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Diffusion Theory

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Although its main principles were in use earlier, *diffusion of innovations theory* (diffusion theory) was first formally articulated by Everett M. Rogers in the early 1960s. Areas of research where this theory has been applied include agriculture, health, teaching and learning, marketing and management, and, in the recent past, communication innovations involving new technologies, such as the Internet and e-mail. The four main elements of diffusion theory are embodied in a deceptively simple definition: Diffusion is the process by which an *innovation* is *communicated through channels over time* among members of a *social system* (Rogers, 2003).

An *innovation* is an idea, practice, or object that is perceived as new by an individual or other unit of adoption (Rogers, 2003). Knowing of an innovation creates uncertainty in the mind and the potential of a new idea impels an individual to learn more about the innovation. Once information-seeking activities reduce uncertainty about expectations to a comfortable level, a decision concerning adoption is made. If adopted, further evaluation about the effects of the innovation is carried out. Thus, the innovation-decision process is essentially an information-seeking and processing activity in which an individual is motivated to reduce uncertainty about relative advantages and disadvantages of an innovation (Rogers, 2003).

The main questions typically asked are: What is the innovation?; How does it work?; Why does it work?; What are its consequences?; and, What will be its advantages and disadvantages in my situation? (Rogers, 2003).

It should not be assumed that all innovations are equivalent units of analysis. While consumer innovations such as cell phones and DVD players require only a few years to reach widespread use, other new ideas, such as the metric system or auto seat belts, require decades to reach popular use.

According to Rogers (2003), the following perceived characteristics of innovations help to explain their different rates of adoption:

- *Relative advantage*, or the degree to which an innovation is perceived as better than the former idea. This may be measured in economic terms, but social prestige, convenience, and satisfaction are also important factors.
- *Compatibility*, or 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 more compatible.
- *Complexity*, or the degree to which an innovation is perceived as difficult to understand and use. Simple ideas are diffused more rapidly than innovations requiring development of new skills and understanding.
- *Trialability*, or the degree to which an innovation may be experimented with before adoption. New ideas that can be tested in increments will generally be adopted more quickly than those that cannot.
- *Observability*, or the degree to which the results of an innovation are visible to others. The easier it is to see the results of an innovation, the more likely it is to be adopted.

Diffusion is a particular type of communication in which the message content is concerned with a new idea. The essence of the diffusion process is the information exchange through which one individual communicates a new idea to others. At its most elementary form, the process involves an innovation, an individual with knowledge of or experience with the innovation, another individual with no knowledge of or experience with the innovation and, finally, a communication channel connecting the two individuals. A communication channel is the means by which messages transfer between individuals. Channels may include mass media such as radio, television, newspapers, the Internet, or interpersonal channels such as face-to-face exchanges.

Time is a crucial element in three aspects of the diffusion process: 1) the innovation-decision process by which an individual passes from first knowledge of an innovation through to its adoption or rejection; 2) the innovativeness of an individual, that is, the timeliness with which an innovation is adopted compared with other members in the system; and, 3) the rate of adoption of an innovation, usually measured as the number of members of the system who adopt the innovation in a given time period.

In the innovation-decision process, an individual passes from *knowledge* (first knowledge of an innovation) to *persuasion* (formation of an attitude toward the innovation) to *decision* (the decision to adopt or reject) to *implementation* (actual use of the innovation) and finally to *confirmation* (commitment to adopt). A social system, as defined by Rogers (2003), is a set of interrelated units engaged in joint problem solving to accomplish a common goal. The units of a social system may be individuals, informal groups, organizations, or subsystems. Social structure affects diffusion in several ways through the system's own set of norms, its established internal behavior patterns, as well as its opinion leaders who are able to influence attitudes or behavior.

As innovations tend to be related to technologies it is not surprising that library and information science research on diffusion theory has focused on technology, particularly the Internet and various digital tools that have emerged in the past decade. White's (2001) survey of 140 American academic libraries used diffusion theory to analyze the use of academic digital reference services, focusing on the extent and rate of diffusion, the characteristics of libraries in each adopter category, and the re-invention of the innovation during implementation. Starkweather and Wallin (1999) conducted focus group sessions and personal interviews to explore faculty attitudes regarding the increasing computerization of academic library information resources. Brown's (2001) study of music scholars examined the use and perceptions of helpfulness of electronic mail and electronic discussion groups by music scholars using diffusion theory to describe and assess scholars' level of agreement with statements concerning relative advantages and compatibility of e-mail and electronic discussion groups to the research process. A study by Marshall (1990) used diffusion theory to predict the level of implementation of end-user online searching.

Two examples of library and information science diffusion theory research that does not involve computer technology are found in PhD dissertations on the influence of American librarianship on librarianship in other countries. Rochester (1990) examined American influence, as facilitated by the Carnegie Corporation of New York in the 1930s, on librarianship in New Zealand. Maack (1986) focused on the impact of American librarianship on the diffusion of the philosophy and practice of librarianship in France.

The research of Elfreda Chatman stands out in its examination of diffusion of innovations theory as it relates to those whom she calls informationally disadvantaged. Chatman (1986) attempted to test diffusion theory in a study of the awareness, use, and diffusion of an innovation in a job environment of the working poor. In this case, the innovation was information itself, an unusual approach in the field of diffusion research. Chatman (1987) also looked at opinion leadership in a low-income environment, the diffusion of information within this milieu, and the role opinion leaders play as disseminators of new information related to employment.

Possibilities for future information behavior research using diffusion theory research abound. Many more groups of people, many different information uses, and many more information channels remain totally unexplored.

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The Domain Analytic Approach to Scholars' Information Practices

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The term *domain analysis* was introduced by Hjørland and Albrechtsen (1995) who argued that it is more fruitful to view domains (specialties, disciplines, or discourse communities) as basic units of analysis rather than focus on “users” in a generalized and context-independent manner. The domain analytic approach is not new, however; the history of social science research on scholars' information practices in various fields goes back to the 1930s, culminating in the many classic papers presented in the 1958 International Conference on Scientific Information (Bates, 1971). Thus, from the very beginning, studies on scholars' information practices have represented a more sociologically and contextually oriented line of research in comparison to, for instance, information search behavior studies.

The work of Diana Crane (1972), Herbert Menzel (1959), Thomas Allen (1977), William Paisley (1968; Parker & Paisley, 1966), William Garvey (1979), and others are classics of “domain analytic” research because they embed scholars' information practices within the overarching context of disciplinary differences, with the goal of forming holistic understandings of scholarly communities' work and communication practices.

However, as noted by Palmer (1999), Bates (2002), and Hjørland (2002), the development of a more systematic domain analytic approach for explaining scholars' information practices is still in its infancy. While numerous studies have shown that there are major field differences in scholars' work and information practices, and that these differences are likely to persist in the electronic era, (Kling & Covi, 1997; Kling & McKim, 2000) few studies have attempted to develop a comprehensive understanding of the epistemic and other factors that underlie these differences.