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2005

A Research Agenda Toward a Better Conceptualization of IT Use

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ABSTRACT

IT use is a primary concept that should be clarified carefully since it is a major concept in several existing IS theoretical models such as the Technology Acceptance Model, Task-Technology Fit, and IS Success model. Unfortunately, most studies define this concept too simply. This can constrain our understandings of IT impacts. Therefore, it is necessary to conceptualize IT use and explore its multiple dimensions. This research attempts to formulate a research agenda for this purpose. Using activity theory and other related theories, we propose a research framework to conceptualize IT use and a multi-item scale to measure it.

Keywords

IT use, performance, activity theory

INTRODUCTION

Along with the vast body of investment in information technology (IT), IT effectiveness becomes an important issue for businesses and organizations. How to use IT effectively and efficiently is thus a pivotal topic for both researchers and practitioners. IT use is the key concept in this issue. While extensively studied at the organizational level (e.g. Orlikowski, 1992; Zmud and Massetti, 1996), IT use is not adequately studied at the individual level. To date, it has been defined and measured in terms of the amount, duration, and frequency of IT use. This simplicity can be problematic and limits our understanding of the IT performance and productivity phenomenon, constrains IT developers from developing more appropriate IT for various tasks and contexts, and causes ineffective and inefficient IT training and education.

Consistent with DeLone and McLean's argument that we should consider the "nature, extent, quality, and appropriateness" of IT use (DeLone and McLean, 2003), this research is an attempt to systemically explore the black box of IT use. We focus on the conceptualization of IT use by addressing the following research questions: *What is IT use (conceptualizations)? And what dimensions does IT use encompass?*

LITERATURE REVIEW

Based on a literature review in user technology acceptance and IS Success, we summarize existing conceptualizations and major findings of IT use in Table 1. The summary indicates that IT use has been measured mainly by the amount of time, the frequency and duration, and the tasks/packages completed.

The above literature review reveals a theoretical gap: a simply defined concept of IT use. Because it has not been defined explicitly, IT use is implied in the measurements used. Table 1 indicates that existing measurements of IT use at the individual level, albeit important, are simply defined and insufficient. Also, there has been little systematic approach to defining and measuring IT use. DeLone and McLean explicitly argued that the problem to date has been "a too simplistic definition of this complex variable" and subsequently called for more research to refine the multidimensionality of systems usage (DeLone and McLean, 2003).

This finding of simply defined and measured IT use is also supported empirically. Previous research indicates that the amount or frequency of IT use is not enough to explain performance. Goodhue and Thompson (Goodhue and Thompson, 1995) examine the IT use and task-technology fit (TTF) simultaneously. Their results showed that utilization has a significant effect on performance. However, IT use has a smaller impact on performance than TTF does. Similarly, Guimaraes and Igbaria (1997) found that the impact of system usage on performance is much smaller than that of management supports. Igbaria and Tan (1997), on the other hand, found a smaller impact of system usage on performance than that of user satisfaction. All these empirical results suggest that the explanatory power of currently defined IT use is relatively weak. Therefore, it is necessary to conceptualize IT use at the individual level.

Literature	Measurement of IT use
(Davis, 1989)	The frequency of IT use: Do not use; Use less than once each week; Use about once each week; Use several times each week; Use about once each day; and Use several times each day.
(Compeau and Higgins, 1995a)	1. Duration of IT use at work; 2. Frequency of IT use at work; 3. Duration of IT use at home on weekdays/weekends.
(Goodhue and Thompson, 1995)	Dependence on systems.
(Taylor and Todd, 1995)	1. Total number of visit per use; 2. Total time of use; 3. Total number of projects completed.
(Igbaria and Tan, 1997)	1. The number of computerized applications used by employees; 2. The number of business tasks for which the system is used.
(Gefen and Keil, 1998)	The percentage of use of the particular technology
(Dishaw and Strong, 1999)	The amount of time spent using the tool (IT).
(Torkzadeh and Doll, 1999)	Perceived usage pattern including items for decision support, work integration and customer service.
(Cheung, 2000)	1. Perceived intensity of using IT; 2. The frequency of IT use; 3. The variety of applications; 4. Overall, I use IT a lot.
(Venkatesh and Davis, 2000)	The amount of time spent on the IT.
(Moon and Kim, 2001)	1. How many times per week; 2. The amount of time (hours); 3. The frequency.
(Venkatesh, et al., 2003)	The duration of use via system logs.

Table 1: Summary of IT use in User Technology Adoption and IS Success literature

A RESEARCH FRAMEWORK

In this section, we plan to address the theoretical gap mentioned above by applying activity theory along with other related theories to conceptualize IT use.

