ROLE OF COMMUNICATION IN DIFFUSION OF INNOVATIONS
(A Historical Analysis)

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Abstract
The purpose of this paper is to derive lessons learned from the past research on the diffusion of innovations that could be utilized in present day research in the area of mass communication. We place a main emphasis on how to evaluate the effects of diffusion process on adopters of the innovations. The paper describes the main elements involved in the diffusion of innovations process as well as it elaborates new dimensions in this research area. The role of communication channels have also been described in the process of diffusion of innovations.

Historical Background
Before the industrial revolution, changes in societies took place slowly. Some inventions were widely adopted, but a lot of them were not accepted in the societies. A lot of inventions took many decades or even centuries to come into wide use. Consequently the social and cultural structures of societies remained relatively stable over long periods.

The process of slow adoption of innovations might be due to low rate of innovations, but the major reason behind this was the limitations of communications that were essentially limited to word of mouth. The majority of people lived and worked in farms, even in Europe and U.S.A. Illiteracy was ruling over the world. Even after the invention of the printing press, literacy was limited to affluent and urban elite who could afford to buy the limited number of books, the early versions of newspapers and a few magazines that were available.

The industrial revolution changed the situation. It began near the end of the eighteenth century and accelerated during the nineteenth and twentieth centuries. In this period the rate of inventions drastically increased. Literacy became more common with increase in industrialization. Increased literacy made possible a rising tide of mass communication. In 1830s, the Penny Press became the first mass medium serving large number of readers on daily basis. Broadcast and film media were added in 1890s (Lowery, S.A. and DeFleur, M.L. 1995, p.116). Now the communication process was increased from the words-of-mouth medium to a number of print and electronic media. All of these changes provided circumstances favorable to both development and spread of innovations.

In this period of industrialization, significant social and cultural changes took place in human lifestyles. Cheap amusements like music etc. became a necessity for industrial workers. The demand of entertainment and news gave birth to wide spread media empires.

The industrial revolution changed the traditional society into a mass society in which people were isolated due to their different socio-economic backgrounds. Factors like bureaucracy, contracts, migration, stratification and the spread of innovations worked to set people apart far more than to bring them together. For these reasons, social scientists of the nineteenth century conceptualized the urban industrialized society as a mass society. (Lowery, S.A. and DeFleur, M.L. 1995, p.11)

As a result of industrial revolution, many kinds of unlike people were mixed through migrations and now they began to live together in urban areas. This diversity reduced the free flow of information through informal interpersonal channels based on friendship and kinship. The old traditional society was disappearing. People became increasingly dependent on mass media as a means by which they could become aware of new products, ideas and other innovations. (DeFleur, M.L. and Dennis, E.E., 1994, pp.18-19).

Role of Innovations in Social Change

A real wave of inventions had been produced in industrializing societies by the beginning of the last (20^{th}) century. New machines, ideas, devices and equipments were constantly being invented or borrowed from other societies. This flow of innovations had the capacity to change almost every aspect of life. But the phenomenon of adoption of innovations became complex when some items were widely accepted while some others were ignored or rejected by the societies. In these circumstances the question was significant: why is one thing, practice or idea well received and widely adopted, while another is all but ignored? The French sociologist Gabriel Tarde stated this issue almost one hundred years ago in these words:

"Our problem is to learn why given one hundred innovations conceived at the same time, ten will spread abroad, while ninety will be forgotten."(Gabriel, T. 1903, p.140)

Tarde's answer was to search for universal "laws of imitation" relating the characteristics of "things" to human desires through a process of "suggestion". In other words, he wanted to identify the human decision-making process that led people to adopt or reject a given innovation when it came to their attention. Social scientists began to see similarities between the cumulative patterns of growth over time in the adoption of an innovation by a population. Researchers found S-shaped curves in adoption of innovations. Similarities were found between growth patterns in research studies conducted in the fields of biology and economics and in the adoption of certain social and cultural phenomena. (Lowery, S.A. and DeFleur, M.L. 1995, p.117) Another sociologist Stuart Chapin studied growth patterns in social institutions over varying spans of years. He also found cumulative S-shaped curves describing the adoption of such phenomena as the commission form of city government. He had high hopes that some kind of universal pattern would eventually be revealed. (Chapin, F.S. 1928, P.376)

