December 2003

Knowledge Management and Performance: A Fit Perspective

Saurabh Gupta
University of Georgia

KNOWLEDGE MANAGEMENT AND PERFORMANCE: A FIT PERSPECTIVE

Saurabh Gupta
Terry College of Business
University of Georgia
gupta@terry.uga.edu

Abstract

The impact of knowledge management systems on organizational performance continues to be an under researched area. What complicates the area of knowledge management is the lack of understanding about the concept of knowledge. This paper focuses on knowledge to tease out the differences between information and knowledge as used by information systems. The thrust of the paper is to develop a model for understanding how a knowledge management system impacts performance. The paper presents a research model that argues that performance needs to be examined in terms of the fit between two constructs, knowledge sharing needs and knowledge processing capacity. The antecedents of each of these constructs are developed. Finally, we outline a research study using the model developed. The study focuses on the use a knowledge portal, as an instance of knowledge management system, as an intervention to improve knowledge processing capacity.

Keywords: Knowledge management, knowledge portals, collaboration, integration, personalization, knowledge reach, knowledge richness, knowledge sharing needs, knowledge processing capacity

Overview and Contribution

An organization's knowledge has always been critical to its competitive success, but it was not until recently that focus has shifted to the need for explicit management of knowledge as an organizational resource. Earlier models and theories (Daft & Lengel, 1986; Galbraith, 1974; Tushman & Nadler, 1978) in this area did not differentiate between information and knowledge. This paper builds on these models to present a conceptual model for knowledge processing in an organization. Prior contributions in this field have focused on increasing the processing capacity of the firm. This paper introduces the concept of fit within the KM framework. It looks at the fit between knowledge sharing needs and knowledge processing capacity as a factor influencing organizational performance. The model is aimed at bridging the gap between the information processing literature and Knowledge Management (KM) concepts. In addition, the paper outlines a study that looks at new technology called organizational/enterprise knowledge portals as a mechanism to achieve this fit.

The paper is divided into two sections. The first section provides a conceptual background for the development of the model. The last section looks at portals and outlines a research study investigating their impact.

Conceptual Development

At the heart of the conceptual model, Figure 2 is the concept of knowledge. The KM literature differentiates between data, information and knowledge (Gupta, 2000; Pearlson, 2001), see Figure 1. Data is a set of specific, objective facts or observations, but such facts have no intrinsic meaning. People turn data into information by organizing it into some unit of analysis that creates meaning. Knowledge is defined as information that is contextual, relevant and actionable (Turban & Aronson, 2000). It involves higher human contribution and interaction (Davenport & Prusak, 1997; Swift, 2002). Consequently, the knowledge capacity of an organization is enhanced through promoting and capturing collaboration of knowledge within its subunits (Davis, 1998).
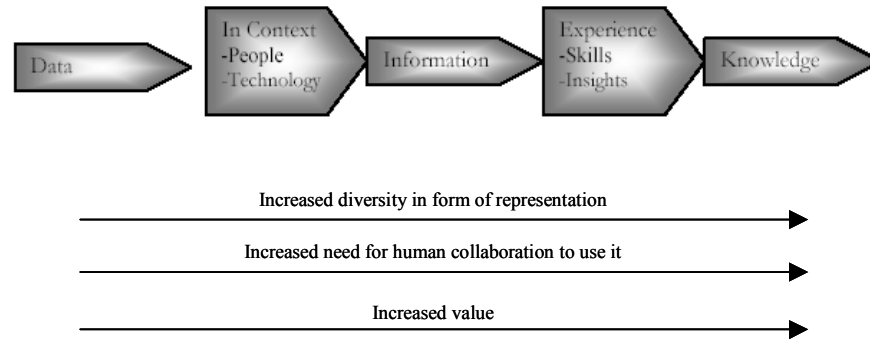
Figure 1. Data, Information, and Knowledge

The basic assumption is that organizations are open social systems that must process knowledge (Mackenzie, 1984). Organizations, thus, have knowledge sharing needs which must be satisfied. On the other hand, organizations organize themselves to match its resources (knowledge being one of them) to the needs imposed on it to achieve performance (Chandler, 1962; Hofer & Schendel, 1978). Thus, organizations create a knowledge processing capacity to satisfy these needs. Our model proposes that it is the fit between the knowledge sharing needs and the knowledge processing capacity of the organization that leads to performance within the organization, see Figure 2.

Knowledge Sharing Needs

Knowledge builds on information. Thus, the two antecedents of knowledge sharing needs primarily stem from information processing theory (Daft & Lengel, 1986; Galbraith, 1974; Tushman & Nadler, 1978), but have been reexamined in the context of KM framework.