Activity Theory

Activity theory is a philosophy and cross-disciplinary framework for examining various forms of human practices, factoring in the processes of context, as developmental processes both at the individual and social levels at the same time (Kuutti, 1996). It was developed by the Russian psychologist Vygotsky in the 1920's and elaborated by his followers, particularly Leont'ev (Sun and Poole, 2004). It has historical roots in Hegelian philosophy that emphasize both the active role of humans and developmental ideas, as well as in Marxian dialectical materialism. Some Anglo-American research traditions have been following similar venues of thought such as Dewey's pragmatism and G.H. Mead's symbolic interactionism (Star, 1997).

Activity theory is a powerful and clarifying descriptive tool (Nardi, 1996). It provides a set of perspectives on human activity and a set of concepts for describing the activity. One of the main principles of activity theory is the hierarchical and dynamic structuring of an activity (Kuutti, 1996). According to activity theory, human behavior can be studied at three different levels: activity, action, and operation. Activities consist of actions or chains of actions, which in turn consist of operations. Activity is the highest level and is focused on a specific motive. Actions with specific goals constitute an activity and are organized by the *motive* for the activity. Or in other words, an activity is the *minimal* meaningful context to understand individual actions (Kuutti, 1996). Finally, operations are routinized behaviors that require little conscious attention. The borders among the three levels of activity are blurred and all levels can move up and down (Leont'ev, 1974). For instance, when an action becomes routine and users do not think about how to do it, it becomes an operation. On the other hand, when the result of an operation does not turn out as expected, the operation will be brought to the consciousness of the actor and becomes an action again.

According to activity theory, the basic unit of analysis is activity. Activities involve some major concepts such as *subjects* and *objects* that are mediated by *tools* (Figure 1). An actor who participates in an activity is a *subject.* An object, tangible or intangible (e.g. information), is what is transformed and manipulated by a subject. Tools mediate the interaction between subjects and objects. The function of technical tools (e.g. information technologies) is to "serve as the conductor of human influence on the object of activity; it is externally oriented; it must lead to the changes in objects" (Vygotsky, 1981, p.55). Those who share the same *object* form the *community* (Kuutti, 1996). The interactions among community members (subjects) are mediated by rules and how community members share the same object constitutes the division of labor.

Using activity theory, we can deconstruct and reconceptualize IT use. A framework, which will be used in the following empirical analyses, will be presented.

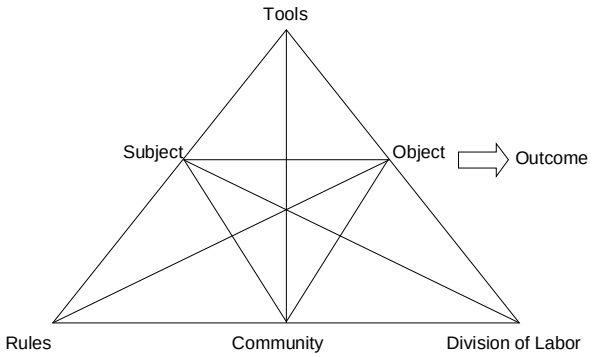

Figure 1: Activity Theory (source: Engeström, et al., 1998)

Other Related Theories

Activity theory is a powerful descriptive tool rather than a strongly predictive theory (Nardi, 1996). According to Cronbach and Meehl, a construct's meaning is defined by its internal structure and other constructs in its nomological network simultaneously (Cronbach and Meehl, 1955). Therefore, in order to reflect the nomological value of IT use, other relevant theories are needed to examine the antecedents and consequences of IT use. The relationships of IT use with its antecedents and consequences will be examined with psychological theories such as Theory of Reasoned Action (TRA Fishbein and Ajzen, 1975) and Theory of Planned Behavior (TPB) (Ajzen, 1991). Individual difference factors such as computer self-efficacy (Compeau and Higgins, 1995a; Compeau and Higgins, 1995b), personal innovativeness in IT (PIIT, Agarwal and Prasad, 1999), and computer playfulness (Webster and Martocchio, 1992) will be considered. As for the consequence of IT use, we refer to the individual level work-related performance. Based on a comprehensive literature review and structured interviews, Torkzadeh and Doll (1999) identified four dimensions of IT's impacts on work: task productivity, task innovation, customer satisfaction, and management control.

NEXT STAGE OF WORK AND EXPECTED CONTRIBUTIONS

This research includes two phases. During Phase I, we will conceptualize and validate the multiple dimensions of the IT use construct. A pool of items measuring them will be generated. Various methods will be conducted to assess the semantic context of the items (content validity). Then a pre-test survey will be used to assess the reliability and construct validity, based on which item purification will be conducted. In Phase II, a survey will be conducted to re-examine construct validity and reliability. Furthermore, the nomological validity will also be examined by including antecedents and consequences of IT use (e.g. individual traits and work performance).

This research has implications for both researchers and practitioners. For researchers, we bridge a theoretical gap of the simply defined IT use construct through a systematic exploration of its multidimensionality. For practitioners, findings from this research provide insights into the behavioral aspect of IT use that should be addressed in designing new information systems and facilitating information display. Organizational training can also benefit from this research in order to enhance employees' performance by addressing the most effective way of using IT.

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