By the 1940s, then, it seemed clear that those innovations that did spread through a population were likely to follow an S-shaped curve of adoption. (These curves are shown in the figure included in this paper). It appeared that a universal law was within reach. However, it was yet not clear how the innovation came to their attention and how they decided whether or not to adopt it. No researcher provided effective insights into why some innovations were widely adopted while others were largely ignored. Then a longitudinal study was conducted by rural sociologists of the Iowa State University. It was a study of how an agricultural innovation was adopted by a number of Iowa farmers who raised corn. This study has revealed a more complete understanding of how adoption takes place and the role of communication especially mass media, in the process of adoption of innovations in some population. The researchers of this study were two rural sociologists, Ryan and Gross, and the adoption of hybrid seed corn was studied between two groups of farmers in Iowa. The data was gathered through in-depth interviews with farmers.

Ryan and Gross Study:
New Dimensions in Diffusion of Innovations Research

The paradigm for diffusion research can be traced to the rural sociology research tradition, which began in the 1940s. Ryan and Gross (1943) investigated the diffusion of hybrid seed corn among Iowa farmers. Hybrid seed was made available to Iowa farmers in 1928. The hybrid vigor of the new seed increased corn yields on Iowa farms, hybrid corn varieties withstood drought better than the open-pollinated seed they replaced, and hybrid corn was better suited to harvesting by mechanical corn pickers. By 1941, about thirteen years after its first release, the innovation was adopted by almost 100 percent of Iowa farmers. (Ryan and Gross, 1943) Ryan and Gross studied the rapid diffusion of hybrid corn in order to obtain lessons learned that might be applied to the diffusion of other farm innovations. However, the intellectual influence of the hybrid corn study reached far beyond the study of agricultural innovations, and outside of the rural sociology tradition of diffusion research. Since the 1960s, the diffusion model

has been applied in a wide variety of disciplines such as education, public health, communication, marketing, geography, general sociology, and economics.

Ryan and Gross study of the adoption of hybrid seed corn opened new dimensions in the research of diffusion of innovations. The researchers found that the adoption tended to be on a gradual and almost experimental basis. Few farmers had switched their entire land from old seed to new hybrid in a single planting. A number of different channels were involved in the process of attention of the innovation. Nearly half of the adopters stated salesmen from the seed companies as their earliest source of information. About ten percent learned of its existence from radio advertisements. Articles in farm journals accounted for an additional 10.7 percent. Only 14.6 percent named neighbors as their initial source of information. Some few people had been informed by their relatives. In decision making process, neighbors were found as the most influential source and the salesmen as the least influential in spite of the fact that they were identified as the most frequent source of initial information. (Ryan and Gross, 1943, p.16)

Concepts of Diffusion and Innovation

Rogers defined and explained the concepts of diffusion and innovation. He defined an innovation in a straightforward manner as an idea, practice or object that is perceived as new by an individual or other unit of adoption. According to this definition it does not matter whether or not something is in fact "new". It can be regarded as innovation if it appears to be new to the adopter. Rogers defined diffusion as a process by which an innovation is communicated through certain channels over time among the members of a social system. (Rogers, E.M. 1995, p.1) Different types of innovations diffuse at different rates. The pattern of adoption (swift or slow) will depend on the particular trait and the characteristics of the social system, as well as the types of people who become aware of its existence and potential value for their purposes.

In other words, diffusion is the process by which (1) an innovation (2) is communicated through certain channels (3) over time (4) among the members of a social system. Diffusion is a special type of communication concerned with the spread of messages that are perceived as new ideas. The four main elements in the diffusion of new ideas are (1) the innovation, (2) communication channels, (3) time, and (4) the social system The following Figure elaborates the process of diffusion of innovations.

