Codification of Knowledge for a Database: Best Practices and their Effectiveness (Proposal for an Empirical Investigation)

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ABSTRACT

The resource-based view of the firm has given rise to the knowledge-base view, which extols the benefits of knowledge and how it can be a source of sustained competitive advantage for a firm. Therefore, it is no wonder that there has been a growing use of knowledge databases to share, create, and utilize knowledge in order to stay competitive. Based on our limited research review, we have identified three core themes –sharing, codification, and utilization of knowledge in databases. Of these three, the codification of knowledge gains paramount importance because if the knowledge is not codified properly and does not lead to increased performance, then all the efforts will be futile. This paper is a proposal to identify the best practices in the codification of knowledge and to determine their effectiveness.

INTRODUCTION

According to Chen (1994), database management has been enhanced to knowledge base management in recent years. So now the question is what is knowledge management anyway? Nilkanta, Miller and Zhu (2006) define knowledge management as a "process in which information is transformed into actionable knowledge and made available to the user" (p.85). Alavi and Leidner (2001) state that "knowledge management refers to identifying and leveraging the collective knowledge in an organization to help the organization compete" (p.113). Zhang and Zhao (2006) define knowledge management as "the study of strategy, process, and technology to acquire, select, organize, share, and leverage business-critical information and expertise so as to improve company productivity and decision quality" (p.1). The highlights of

both these definitions are the key words “knowledge” and “information”. So now what is knowledge? Is there a difference between knowledge and information? Alavi and Leidner (2001), state that IT literature has presented a hierarchical view of data, information and knowledge. It almost seems that knowledge is defined in literature by distinguishing among knowledge, information, and data (Alavi & Leidner, 2001). According to Dreske (1981), Machlup (1983), and Vance (1987), the most commonly held view is that data is raw numbers and facts, information is processed data, and knowledge is authenticated information (Alavi & Lediner, 2001). This hierarchy does not however; seem to be the best way to distinguish between knowledge and information. Alavi and Leidner (2001) state that information processed in the mind of individuals is knowledge; it is the personalized information that is related to facts, procedures, concepts, interpretations, ideas, observations, and judgments. Alavi and Leidner (2001) further clarify this by saying that this personalized information may or may not be new, unique, useful, or accurate. Tuomi (1999) also does not seem to agree with the hierarchy of data and argues that the hierarchy of data is actually inverse (Alavi & Leidner, 2001). According to Tuomi (1999), “knowledge exists which, when articulated, verbalized, and structured becomes information which, when assigned a fixed representation and standard interpretation becomes data” (Alavi & Leidner, 2001, p.1999). Based on the argument made by Tuomi (1999), Alavi and Leidner (2001) take the stance that information gets converted to knowledge once it gets processed in the mind of individuals and knowledge becomes information after it is articulated and presented in the form of symbolic forms such as text, graphics, words, etc.

There are many perspectives to knowledge management according to Alavi and Leidner (2001) and therefore, knowledge can be viewed from any of the following perspectives: a state of mind, an object, a process, or a capability. Based on these different perspectives, knowledge management can be viewed in different ways. According to Alavi and Leidner (2001), when knowledge is viewed as an object, or is equated with information access, then knowledge management should be focusing on building and managing knowledge stocks. When knowledge is viewed as a process, then it is suggested by Alavi and Leidner (2001) that knowledge management should focus on knowledge flow and the process of creation, sharing and distribution of knowledge. If it is viewed as a capability, then knowledge management perspective focuses on “building core competencies, understanding the strategic advantage of know-how, and creating intellectual capital” (Alavi and Leidner, 2001, p.110). This implies that for each perspective of knowledge, there seems to be a different suggested strategy for managing knowledge and a different perspective of the role of systems in support of knowledge management (Alavi & Leidner, 2001).

THEORETICAL FOUNDATION

The last perspective stated in the above section regarding knowledge being viewed as a capability brings to mind the core ideas of the resource-based view. And true enough, Alavi and Leidner (2001) report in their landmark research article that knowledge is increasingly being treated as an organizational resource. This stream of research that views knowledge as a resource has given rise to the knowledge-based perspective of the firm (Alavi & Leidner, 2001). This perspective has its roots in the resource-based theory promoted by Penrose (1959) and expanded by Barney (1991), Conner (1991), and Wernerfelt (1984) (Alavi & Leidner, 2001).