Information Uncertainty: Uncertainty is the deficit in information needed to complete a task. The basic proposition is that the greater the uncertainty of the task, the greater the amount of information that has to be processed between decision makers during the execution of the task (Galbraith, 1974). In a KM framework, information exists in multiple formats and in multiple information silos. Reducing uncertainty involves finding the right pieces of information and integrating them to form a knowledge base needed to complete the task. At an organizational level, this activity is facilitated through the ability to search and integrate.

Proposition 1a

> *Ceteris paribus, an increase in information uncertainty in an organization increases the knowledge sharing needs of the organization*

Episodic Equivocality: A knowledge stimulant can have multiple interpretations that vary by each specific situation. Equivocality means ambiguity, the existence of multiple and conflicting interpretations about an organizational situation, giving rise to episodic equivocality (Daft & Lengel, 1986). In an organization, where most decisions are taken at group levels (Huber & McDaniel, 1986), individuals bring different experiences and skills to the table. Thus, each individual is a potential source of a different interpretation, different "sense making", which needs to be reconciled. From a KM framework, the ability to collaborate facilitates the reduction in equivocality.

Preposition 1b

> *Ceteris paribus, an increase in the episodic equivocality within the organization increases the knowledge sharing needs of the organization.*
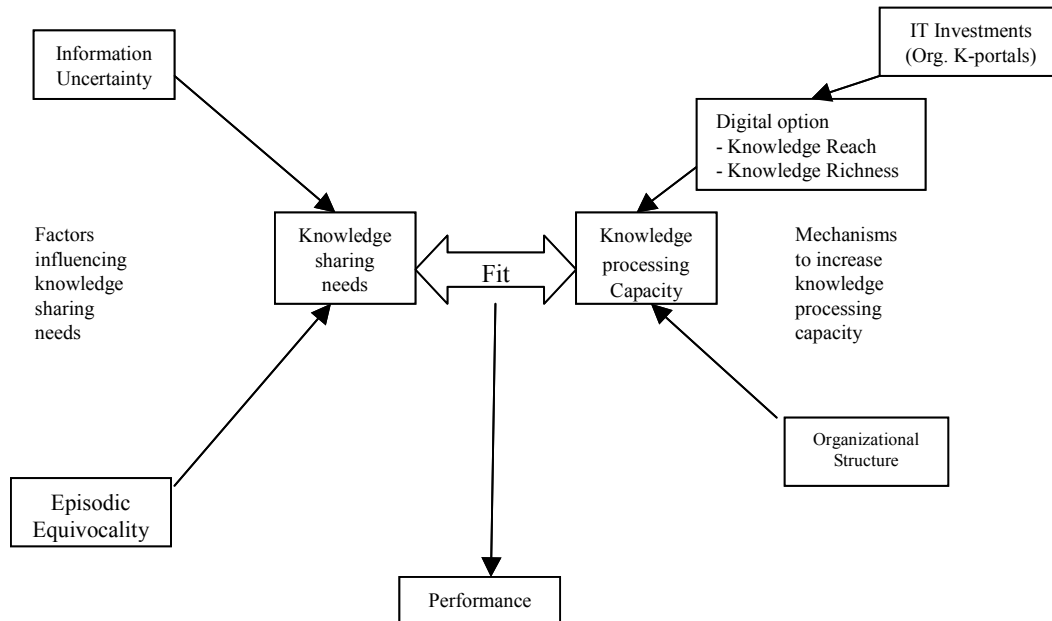
Figure 2. Knowledge Processing Model

Knowledge Processing Capacity

Organizations need to process knowledge, but they have limits to the level of processing that can be achieved (Cyert & March, 1992). Organizations, thus, organize themselves to increase their knowledge processing capacity with an aim to process knowledge based on their knowledge sharing needs. Previous work (Galbraith, 1974; Tushman & Nadler, 1978) has shown that there are multiple options derived from a combination of two mechanisms to increase the information sharing capacity of a firm: (i) organizational structure and (ii) information systems. We propose to take this line of argument and develop it further for the knowledge processing perspective.

Organization Structure: Organization structure is the design for integrating the organizations existing resources to its current needs (Chandler, 1962). Organizational structures can be differentiated based on their level of centralization, formalization and complexity (Duncan, 1973). Organic structures are characterized by low levels of centralization, low levels of formalizations and high levels of complexity. Mechanistic structures are characterized by high centralization, high formalization and low complexity. Since organic structures encourage more flow of knowledge within an organization, it is proposed that such structures lead to an increase in knowledge processing capacity.