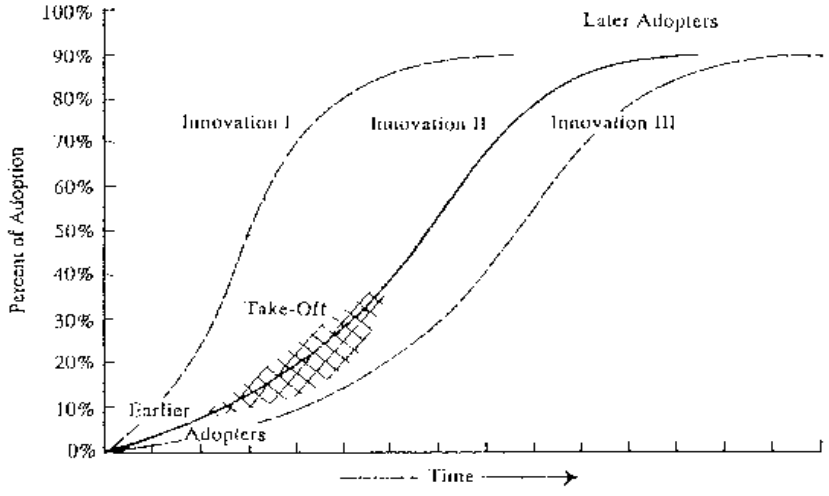

Figure: Diffusion is the process by which (1) an *Innovation* is (2) *Communicated* through certain *Channels* (3) over *Time* (4) among the members of a *Social System*

Role of Innovations in Diffusion Process

An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. The characteristics of an innovation, as perceived by the members of a social system, determine its rate of adoption. The above figure shows the relatively slower, and faster, rates of adoption for three different innovations. Why do certain innovations spread more quickly than others? The characteristics which determine an innovation's rate of adoption are:

(1) relative advantage

(2) compatibility

(3) complexity

(4) trialability, and

(5) observability.

- Relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes. The degree of relative advantage may be measured in economic terms, but social prestige, convenience, and satisfaction are also important factors. It does not matter so much if an innovation has a great deal of objective advantage. What does matter is whether an individual perceives the innovation as advantageous. The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption will be.
- Compatibility is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. An idea that is incompatible with the values and norms of a social system will not be adopted as rapidly as an innovation that is compatible.
- Complexity is the degree to which an innovation is perceived as difficult to understand and use. Some innovations are readily

understood by most members of a social system; others are more complicated and will be adopted more slowly. New ideas that are simpler to understand are adopted more rapidly than innovations that require the adopter to develop new skills and understandings.

- Trialability is the degree to which an innovation may be experimented with on a limited basis. New ideas that can be tried on the installment plan will generally be adopted more quickly than innovations that are not isolatable. An innovation that is trialable represents less uncertainty to the individual who is considering it for adoption.
- Observability is the degree to which the results of an innovation are visible to others. The easier it is for individuals to see the results of an innovation, the more likely they are to adopt it. In summary, then, innovations that are perceived by individuals as having greater relative advantage, compatibility, trialability, observability, and less complexity will be adopted more rapidly than other innovations.

Role of Communication Channels in Diffusion Process

Another main element in the diffusion of new ideas is the communication channel. Communication is the process by which participants create and share information with one another in order to reach a mutual understanding. A communication channel is the means by which messages get from one individual to another. Mass media channels are more effective in creating knowledge of innovations, whereas interpersonal channels are more effective in forming and changing attitudes toward a new idea, and thus in influencing the decision to adopt or reject a new idea. Most individuals evaluate an innovation, not on the basis of scientific research by experts, but through the subjective evaluations of near-peers who have adopted the innovation.

Ryan and Gross study found interpersonal channels (salesmen and neighbors) more important in bringing the innovation to the attention of potential adopters than mass media like radio, magazines and

newspapers. The finding is to some extent astonishing for the scholars of mass communication because the research did not show that mass communications were particularly important, either in informing the relevant population or in persuading them to adopt it. The reasons that mass communications played a relatively minor part in the diffusion of the adoption of the hybrid seed corn in Iowa at the time is that the setting was a rural environment closely resembling a traditional society where word-of-mouth communication channels were more important. Moreover it was not a kind of innovation that would normally be advertised via common mass media that were operative at the time. Because of these reasons interpersonal channels were stronger than mass media in the diffusion of innovations process of the hybrid seed corn.