According to the resource-based view of the firm, superior financial performance is attributed to organizational resources and capabilities (Bharadwaj, 2000). According to Barney (1986, 1991), the resource-based view of the firm links the "performance of organizations to resources and skills that are firm-specific, rare, and difficult to imitate of substitute" (Bharadwaj, 2000, p.170). IT capability is defined as a firm's "ability to mobilize and deploy IT-based resources in combination or copresent with other resources and capabilities" (Bharadwaj, 2000, p.171). By adopting, Grant's classification scheme for resources, Bharadwaj (2000), classified the key IT-based resources as follows: (1) the tangible resource comprising the physical IT infrastructure components, (2) the human IT resources comprising the technical and managerial IT skills, and (3) the intangible IT-enabled resources such as knowledge assets, customer orientation, and synergy. These three components in combination create a firm-wide IT capability (Bharadwaj, 2000). Bharadwaj (2000) empirically assessed the relationship between superior IT capability and firm performance and found that "firms with high IT capability tend to outperform a control sample of firms on a variety of profit and cost-based performance measures" (Bharadwaj, 2000, 169).

The resource-based view also states that a firm derives sustained competitive advantage from the resources and capabilities it controls and which are valuable, rare, imperfectly imitable, and not substitutable (Barney, 1991). The information and knowledge controlled by a firm and its information technology have been considered to be the resources and capabilities that are found to be sources of sustained competitive advantage by researchers (Barney, 1991; Mata, Fuerst, and Barney, 1995; Barney, White, and Ketchen Jr., 2001).

The resource-based view postulates that firms gain and sustain competitive advantages by deploying valuable resources and capabilities that are inelastic in supply (Ray, Barney, and Muhanna, 2004). According to Porter (1991), 'resources are not valuable in and of themselves, but they are valuable because they allow firms to perform activities…business processes are the source of competitive advantage (Ray, Barney, and Muhanna, 2004). Barney (1991) theorizes that the Resource-based logic implies that "business processes that exploit valuable, but common resources can only be a source of competitive parity; business processes that exploit valuable and rare resources can be a source of temporary competitive advantage; and business processes that exploit valuable, rare, and costly-to-imitate resources can be a source of sustained competitive advantage" (Ray, Barney and Muhanna, 2004). According to Barney (1991), a firm derives sustained competitive advantage from the resources and capabilities it controls and which are valuable, rare, imperfectly imitable, and not substitutable (Barney, White, and Ketchen Jr., 2001). Further these resources and capabilities are tangible and intangible assets that include a firm's management skills, its organizational processes and routines, and the information and knowledge that it controls (Barney, White, and Ketchen Jr., 2001).

As we can see from the discussion above, most of the resource-based view theorists consider knowledge to be an important asset that is capable of bringing competitive advantage to firms. According to Alavi and Leidner (2001), the knowledge-based perspective states that "the services rendered by tangible resources depend on how they are combined and applied, which is in turn a function of the firm's know-how (i.e., knowledge)" (p.108). They further go on to assert that according to the knowledge-based view, knowledge assets are capable of producing long-term sustained competitive advantage (Alavi & Leidner, 2001). Discussing the role of

advanced information technologies, Alavi and Leidner (2001) state that the Internet, intranets, extranets, browsers, data warehouses, data mining techniques, and software agents may be used to systematize, enhance, and expedite large-scale intra-and inter-firm knowledge management.

KNOWLEDGE - TAXONOMY

Knowledge has been classified in different ways by different researchers. Even though many classifications seem to abound, the most popular classification definitely seems to be the classification of knowledge into tacit and explicit knowledge. According to Nonaka (1994), the tacit knowledge has its roots in action, experience, and involvement in a specific context; and it consist of both cognitive and technical elements. The cognitive elements are an individual's mental models that consist of mental maps, beliefs, paradigms, and view points, while the technical component is made up of concrete know-how, crafts, and skills that can be applied to a specific context (Alavi & Leidner, 2001). The following is an example of tacit knowledge given by Alavi and Leidner (2001): the best means of approaching a customer could be by using flattery, using a hardsell, or using a no-nonsense approach. Explicit knowledge on the other hand is articulated, codified, and communicated in symbolic form and/or natural language (Alavi & Leidner, 2001). An example could be an owner's manual that is accompanied with the purchase of an electronic product (Alavi & Leidner, 2001).

