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Course management system adoption and usage: A process theoretic perspective

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ABSTRACT

Software platforms called Course Management Systems (CMS) have been widely deployed in recent times to enhance both the effectiveness and efficiency of course delivery. Research into how best to derive value from CMS is still in a nascent stage. Based on the well-established finding that actual usage is an important intermediate variable between IT and value, this paper develops a parsimonious bi-dimensional characterization of CMS *use*, consisting of scale and sophistication of use. It then presents a process theoretic framework that can be used to explain the pattern of evolution of CMS use. These two conceptual developments are applied to the usage patterns of 62 faculty members over a 5 year period at a major Indian business school. Usage was found to become more broad-based over time. Overall sophistication of use remained unchanged for infrequent users but increased among frequent users. This evolution in usage patterns is tied to specific actions and events along the way, allowing us to draw prescriptive lessons to enhance usage in CMS environments and potentially derive more value from this type of technology.

1. Introduction

Software platforms, commonly referred to as Course Management Systems (CMS), are being widely used for instructional delivery. They assist in various ways, including online testing, course discussion, assignment submission and grading. They vary in functionality, ease of use and cost. A few, such as Moodle (Lawrence, 2009) are open source, but others, such as Blackboard (Yudko, Hirokawa, & Chi, 2008) are proprietary. There are also custom built CMSs developed in house (Yueh & Hsu, 2008). Educators note that CMSs are among the most significant technologies that have been introduced in the delivery of education in recent times (Katz, 2003). Investment in CMS has increased sharply (Williams & Williams, 2010), but research into its effectiveness is in a nascent stage. Further inquiry is needed to guide the deployment of these platforms in ways that extract more value for organizations. Research on CMS has largely used the variance approach to understanding CMS adoption and success. While variance-based research helps identify determinants and their impact on technology adoption outcomes, it is more limited in its ability to study the "how" of technology use (Markus & Robey, 1988) because the process linking these factors to outcomes is viewed as a black-box. In this paper, we examine an actual CMS implementation at a major educational institute using a process theoretic perspective. It allows us to get a richer understanding of the mechanics of CMS use beyond that uncovered through variance based approaches.

The literature is replete with studies on the relationship between IT Investment and value. Many determinants of and moderating influences on value have been identified. One enduring thread is that the human–IT interaction, manifested as *actual use* of the technology, has an important influence on realizing the benefits (Devaraj & Kohli, 2003). Although investments in IT continue to increase, intermittent periods of "technology digestion" and "cud-chewing" are likely to occur (Forrester Research, 2005), implying that IT investments are likely to yield benefits only when users' reluctance to use available systems is mitigated (Venkatesh & Goyal, 2010). The literature also reveals that 'use' is a multifaceted phenomenon. For instance, initial and continuing use are different phenomena which need to be studied through different lenses. Moreover, in a given technology-organization context, users vary in their levels of use. Evidence can be seen in use patterns of email and office productivity tools. In short, a good understanding of the 'use' phenomenon is key to deriving value from an IT investment.

The richness and complexity of "IT use" may make it difficult to apply general findings to specific IT-organizational contexts (Boynton, Zmud, & Jacobs, 1994; Brown, Dennis, & Venkatesh, 2010). Unlike single user systems such as word processors and

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spreadsheets, CMSs link multiple users together. Such interactions increase the complexity of use. Also, CMSs are different from some common organization-wide platforms in that they not only handle individual transactions, but also support collaboration through sharing of information, managing group information, and asynchronous and synchronous discussions. Given the varied functionalities of CMS platforms, modalities of use, and the distinctive characteristics of the academic environment in which they are commonly deployed, we submit that it is important to better understand the 'IT use' phenomenon in this specific context to deriving value from CMSs. Studies on CMS adoption, implementation, use, impact and benefits are necessary in order to develop the descriptive and prescriptive findings to guide stakeholders. This paper uses a process theoretic lens to understand the phenomenon of CMS use, focusing on how and why use occurred, and is organized as follows. In Section 2, we review the literature on IT use and highlight key findings, in Section 3, the relevant studies on CMS. This is followed by a brief review of process theory in Section 4, which helps develop a causal explanation for the evolution of a particular phenomenon by linking it to underlying events (Chiles, 2003). We then present our framework of analysis of CMS usage in Section 5, followed in Sections 6 and 7 by analysis of the evolution of use, by 62 faculty members, of an in-house custom built CMS at a premier business school in India. Section 8 discusses the process view analysis of the case studied. We identify likely transition paths in the evolution of their CMS use in Section 9. The implications for managerial interventions in realizing benefits from this type of platform are discussed in Section 10, the conclusion.