Preposition 2a

> *Ceteris paribus, the more organic the organizational structure of an organization, the higher its knowledge processing capacity.*

IT investments: The use of information systems represents another option of increasing the knowledge processing capacity of the organization. Organizations, thus, make investments in information technology systems (IS). Since IT investments are made now with an expectancy of returns in the future, Sambamurthy et.al. (2002) refer to these as digital options. Their model looks at two dimensions of these options – process and knowledge. The knowledge dimension is our focus and it can be further conceptualized into two dimensions – knowledge reach and knowledge richness (Sambamurthy et al., 2002). Knowledge reach refers to the perceived comprehensiveness of codified knowledge that resides in a firm's knowledge base (Sambamurthy et al., 2002).

Proposition 2b(i)

> *Ceteris paribus, the more IT investments lead to greater knowledge reach in an organization, the higher the knowledge processing capacity of the organization.*

Knowledge richness refers to the extent to which IT investment supports the KM process (Sambamurthy et al., 2002). At a minimum, this process has four sub-processes: creating, storing/ retrieving, transferring/ distributing, and applying knowledge (Alavi & Leidner, 2001). Since information systems positively assist the KM process by providing tools for each sub-process; the greater the support for the KM process, the greater the knowledge richness, and consequently, greater the knowledge processing capacity of the organization.

Proposition 2b(ii)

> *Ceteris paribus, more IT investments lead to greater knowledge richness in an organization, the higher the knowledge processing capacity of the organization.*

The Fit

Prior literature in KM focuses on the KM process where the primary focus has been on increasing the knowledge processing capacity of the firm (Alavi & Leidner, 2001). We feel that this is a narrow perspective. The focus should be on matching the knowledge sharing needs and knowledge processing capacity to achieve a fit in order to maximize organizational performance.

An optimum fit should provide opportunities for competitive actions via innovation, improved customer service and boost revenues by getting products & services to market faster (Santosus & Surmacz, 2001).

An underfit, i.e. having too little knowledge processing capacity, would result in the organization not being able to exploit its knowledge base effectively, and thus, not being able to achieve the benefits stated above resulting in expensive mistakes. On the other hand, an overfit, i.e. too much knowledge processing capacity, represents non-optimal utilization of resources and thus, creation of organizational slack. Organizational slack can be in the form of excess IT investments or employees in the organizational design.

Proposition 3

> *Ceteris paribus, the better the fit between organizational knowledge sharing needs and knowledge sharing capacity, the better the organizational performance.*
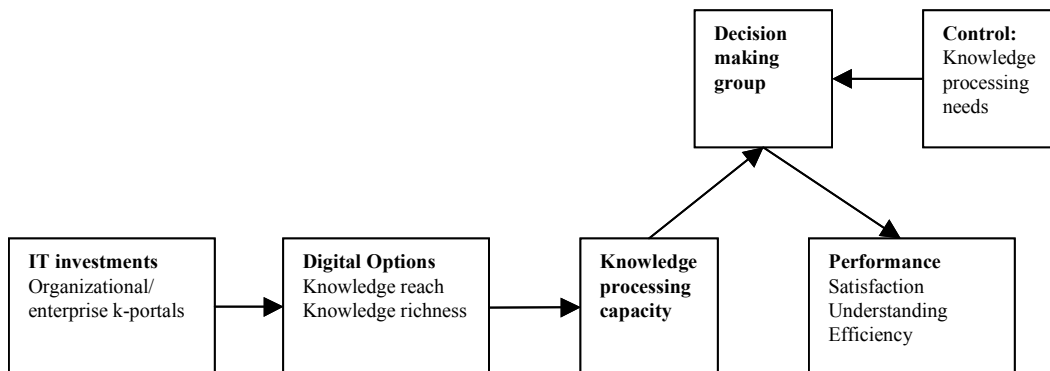
Proposed Research Study

Figure 3. Research Model

The focus of the conceptual model presented in Figure 2 is to match knowledge sharing needs and capacity for decisions within the organization. As organizations face demands for improved productivity, they increasingly turn to teams for decision-making activities (Dennis & Kinney, 1998). We, thus, focus on decision making groups as our level of analysis. The research model, presented in Figure 3, focuses on the ability of IT investments to influence the knowledge processing capacity of firm in a controlled knowledge sharing needs environment. A specific instance of an IT investment is an organizational/enterprise knowledge portal.

