2003

Fit and Social Construction in Knowledge Management Systems

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Abstract

This paper proposes a study of the effects of knowledge management systems (KMS) on individual and organizational performance. The study seeks to answer the following question: Which factors determine the impact of KMS on performance by individuals and groups? A model for KMS and performance is developed. This model takes the special characteristics of KMS into account, and extends the theory of task technology fit with concepts from adaptive structuration theory. The paper presents four key propositions that are to be tested through a survey: 1. Task-KMS fit will impact faithfulness of appropriation; 2. Consensus on appropriation will impact faithfulness of appropriation; 3. Faithfulness of appropriation will moderate the impact of task-KMS fit to performance; 4. Consensus on appropriation will impact KMS use. The study will compare existing models with a composite model, and will contribute to our general knowledge of KMS through an empirical study of their effect on performance.

Keywords

Knowledge management systems, Task-technology fit, Adaptive structuration theory

1. Introduction

In recent years a large number of vendors and products have emerged in the knowledge management systems (KMS) area. KMS have become an essential component of organizations, but despite great promise have not been as successful as was expected. Our initial explorations of the topic with IT department personnel and users of KMS have provided anecdotal evidence that the systems do not lead to expected performance improvements. Expensive systems with extensive functionality, such as Lotus Notes©, are often used in very limited ways, e.g. only for email. Additionally, many systems never attain the critical mass of users needed to make the system a success. As a result, the performance of groups of people is not as effective as it can be. A broad definition of KMS is provided by Alavi and Leidner (2001) as "IT-based systems developed to support and enhance the organizational processes of knowledge creation, storage/retrieval, transfer, and application." This definition reflects two views of knowledge: as an object, and as a process. Others take a more narrow view of KMS, and focus on its organizational memory aspects (Maier

and Lehner 2000; Stein and Zwass 1995). Stein et al. (1995) identified three key tasks - knowledge acquisition, maintenance, and search/retrieval - as the key processes of an organizational memory information system. In the terminology of Maier et al. (2000), this is a functional perspective of such systems. From a behavioural perspective, the organizational memory system can be seen as triggering and supporting the organizational processes that Alavi et al. (2001) identified, namely knowledge creation, storage, transfer, and application. Combining the work of all three sets of authors, we can now define the organizational memory systems that are the subject of our study as IT-based systems developed to support and enhance the organizational processes of knowledge creation, storage, transfer, and application through the acquisition, maintenance, and storage/retrieval of knowledge. The importance of KMS, and the apparent gap between promised and delivered performance, lead us to the following research question: *Which factors determine the impact of KMS on performance by individuals and groups?*

A review of the information systems literature indicates the suitability of contingency theories as tools to explore KMS and performance. Contingency theories seek the fit of specific techniques or concepts of managing to the specific situation at hand in order to attain organizational objectives most effectively (Hatch 1997). Task-technology fit (TTF) models (Goodhue and Thompson 1995; Zigurs and Buckland 1998) are a subset of contingency theories which suggest that the congruence between a technology and a task for which it is used determines different outcomes. Studies have focused on the organizational level (organizational structure and IS; Raymond et al. 1995), the individual level (computer aided software engineering and task; Lai 1999), general information systems and tasks (Goodhue and Thompson 1995), and group support systems (Dennis et al. 2001; Zigurs and Buckland 1998). Collectively, this research has demonstrated significant performance implications at individual as well as organizational levels.

KMS have special characteristics that make them different from more traditional information systems. They support interactions between people, and require a critical mass of users that agree on the ways in which the system is used. TTF models do not account for these characteristics, and we therefore extend Goodhue et al.'s model through the inclusion of key constructs from adaptive structuration theory (DeSanctis and Poole 1994). By taking account of the reality of social construction in KMS use, we expect to overcome some of the limitations of TTF theory, and to add more explanatory power through the inclusion of appropriation mechanisms. Figure 1 shows the model of TTF and social construction for KMS. The model is discussed in detail in the next section.

2. KMS Performance Model

Fit Model

Tasks are defined as the actions carried out by individuals in turning inputs into outputs (Goodhue and Thompson 1995). According to Goodhue et al. (1995), tasks dimension can be narrowed down to non-routineness and interdependence. Technology, i.e. KMS, is characterized by its functionality, flexibility, and integration. We expect that individual users with different levels of non-routineness and interdependence of tasks demand different features from KMS, leading to various fit/misfit perceptions of KMS. We also expect that different characteristics of KMS affect individual users differently.

