively' new as measured by the time since its first use or discovery makes little difference. The individual's reaction to the idea is determined by how new it appears to him or her. It is an innovation if the concept appears novel to the individual.
- 2) Diffusion is a type of communication in which the messages are about a new idea. It is the novelty of the idea in the message content of communication that distinguishes diffusion. Because it is new, there is some degree of uncertainty involved.

Check Your Progress 2

- 1) The ICT revolution has opened up a plethora of new economic and social revolutions that can assist any country's development process. Its appeal has grown as a result of the convenience and reasonableness with which it may use ICT technologies. ICT is far more than social networking sites, and it can be wisely applied to support numerous elements of development such as education, business, health, government, and so on.
- 2) In the minds of potential users, a technological advance causes one sort of uncertainty about its projected implications, while also providing a possibility for decreased ambiguity in another sense, that of the technology's knowledge base.