The Effect of Environmental Factors on the Adoption and Diffusion of Telework

Cynthia Ruppel
University of Toledo, USA

Geoffry S. Howard
Kent State University, USA

Telework ("telecommuting") has been predicted to dramatically alter the place-dependence of information-based work. Instead, the implemented incidence of employees being permitted to work at home remains quite low. This is puzzling, given the potential benefits of telework, including reduced commuting time, positive environmental impacts, decreased absenteeism, enhanced employee retention, and an expanded employee recruiting area. This study explores the relationship between environmental variables and the adoption and diffusion of telework among computer specialists in an effort to understand telework's slow growth. A national survey of information systems managers was conducted, with the result that the environmental factors of market competitiveness, competitor use of telework, industry globalization, and legislative mandates were found to be significantly related to adoption of telework. Competitor use of telework and external corporate communication significantly related to diffusion of telework. These results are useful in guiding managers who wish to stimulate telework practices, and to researchers exploring telework in greater depth.

Telework, the electronic displacement of workers from their primary work location, offers potential benefits to employers and employees alike. Employer benefits may include increased telecommuter productivity, enhanced morale, decreased absenteeism, and improved employee retention and recruiting. (Seaman, 1997) Benefits to employees might include less stressful and less costly commutes, increased schedule flexibility, and proximity to family and community. (U.S. Department of Transportation, 1993; Scholtz, 1998). Because these potential benefits appear to constitute a win-win for both employers and employees, rapid growth in telework has frequently been predicted. (Toeffler, 1980) Surprisingly, though, the growth of telework has fallen far short of expectations. (Christensen, 1990; Hughson & Goodman, 1986; Olson, 1987; Korzeniowski, 1997) Innovation theory provides two separate perspectives that constitute a useful starting point for probing why this may be so.

First, theory suggests that innovation proceeds in stages in most organizations, wherein the organization first becomes aware of the innovation, next recognizes that the innovation may be appropriate to meet its needs, adopts it for use, and finally diffuses it throughout the organization. These initiation, adoption, and diffusion stages have aided researchers significantly in understanding the mechanisms of innovation, (i.e. Zmud, 1982), and are applied in the present study.

A second perspective from innovation theory suggests
three groups of factors that may relate to the adoption and diffusion of innovations within organizations: those related to the external environment of the organization, those factors related to both the structure and culture of the organization, and those factors which facilitate the compatibility between the innovation and the organization. This study chooses to develop a special depth of understanding of the first of these three groups, external environmental factors, as they may relate to both the adoption and diffusion of telework in organizations.

For this study of environmental factors, computer programmers and systems analysts were chosen as subjects. This was because the information manipulation inherent in their work lends itself to remote electronic implementations, and because information system professionals could be expected to be comfortable with the technologies that support telework. (Ishii, 1995; Olson, 1989) Telecommuting is also particularly germane to the information systems profession because it offers at least a partial solution to the present acute technical labor shortage. (Ouellette, 1998). The reasoning was that if any significant correlates of telework existed in any occupational group, they would be most apparent among programmers and analysts.

A national mail survey was undertaken to determine which external environmental factors related significantly to adoption and diffusion of telework. In addition to the correlation data, considerable descriptive telework usage data were also obtained. The findings will be valuable to steer future telework research, and will serve to guide managers who wish to stimulate telework in their organizations.

Relevant Research Literature

Environmental variables appear frequently in studies of innovation. (Van de Ven & Chu, 1989; Grover & Goslar, 1993; Kimberly & Evanisko, 1981; Tannenbaum & Dupree-Bruno, 1994) Van de Ven and Chu suggest that these environmental variables can conveniently be categorized into four groups: those related to the economic environment, to the technological environment, to the demographic environment and to the legal environment. While this classification includes both internal and external environmental factors, only the external factors will be considered in this study. Another characterization of environmental variables that is ubiquitous in the literature is perceived environmental uncertainty, which captures aspects of all four of the categories above. (Van de Ven & Chu, 1989) Several specific variables that are implementations of the environmental uncertainty theme appear in the present study.

The relevance of the above characterizations of environmental variables is upheld by many innovation studies have included external environmental variables in connection with innovation. For example, Grover and Goslar (1993) studied environmental uncertainty relative to the use of innovative telecommunications technologies. Hoffer and Alexander (1992) studied environmental factors related to the diffusion of database machines. The importance of environmental variables in relation to the adoption and implementation of technical innovations in hospitals was studied by Meyer and Goes (1988). Similarly, Kimberly and Evanisko’s (1981) study of innovations in hospitals also included environmental variables. Zmud (1983) investigated the relationship between the environmental variable external information channels and the adoption of “Modern Software Practices.”

The importance of the study of the external environment to the adoption and diffusion of innovations is further emphasized by Marcus and Weber (1989). They suggest that innovations may be externally-induced and that these “external jolts” are often needed to stimulate innovation. They also suggest that externally-induced innovations require specific approaches to facilitate the successful adoption, and particularly the implementation, of the innovation. Therefore, it is important to determine the extent (if any) to which telework is an externally induced innovation so that the proper techniques can be developed and employed to maximize odds of successful diffusion.

Using the innovation telework, this study is designed to determine specifically which external environmental factors may have an impact on the adoption and the diffusion of this specific innovation. To identify specific environmental factors that may be relevant to the adoption and diffusion of telework, the telework literature was studied in light of the currently used innovation variables that are related to the environment.

Studying this literature yielded a list of specific environmental variables which had been used in other studies and which were consistent with the above typologies and characterizations. (Korzeniowski, 1995, for example). The telework literature was then searched for references that gauged the relative importance of these factors in the adoption and use of telework. This search ultimately resulted in identification of the following external environmental factors for empirical study: 1) perceived competitiveness of the marketplace, 2) implementation of telework by perceived competitors, 3) perceived globalization of the marketplace, 4) communication with external consultants, 5) the existence of regulatory legislation, 6) perceived shortage of external labor supply, and 7) perceived sensitivity to concerns with the ecological environment. (Adam, 1997).

Variables 1, 2, and 3 relate directly to the environmental uncertainty theme prevalent in the existing body of innovation research. Turning to the Van de Ven and Chu categories, the economic environment is a component of variables 1, 2, and 6, the technological environment of variables 2 and 3, the demographic environment of variable 7, and the legal environment of variable 5. The environmental factors selected for inclusion in the present study are consistent with existing innovation research as well as with the accepted typologies and characterizations of external environmental variables. A model of the “innovation system” thus characterized appears in Figure 1.

Each of these variables selected for study was
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