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Chapter XI

Quality of Use of a Complex Technology: A Learning-Based Model

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Abstract

It has been argued that simple conceptualizations of usage are inadequate for understanding and studying use of complex information technologies. In this paper we contend that quality of use, instead of the dichotomy of use versus non-use, is appropriate for understanding the extent to which a complex information technology is being used. An inductive case study of the implementation of a complex information technology was conducted, which led to the development of a learning-based model of quality of use. This model suggests the inclusion of factors relating to training (either formal or informal), learning, and beliefs, their impact on quality of use, and their change over time. Moreover, it describes how quality of use evolves over time as learning increases and perceptions of the system change. Evidence from the case study, along with relationships from the literature, is provided to support the model. Implications for future research are also discussed.

Introduction

The antecedents to use of an information system (IS) have been extensively explored in the technology adoption and diffusion literatures. Typically, these studies examine the construct of use and its antecedents through models based in diffusion of innovations theory (Rogers, 1995), the theory of reasoned action (Ajzen & Fishbein, 1980), and the theory of planned behavior (Ajzen & Madden, 1986). Studies of these models often measure perceptions, attitudes, intentions, and use at a single point in time, with a dichotomous conceptualization of use, that is, either the system was used or it was not used.

It may be argued that such models are not suited for the study of a complex technology; rather, they are most relevant to simple technologies that can only be used in a limited number of ways. Eveland and Tornatzky (1990) pointed out that, "problems arise when the diffusion model is applied in situations where its basic assumptions are not met — that is to say, virtually every case involving complex, advanced technology" (p. 123). Indeed, many studies of adoption/acceptance models based on the aforementioned theories explore technologies that are relatively simple to use, such as e-mail (e.g., Karahanna & Straub, 1999; Szajna, 1996) and word processors (e.g., Agarwal, Sambamurthy, & Stair, 2000; Chau, 1996). Because simple technologies are easy to conceptualize and operationalize, and because many people use them, researchers have often preferred the study of simple technologies to complex ones for testing their models.

By many accounts, ERP packages qualify as a complex technology (Akkermans & van Helden, 2002; Gill, 1999; Maney, 1999; Ribbers & Schoo, 2002; Umble, Haft, & Umble, 2003). Because they typically involve many processes that are highly integrated, the basic infrastructure of ERP packages fits systems theorist's characterization of complexity: A large number of elements together with a large number of relationships between them (Flood & Carson, 1993). When introduced within organizations, complex information technologies often impose a substantial burden on potential adopters to use them effectively (Attewell, 1992; Fichman & Kemerer, 1997; Robey, Ross, & Boudreau, 2002). Tornatzky and Fleischer (1990) claim that complex technologies tend to be "fragile," because they do not always operate as expected. Moreover, they argue that complex information technologies (IT) often require hand-holding in their appropriation because they are difficult to learn.

Given this complexity, the successful implementation of an ERP package may not always imply that its users exhibit a high quality of use, that is, high levels of satisfaction, efficiency, and effectiveness resulting from users' interaction with the system (Bevan, 1995). This is consistent with past research, which shows that it is common for complex IT to be successfully implemented but unsuccess-