Organizational Knowledge Portals

Portals started as applications, typically web-based, which provided a single point of access to distributed on-line information. Because of their emphasis on information collection and access, these first-generation portals are often called information portals. We refer to portals used by knowledge workers as knowledge portals to differentiate this KM role and usage from other portal roles (Mack, Ravin, & Byrd, 2001). Knowledge portals go beyond information management and are based on the process of knowledge management, i.e., these portals provide support for all the four sub-processes of KM described earlier.

Organizational portals can be classified based on three dimensions: The ability of the portals to integrate information from various sources, the extent to which they support collaboration, and the extent to which they present knowledge in a personalized manner (see Figure 4).

Knowledge Reach

Knowledge integration represents the extent to which the knowledge available through the portal is adequate to complete the task and the ability of the portal to present knowledge in an integrated manner. Portals do not have to store knowledge in their databases, but have to be able to access it. Knowledge integration represents the way portals enhance the knowledge reach of the firm. Thus, knowledge reach of a knowledge portal is operationalized as the content that the portal captures and integrates. The greater the knowledge reach of the knowledge portal, the higher the knowledge processing capacity of the organization.
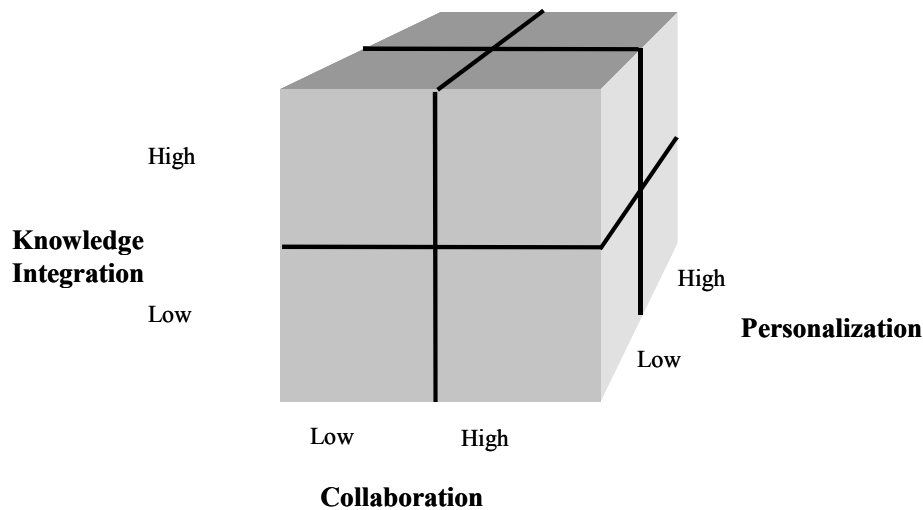

Figure 4. Dimensions of Organization Portals

Knowledge Creation

Organizational knowledge creation involves developing new content or replacing existing knowledge within organization's tacit and explicit knowledge (Pentland, 1995). This involves multiple people (Cyert & March, 1992) coming together with their own set of experiences and skills. Portals enhance their interaction by providing groups with the tools to collaborate. Collaboration is the ability to have conversation, while maintaining a common frame of reference, usually referred to as a shared space (Schrage,

1997). Two possible forms of collaboration (asynchronous and synchronous tools) are available in a portal. Collaboration enhances the ability of the group to draw on the experiences and insights of individuals, thereby increasing knowledge richness.

Knowledge Transfer/Distribution

The next important sub-process is that of knowledge transfer. The process of knowledge storage also makes an impact through the process of knowledge transfer. Knowledge presented through the portal can be tailored to individual needs. This is referred to as personalization. Personalization significantly impacts the ability to transfer knowledge since it presents presorted knowledge base on individual needs. Therefore, the greater the ability to customize the portal, the greater the knowledge richness.

Knowledge richness is, thus, measured on two dimensions 1) the ability of the portal to provide collaborative tools and 2) the ability of the portal to personalize knowledge for the user. The greater the knowledge richness of the knowledge portal, the higher the knowledge processing capacity of the organization.

Performance and Fit

Performance has been operationalized with the help of the following variables: (1) Satisfaction with the outcome and process, (2) Commonality of understanding about the task in group, (3) Effectiveness of the solution and (4) Efficiency of the process. We examine the variation of IT investments via of knowledge reach and richness on performance of the task. The knowledge management fit; fit between the needs and capacity, should lead to a better performance on the above performance variables.