According to Nonaka (1994), knowledge is also viewed as existing in the individual or the collective. Nilkanta et al (2006) state that at the organizational level, knowledge includes both the explicit knowledge such as the corporate manuals, databases, filing systems, etc and tacit knowledge such as experience, intuition, and beliefs. Most of the research seems to be focused on tacit and explicit knowledge, but Alavi and Leidner (2001) summarize all the existing taxonomies as follows.

- Tacit
  - Cognitive Tacit-Mental Models
  - Technical Tacit-Know-how
- Explicit-Articulated, generalized
- Individual-Created by & inherent in individual
- Social – Created by & inherent in collective actions of groups
- Declarative-Know-about
- Procedural-Know-how
- Causal-Know-why
- Conditional-Know-when
- Relational-Know-with
- Pragmatic – Useful knowledge for an organization

KNOWLEDGE MANAGEMENT SYSTEMS

Now that we have defined knowledge; differentiated between data, knowledge, and information; defined knowledge management; discussed the theoretical foundation of knowledge management; and the taxonomies of knowledge, it is perfectly in order now to discuss about knowledge management systems.

According to Alavi and Leidner (2001), knowledge management systems are a class of information systems applied to managing organizational knowledge. According to Nilkanta et al (2006), organizational knowledge is also known as institutional memory or organizational memory and this "organizational memory is the collection of historical corporate knowledge that is employed for current use through appropriate methods of gathering, organizing, refining, and disseminating the stored information and knowledge" (p.85, 86). According to Mandiwalla et al. (1998), an OMS "includes a database management system (DBMS) that can represent more than transactional data and an application that runs on top of the DBMS" (Nilkanta et al, 2006). Mandiwala et al (1998) also state that the generic requirements of an OMS include various types of memory, including how to represent, capture, and use organizational memory (Nilkanata et al, 2006). This definition highlights the importance of knowledge warehouses.

According to Nemati et al (2002) a knowledge warehouse combines the following three abilities (Nilkanta et al, 2006).

(1) an ability to efficiently generate, store, retrieve, and in general , manage explicit knowledge in various forms;
(2) an ability to store, execute, and manage the analysis tasks and their supporting technologies with minimal interaction and cognitive requirements from the decision maker;
(3) an ability to update the knowledge warehouse via a feedback loop of validated analysis output.

(p.87).

According to Nilkanta et al (2006), the knowledge warehouse architecture has six major components:

(1) the data/knowledge acquisition model; (2) the two feedback loops; (3) the extraction, transformation, and loading module; (4) a knowledge warehouse (storage) module; (5) the analysis workbench; and (6) a communication manager/user interface module. (p.87).

According to Alavi and Leidner (2001), the three common applications of IT to knowledge management are:

- Coding and sharing of best practices
- Creation of corporate knowledge directories
- Creation of knowledge networks

KNOWLEDGE DATABASES

Based on the discussion in the above section, we see three main themes emerging, which seem to form the main foundation for the creation and utilization of knowledge databases and they are: sharing knowledge, codifying knowledge, and utilizing knowledge. Of these three

themes, we believe that sharing of knowledge and utilization fall somewhere in the behavioral realm; therefore, here we will be focusing mainly on codification of knowledge. The question that comes up is how do you codify knowledge? What are the best practices to codify knowledge into a database? We will try to seek answers to these questions in literature first and then propose an experiment to study the practices and how well they work in an organizational context.

PROPOSED METHODOLOGY

We would like to survey organizations to determine the best practices to codify knowledge into a database. Other than that we would like to conduct an experiment in an organization to find the effectiveness of their knowledge codification techniques. In order to study this, we would like to set up an experiment in an organization willing to work with us on a study like this. The organization would have to be one that has just codified its knowledge into a database. Two groups of employees would be needed. One would be the control group. The control group would consist of experienced employees doing a particular task. The experimental group would consist of either new employees or employees who are new to that task, but would be given access to the knowledge database to assist them on their task. After the task completion, their effectiveness would be rated on a Likert-type performance evaluation scale by the supervisor and then a total performance score would be computed. This total performance score would be the response variable and the treatment factor would be the group with two levels - control and experiment group. We propose that a one-factor ANOVA could be conducted to evaluate the effectiveness of the process of codification into knowledge databases within the organization.

CONCLUSION

This is a work-in-progress paper. In the next phase of our research, we would like to identify the best practices for codification of knowledge into databases and determine their effectiveness.

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