Perceived Value and Technology Adoption Across Four End User Groups

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INTRODUCTION

The introduction of technological innovations is fraught with many difficulties and uncertainties. Innovations based on information technology are the most challenging because they interact with end users in a variety of different ways and can lead to many different outcomes: some intended, some unintended. Problems with user acceptance of seemingly well-designed and sound information systems have been observed since the early days of information technology (Lucas, 1975). Despite our growing body of knowledge, these problems continue to persist (Keen, 1981; Markus, 1983; Benjamin and Blunt, 1992; Markus and Benjamin, 1996).

The issues of user acceptance have been explored from several different research streams, including organizational change and innovation diffusion theory. This paper examines technology adoption from the latter perspective. The aim of this study is to examine how adoption rates and perceptions of technology vary across different applications and end user categories over time. The applications are part of an integrated office information system; the users are members of an engineering organization within a large high technology firm.

This paper explores the role end user perceptions in information technology adoption from the perspective of innovation diffusion theory. It is based on empirical data from a three-year longitudinal study of an information system implementation in an engineering organization. Data were collected on six different applications and their adoption by four categories of end users: engineering managers, project engineers, professionals, and secretaries.

The data indicate a substantial variance across time, user categories, and applications in terms of adoption rates and perceptions of technology. The managerial implications of the results are that differentiated implementation strategies focused on specific end user categories are likely to be more successful than a single broadbrush strategy for all users. The results also suggest a framework for predicting technology adoption in the long run, based on initial adoption rates and user perceptions of technology.

THEORETICAL BACKGROUND

The findings from implementation research suggest that the most critical problems are not technical, but are related to organizational and implementation issues (Cheney and Dickson, 1982; Mankin et al., 1984; Markus and Keil, 1994). As a result, technical system characteristics have attracted less interest among information systems researchers. Recently Yetton et al. (1997) examined the influence of both system characteristics and implementation process on different information system applications instead of a single innovation. Second, the locus of adoption is on groups of end users defined by their job categories. Past diffusion studies have been confined exclusively to either individual adopters or large organizational aggregates regardless of adopter job functions. Finally, the study is longitudinal, covering a three-year time period, in contrast with pre/post-test designs and retrospective studies.

Knowing how different workers perceive information technology and how these perceptions affect their adoption rates is important because it helps managers design more effective implementation strategies and offers guidance for management intervention. This knowledge is also important for providers of various Internet-based products and services for developing effective marketing strategies.
system success. They found that the characteristics of the innovation are critical for low task interdependence innovations, while the implementation process is more important for high task interdependence systems. Innovation diffusion theory recognizes that while the technical attributes of the innovation per se may be not significant, perceptions of technology do matter and are important factors influencing technology adoption.

Rogers (1983) has synthesized over 1,500 studies into a theory of innovation diffusion. He defines diffusion as “the process by which an innovation is communicated through certain channels over time among the members of a social system.” He also defines innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption.” Although the innovations studied by Rogers do not include information systems, several researchers have found his framework useful for analyzing the adoption process of information systems (Perry and Kramer, 1979; Huff and Monroe, 1985; Branchau and Wetherbe, 1990; Taylor et al., 1994; Prescott and Conger, 1995). Moore (1987) reviewed office automation and end-user computing literature and found the innovation diffusion model as an appropriate theoretical basis for the study and management of both types of information systems. Branchau (1987) also considers the innovation diffusion model as the most suitable theoretical framework for this type of information systems applications because the model’s focus on the individual adoption process is consistent with the degree of autonomy most knowledge workers have in carrying out their work. In a comprehensive review of empirical research in information technology diffusion, Fichman (1992) concludes that “diffusion theory provides a useful perspective on one of the most persistent and challenging topics in the IT field, namely, how to improve technology assessment and implementation.” Innovation theory has been found useful for studying information systems in a broader organizational context (Swanson, 1994). More recently, researchers are attempting to view technology adoption within the framework of organizational learning and change management (O’Callahan, 1998).

The primary concern of innovation diffusion research is how innovations are adopted and why some innovations are adopted at a faster or slower rate than others. As people evaluate an innovation, they decide whether to adopt or reject the innovation. Once adopted, the decision can also be reversed at a later time—the decision to reject an innovation once it had been previously adopted is called discontinuance.

The rate of adoption is the relative speed with which an innovation is adopted by members of the group. It is usually measured by the number or percentage of individuals who adopt an innovation in a specified time period. When the cumulative number of adopters is plotted over time, the result is generally an s-shaped curve. The slope of the s-curve represents the adoption rate that may vary from innovation to innovation.

Rogers (1983) identifies five perceptual characteristics of innovations that help explain differences in adoption rates: relative advantage, compatibility, complexity, trialability, and observability. They are defined as follows:

- **Relative advantage**—the degree to which an innovation is perceived as better than the idea it supersedes.
- **Compatibility**—the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters.
- **Complexity**—the degree to which an innovation is perceived as difficult to understand and use.
- **Trialability**—the degree to which an innovation may be experimented with on a limited basis.
- **Observability**—the degree to which the results of an innovation are visible to others.

In general, the rate of adoption is positively related to perceived relative advantage, compatibility, trialability, and observability, and is negatively related to perceived complexity of the innovation. Rogers concludes, “diffusion scholars have found relative advantage to be one of the best predictors of an innovation’s rate of adoption.” Tornatzky and Klein (1982) also found that relative advantage, along with compatibility and complexity, are the most significant factors in explaining relationships across a broad range of innovation types. Davis (1989), who studied information technology usefulness and ease of use, arrived at a major conclusion that perceived usefulness is a strong correlate of user acceptance. Iacovou et al. (1995) found a positive correlation between perceived benefits and adoption. These and other studies indicate a convergence of findings supporting the central role of perceived relative advantage in predicting user acceptance of information technology.

**RESEARCH SETTING AND METHODOLOGY**

The study was conducted in an engineering division of a large Fortune 100 firm. The division develops and produces a wide range of electronic assemblies and systems for marine applications. The organization is structured as a matrix, with several functional groups and a project engineering group.

The study followed the implementation of an integrated office information system from the beginning through a three-year evaluation period. The system provided six different types of applications: word processing, e-mail, electronic filing, electronic calendar, decision support (spreadsheets), and project management. By concurrently providing the applications through a single integrated system it was possible to eliminate potential temporal effects and minimize the confounding influences of other organizational or implementation variables present in many empirical studies.

The use and user perceptions of the different types of applications were measured using self-administered questionnaires. Measurements were made across four different