In urban areas, then or now, where one's neighbors may be total strangers, one would seldom expect to receive a great deal of information about an innovation by word-of-mouth channels. In cities, mass media are undoubtedly far more significant as sources of first learning of almost any new idea, product or service. People hear about new innovations from mass media. The ratio between interpersonal channels and mass media channels is likely to be drastically reversed for most innovations adopted in more urban settings.

The important points revealed by the Ryan and Gross study were the ideas of stages in the adoption process, the different categories of adopters, and the channels by which they receive different influences from various sources. The study has had a profound intellectual impact in understanding the role of mass communication in social and cultural change.

Role of Time Factor

The third main element in the diffusion of new ideas is time. The time dimension is involved in diffusion in two ways. First, time is involved in the innovation-decision process. The innovation-decision process is the mental process through which an individual 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. An individual seeks information at various stages in the innovation-decision process in order to decrease uncertainty about an innovation's expected consequences. The second way in which time is involved in diffusion is in the innovativeness of an individual or other unit of adoption. 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 described five adopter categories on the basis on their innovativeness: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards. (Rogers, E.M. 1997)

Role of Social System

The fourth main element in the diffusion of new ideas is the social system. A social system is defined as a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal.(Rogers, E. M. 1995) The members or units of a social system may be individuals, informal groups, organizations, and/or subsystems. The social system constitutes a boundary within which an innovation diffuses. Social system plays an important role in diffusion of innovations process and without taking it in consideration; no innovation can be diffused successfully.

Role of Opinion Leaders

The two-step flow model of mass communication suggests that communication messages flow from a source, via mass media channels, to opinion leaders, who in turn pass them on to followers (Rogers, 1995). This two-step flow model of mass communication can be utilized to diffuse an innovation. The model focuses attention on the inter-media interface between mass media channels and interpersonal communication channels. Mass media channels are primarily creators of awareness-knowledge of innovations, while interpersonal networks

are more important in persuading individuals to adopt or reject innovations.

Ascraft, Roling and Rogers described the importance of opinion leaders in adoption of innovations in these words:

One essential thing that the change agent must do is to identify the local leaders. The leaders may base their authority on different grounds: religious, traditional, political but often new ideas cannot be introduced without the support of such groups. If they do not wish to encourage the practice of a new idea actively, at least they should be persuaded not to actively oppose it. (Ascraft, Roling and Rogersm E.M. 2000, Development Support Communication, AIOU, Islamabad.

Role of New Communication Technologies

We live in the age of communication revolution. New and developing communication technologies, and, ultimately, equipment and systems, are greatly influencing the communication industry. Internet is one example. This is a network of interconnected computer systems. By using the Internet as a data highway, an individual can communicate with colleagues and friends at great distance very cheaply, and gain direct access to information in other computer systems. The Internet provides a direct connection to library catalogs, electronic journals, software, and data-files. Furthermore, diffusion of the Internet has been exceedingly rapid. From 1990 to 1996, the number of individuals adopting the Internet in North America rose from approximately 5 million to 52 million. (Rogers, E.M. and Karyn L. S. 1997) Now-a-days, internet is playing vital role in diffusion of innovations worldwide.

Conclusion

Now the world has been changed into global village. From U.S to Pakistan, the old traditional societies have changed into modern societies. Media have a pivotal role in the lives of the people in the

whole world. Even farmers rely on media for information, unlike the farmers of 1940. Modern day planners and change agents cannot ignore the role of media and technology in diffusion of innovations process. The need is to evaluate how to use modern media effectively for the wide spread adoption of innovations. The past experiences can provide a solid theoretical and practical background in this regard. The past research can provide a foundation stone to the modern day research.

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