2. Information technology use

The actual use of technology affects the success of technology implementations (Cornell, Eining, & Hu, 2011; Soh & Markus, 1995), and a variety of approaches have been used to study IT use. In the diffusion of innovations approach (Rogers, 1962), the technology application is treated as an innovation and its relative advantage, compatibility, complexity, triability and observability aspects are examined in order to understand the process of use and diffusion through the organization (e.g. Bajwa & Lewis, 2003). Another approach, which can be viewed as a variance approach, examines factors external and internal to the entity that influence use, and the outcomes of use such as efficiency, effectiveness and satisfaction. The Technology Acceptance Model (TAM), a well-known example of this approach, examined the influence of two factors, perceived ease of use and perceived usefulness, on attitude, intention to use and actual use (Davis, Bagozzi, & Warshaw, 1989). Numerous extensions have been developed subsequently. For example, Venkatesh, Morris, Davis, and Davis (2003) adapted TAM as UTAUT (Unified Theory of Acceptance and Use of Technology) using performance expectancy, effort expectancy, social influence and facilitating conditions, as predictors of behavioral intention and use behavior. A third approach consists of feedback and evolutionary studies which examine use of an IT application over time and the various factors which influence sustained and evolving use (Gallivan, 2001; Kwon & Zmud, 1987). Structuration theories fall in this category (DeSanctis & Poole, 1994). They can be considered process theories where evolution of use is seen as being driven by the occurrence of certain events or the existence of certain factors. Authors have also studied the magnitude and nature of IT use changes over time amongst users (Cornell et al., 2011; Otondo, Barnett, Kellermanns, Pearson, & Pearson, 2009). Such changes may occur for different reasons such as increased familiarity through learning, pressures of accountability, peer pressures, shift in beliefs, change in individual abilities, changing incentives, changes in the technology itself and feedback on previous activities.

These studies notwithstanding, researchers have also identified gaps in the literature on IT use. Gallivan (2001) observed that while considerable attention has been focused on initial adoption, less attention has been devoted to studying the subsequent phases of the adoption life cycle – which he referred to as 'secondary' adoption. He presented a framework for secondary adoption and presented three paths to enhance secondary adoption – mandated, supported or phased. Secondary adoption enhances individual use and also increases infusion of use across members of the organization.

Many studies have measured IT use using a one-dimensional metric, which is parsimonious, but does not adequately capture the complexities of use. Common metrics include frequency of use (Venkatesh & Morris, 2000), length of session (Mathieson, Peacock, & Chin, 2001) or login duration (Venkatesh, Speier, & Morris, 2002). Several studies have evaluated intention to use rather than actual use (Williams & Williams, 2010). Others have used self-reported perceptions of use (Beckett, 2007, p. 103), such as perceived frequency or perceived length of time spent on the technology. Such metrics are likely to be subjective, non-reflective of actual use, and may make it difficult to distinguish an expert user from a novice. Relatively few studies examine IT use as a multi-dimensional construct (e.g. Doll & Torkzadeh, 1998; Zigurs & Buckland, 1998), or in specific contexts such as organizational-level strategic IT use (Boynton et al., 1994), richness of media in decision support (Maznevski & Chudoba, 2000), generic computer technology (Al-Gahtani, 2004), communication media (Watson-Manheim & Bélanger, 2007) and collaborative technology (Vaidya & Seetharaman, 2011).

In sum, numerous models and frameworks on adoption and use have been developed in the literature. Of course, no single approach can explain IT use completely. Multiple perspectives are needed and shortcomings in the IT use literature, discussed above, suggest areas for further inquiry. Two, in particular, have motivated the current study. First, many of the IT use studies are generic (Brown et al., 2010) in that their research questions were artifact agnostic and the specific IT artifact was used only as a vehicle to test the generic claims. Understanding usage of the specific IT artifact was not the main aim. More recently, authors have emphasized the need to develop theories and frameworks that are also context-specific (Brown et al., 2010; Orlikowski & Iacono, 2001). We submit that studies of IT use which focus on specific technologies that are in widespread use, will result in actionable findings to augment adoption and use of that particular technology (Venkatesh & Bala, 2008). Motivated by this view, this study focuses on course management systems. The second shortcoming that we focus on is a need to study the evolution of IT use over time. This is particularly appropriate for CMSs as they are yet to be exploited to their full potential.

3. Course management systems

CMSs are software platforms that support creation and delivery of courses (Lawrence, 2009). They allow users to create courses, provide syllabi, register students and faculty to courses, allow participants to add, edit content, create assessments, allow students to complete assessments online, help faculty grade assessments, aggregate scores, and grade students. Examples of such software include Blackboard, Angel, Learning-Space, e-College, .LRN, Sakai, Moodle and On-course.

Four streams of inquiry have been identified in the CMS literature. They are (a) the adoption of CMSs and use of different features (b) factors which influence use of CMS, (c) impact of CMSs