Research Method: Laboratory Experiment

A research method needed to study the above model has to be able to isolate the effect of the introduction of different knowledge portals while keeping the knowledge sharing needs constant. The best method for doing this is experimentation. We control the knowledge processing needs of the decision making group face with a negotiation task. The task would involve bringing together multiple perspectives to achieve a negotiated solution. Such a task is both knowledge reach and richness intensive, thus allowing us to isolate the effects of both.

Table 1. General Expectations from Experiment

Knowledge processing capacity Knowledge needs-capacity fit	Knowledge richness	Knowledge reach	Knowledge richness + Knowledge reach
Underfit	-	-	+
Fit	0	+	+
Overfit	-	-	?

Table 1 lists out the general expectations from the experiment. As proposed earlier, we expect portals that fit knowledge processing requirements to outperform portals that represent under or overfits. For a negotiation task, we also believe that portals high on knowledge richness will out perform portals with high knowledge reach. Finally, since a combination of knowledge reach and richness leads to greater knowledge processing capacity, we expect this condition to outperform portals with just high knowledge reach or richness. These expectations will be further developed into specific hypotheses.

Current Status of Research

Currently, the authors are focused on two issues: 1) experimental design; and 2) since no adequate portal exists to readily simulate the conditions presented above, we are also looking at development of a portal. Initial results based on a pilot study should be available to present at the conference.

References

Alavi, M., & Leidner, D. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual foundations and research issues. MIS Quarterly, 25(1), 107-136.

Chandler, A. D. J. (1962). Strategy and structure: Chapters in the history of industrial enterprise. Cambridge, MA: The MIT Press.

Cyert, R. M., & March, J. G. (1992). A behavioral theory of the firm (2nd ed.). Cambridge, MA: Blackwell.

Daft, R. L., & Lengel, R. H. (1986). Organizational Information Requirements, Media Richness and Structural Design. Management Science, 32(5), 554-571.

Davenport, T. H., & Prusak, L. (1997). Information ecology: mastering the information and knowledge environment. New York: Oxford University Press.

Davis, M. C. (1998). Knowledge Management. Information Strategy: The Executive's Journal(Fall), 11-22.

Dennis, A. R., & Kinney, S. T. (1998). Testing Media Richness Theory in the New Media: The Effects of Cues, Feedback, and Task Equivocality. Information Systems Research, 9(3), 256-275.

Duncan, R. (1973). Multiple decision making structure in adapting to environmental uncertainty. Human Relations, 26, 273-291.

Galbraith, J. (1974). Organizational Design : An information Processing View. Interfaces, 4(1), 87-89.

Gupta, S. (2000). Knowledge Management: Collaborative Infrastructures!!! Paper presented at the International Conference on Business Management - II, Nirma Institute of Management, India.

Hofer, C. W., & Schendel, D. (1978). Strategy Formulation: Analytical concepts. St. Paul, MN: West.

Huber, G. P., & McDaniel, R. R. (1986). The Decision-Making Paradigm of Organizational Design. Management Science, 32(5), 572-589.

Mack, R., Ravin, Y., & Byrd, R. J. (2001). Knowledge portals and the emerging digital knowledge workplace. IBM Systems Journal, 40(4), 925.

Mackenzie, K. D. (1984). Organizational Structures as Primal Information System. In S. K. Chang (Ed.), Management of Office Information Systems (pp. 27-46). New York: Plenum Publishing Corporation.

Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge creation. Organization Science, 5(1).

Pearlson, K. E. (2001). Managing and Using Information systems: A Strategic Approach: Wiley.

Pentland, B. T. (1995). Information Systems and Organizational Learning: The Social Epistemology of Organizational Knowledge Systems. Accounting, Management and Information Technologies, 5(1), 1-21.

Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping Agility through Digital Options: Reconceptualizing the Role of IT in Contemporary Firms. MIS Quarterly, 27(2), 237-263.

Santosus, M., & Surmacz, J. (2001). The ABC's of Knowledge Management. Retrieved November 01, 2002, from **http://www.cio.com/research/knowledge/edit/kmabcs.html**.

Schrage, M. (1997). Collaborative Tools: A first look. In R. L. R. III (Ed.), Knowledge Management Tools (pp. 167-186): Butterworth-Heinemann.

Swift, R. S. (2002). Executive response: CRM is changing our eras, the information we require, and our processes... MIS Quarterly Executive, 1(2), 95-96.

Turban, E., & Aronson, J. E. (2000). Decision support Systems and intelligent systems (6th ed.). New Jersey: Prentice Hall.

Tushman, M., & Nadler, D. A. (1978). Information processing as an integrating concept in organizational design. Academy of Management Review, 3(3), 613-624.