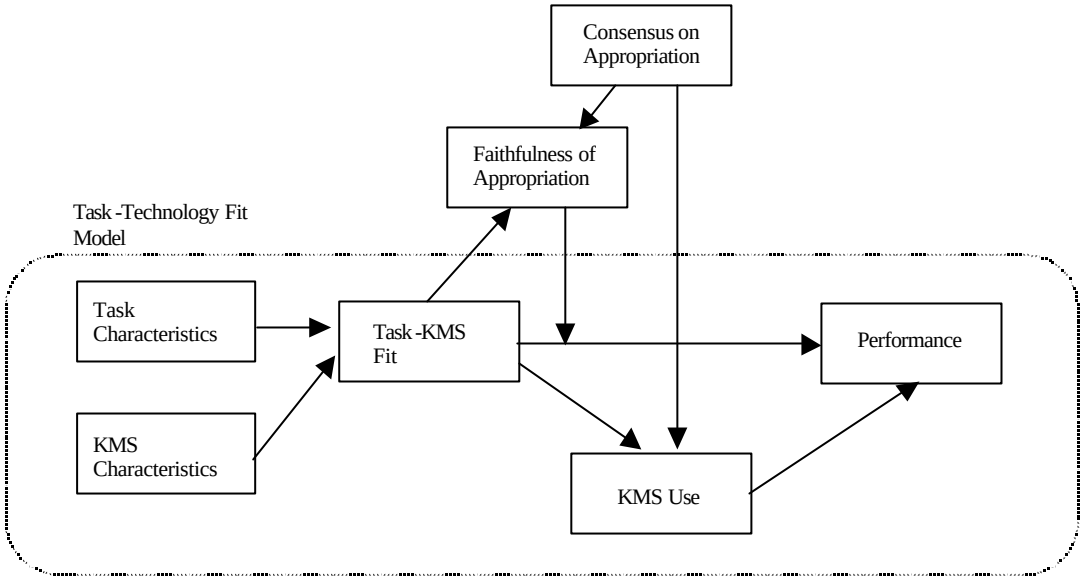

Figure 1.Research Model for TTF and Social Construction

TTF models have been used widely to explain performance impacts of IT (Dennis et al. 2001; Goodhue and Thompson 1995; Zigurs and Buckland 1998). In these models, the fit between IT and tasks affects individual performance. Goodhue and Thompson (1995) extended a simple TTF model with fit only, by combining utilization and fit, adding a link between TTF and utilization. This link suggests that "technologies must be utilized *and* fit the task they support to have a performance impact." (Italics in original, p.216) They argued that technology features that are well aligned with tasks would consistently lead to better utilization of technology and subsequent performance improvement. However, they were not successful in showing the significance of the link between TTF and utilization and instead called for more detailed attention to other variables such as habit and social norms.

Social Construction Model

The institutionalist school recognized the social nature of technology and proposed adaptive structuration theory (DeSanctis and Poole 1994). The theory suggests that it is not the technology per se as an independent variable but the manner or pattern of use of the technology that determines performance impacts (Poole and Desanctis 1989). Therefore, the use or appropriation of technology is understood as part of the adaptive structuring process. There are three main dimensions of appropriation. The first dimension is *attitudes* (the views about using the technology held by group members) such as comfort, respect and challenge. The second dimension is *faithfulness of appropriation* (the extent to which structures provided to a group are used in a manner consistent with the spirit of the technology). The structure provided by the technology is identified by both its spirit and its specific features (Poole and Desanctis 1989). The spirit of the technology is the intended, generally-recognized purpose of the structure (e.g., communication and collaboration support in KMS). The specific features are the operations that the system implies (e.g. display of discussion logs in instant messaging) and the timing and sequence of these operations. A faithful appropriation occurs when the technology is used according to its spirit. An *unfaithful* appropriation follows by the use of the technology against its spirit. For example, users of

groupware technology may appropriate it only for email purpose. The third dimension is *consensus on appropriation* (the extent of the agreement among group members on how the technology should be used) (Chin et al. 1997). If individual users don't reach a very high level of agreement, they cannot effectively appropriate the technology. With lack of agreement or incomplete agreement, they will face uncertainty, ambiguity and conflict, resulting in unexpected, inconsistent, or improvisational use of the technology. This agreement may exist a priori or develop as users adopt and use the technology (Salisbury et al. 2002). The presence of consensus on appropriation will greatly foster consistent use of the technology, resulting in enhanced performance.

Combined Model

Dennis et al. (2001), by integrating task-technology fit theory (Zigurs and Buckland 1998) with appropriation theory (DeSanctis and Poole 1994), argued that if there is a fit between the group support systems structures and the task, and the group receives appropriation support, group support systems use leads to improved performance. We propose that adaptive structuration theory is also very applicable for knowledge management systems. Salisbury et al. (2002, p.93), wrote that "it is important to note that the kind of social construction of reality reflected by consensus on appropriation … is also relevant to individual adoption and use of technologies in other, non-group

For example, the use of a corporate-wide KMS is usually not constrained to a small group. It often encompasses several departments or even the entire organization. Even if individuals in a small group have not made any formal agreements on how to use the KMS, they are likely to develop patterns of usage that lead to an implicit agreement. The underlying force forging this agreement is referred to as social influence (Fulk et al. 1990). Jasperson et al. (1999) called the process that social influence enters into individuals' IT use behaviors "appropriation moves." Attitude dimensions of adaptive structuration theory have already received attention from other researchers (Gopal et al. 1992), and we will not consider them in our model. From the model, a number of key propositions can be derived, and these are presented below.

Proposition 1: Task-KMS fit will impact faithfulness of appropriation.

We believe that faithfulness of appropriation is affected by task-KMS fit. The better the fit, and the more the users perceive its intended purpose and operations favorably, the more the users are likely to use the KMS as intended.

Proposition 2: Consensus on appropriation will impact faithfulness of appropriation.

The more consensus exists on appropriation, and the less ambiguity and conflict over appropriation, the higher the KMS use will be. There exist different kinds of consensus concerning appropriation inside an organization surrounding KMS use. They include peers, groups, business units, and the organization. We are focusing on the consensus at the group level. Higher degrees of consensus on appropriation are expected to influence the users to use the KMS more faithfully.

Proposition 3: Faithfulness of appropriation will moderate the impact of task-KMS fit to performance.

Higher levels of task-KMS fit are expected to generate higher performance. Following the work of Dennis et al. (2001), we expect faithfulness of appropriation to have a moderating effect on the relationship. Even if the KMS is suitable for the task of the users, it would be difficult to achieve high performance unless the technology is used faithfully according to its intended purpose.

Proposition 4: Consensus on appropriation will impact KMS use.

Higher consensus on appropriation is expected to promote more KMS use as more individuals will use it, in ways that are generally accepted.

3. Methodology and Expected Contributions

The model in Figure 1 is tested through a questionnaire that is based on the constructs previously used in studies of TTF and adaptive structuration. The questionnaire includes new measures for KMS characteristics, task-KMS fit and performance. These have to properly reflect the KMS context. The study has been designed such that a comparison can be made between TTF, social construction, and the combination of the two models. Once pilot testing is completed, we will administer the questionnaire at three different sites, with varying levels of KMS use. We intend to target 1500 potential respondents, and expect at least a 15-20% response rate.

Table 1 provides the operationalization of the major constructs used in the study. Three academicians and three business professionals reviewed the complete instrument.

Constructs	**Operationalization**
KMS Characteristics	Flexibility; Integration; Ease of Use
Task-KMS Fit	Knowledge Acquisition; Maintenance; Search/Retrieval
KMS Use	Dependence on System
Performance	Productivity; Effectiveness

Table 1. Operationalization of Major Constructs

The study proposed in this paper tests a model of the impact of knowledge management systems on individual and group performance. Empirical studies of KMS are relatively rare, and this study seeks to improve our understanding of how KMS can affect performance by an investigation of factors from contingency and adaptive structuration theories. It is expected to contribute to our knowledge of KMS by validating existing models, and extending these models by combining theoretical frameworks. A validated model of the impact of KMS on performance can be used as a diagnostic tool to assess problems with KMS, and may suggest solutions.

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