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## **Knowledge strategy and its influence on knowledge organization**

**Abstract:** Knowledge strategy is the set of guidelines that shape the decisions that an organization makes regarding the acquisition, storage, manipulation, and application of its knowledge base. The purpose of this study is to identify and describe the influence knowledge strategy has on the manner in which an organization's knowledge is organized. Using semi-structured interviews of upper level executives from various industries, relationships are established between certain characteristics of knowledge strategy types (e.g. proactive or reactive knowledge acquisition) and the organization of knowledge within the organization. Results indicate that certain aspects of a knowledge strategy are linked to certain approaches to knowledge organization, though organizational characteristics such as structure and industry type also play a major role.

### **1. Introduction**

Knowledge strategy is a relatively new topic in the business literature, even though the concept of using knowledge as a strategic tool to gain a competitive advantage has been recognized since the dawn of organized business. Adam Smith wrote about the use of superior knowledge in the eighteenth century (Smith, 1976) and present day organizations, ranging from investment houses to exterminators, tout their superior knowledge in their marketing. Only recently, however, has the strategic use of knowledge taken on a more formal character.

Knowledge strategy is defined as the set of guidelines and beliefs that shape an organization's manipulation of knowledge (Kasten, 2006). These manipulations might include, but are not limited to, identification, development, storage, management, retrieval, application, and disposal. A knowledge strategy, as a component of the business strategy, provides a link between the organization's strategic decisions and its knowledge structures and activities. These structures and activities often include knowledge management systems, which places knowledge strategy as the guiding principle of the knowledge management system.

One of the most important activities undertaken by an organization, in terms of its knowledge base, is to organize it for later retrieval and use. In keeping with the definition of knowledge strategy, it seems appropriate that the knowledge organization mechanisms and schemas used by an organization should be influenced by its knowledge strategy, just as the types and sources of knowledge are. The purpose of this study is to explore the linkage between knowledge strategy and knowledge organization. This linkage, if it is definable and predictable, will allow the construction of knowledge organization mechanisms that will support the strategic needs of an organization as well as providing an opportunity for developing business strategy that exploits existing knowledge stores.

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Previous research has shown knowledge strategy to have a predominantly emergent, rather than predetermined, nature. The present research relies on knowledge strategy classifications developed by Kasten (2006) in which organizations' knowledge activities are analyzed and categorized based upon three dimensions: reliance on technology to store knowledge, the degree of proactive or reactive knowledge acquisition, and the broadness of the knowledge acquisition activities. These dimensions are used to categorize the organizations in this study and are used as a framework to determine if these characteristics of knowledge strategy have any influence over their knowledge organization activities.

This paper is organized as follows: Section 2 provides a review of the literature surrounding the organization of knowledge in various organizational milieu as well as the current research in knowledge strategy. Section 2 also provides a discussion of the research questions. Section 3 describes the methodologies employed to gather and analyze data as well as the selection of the participants. The findings of the research are presented in Section 4 and a discussion of those findings follows in Section 5. Section 6 provides some concluding remarks and directions for future inquiry.

## **2. Literature review**

This section begins with a review of the pertinent literature (Section 2.1), and concludes with the presentation of the research questions driving the present study in Section 2.2.

### **2.1. Knowledge organization and knowledge strategy**

In order to provide adequate grounding for this study, the literature from three independent, yet related, streams must be addressed. Because of the focus on organizational knowledge, and especially knowledge organization that is driven by the organization's needs, Section 2.1.1 reviews the literature regarding the organizationally-driven, or post-modern, approach to knowledge organization. Section 2.1.2 addresses the view taken of knowledge organization within the business or organizational environment, and the concept of knowledge strategy is discussed in Section 2.1.3.

#### **2.1.1. Post-modern knowledge organization**

Hjørland (2003) states that the "basic units of KO are semantic relations between concepts." He goes on to say that these relationships cannot be governed by some universal law but must be understood based upon the specific domain within which they exist. He bases his comments on a pragmatic philosophical viewpoint, which supports the creation of organizational systems based upon "cultural warrant" rather than a universal basis such as those based in a more rationalistic paradigm. The faceted classification systems tend to be based upon a pragmatic foundation.

Further writing on this postmodern epistemological stance stresses that the approach to organizing knowledge should come from the order of the knowledge itself, but also from the situational context within which the knowledge is to be used (Pejtersen and Albrechtsen, 2002).

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This ecological approach allows the “truth” of the knowledge to be judged from the standpoint of its use rather than from a universal, objective perspective. This organizational standpoint is created within the community as a function of its language, discourse, and internal information and knowledge flows (Mai, 2002).

Beghtol (2003) terms this approach to organic knowledge organization *naive*. By applying this label, she differentiates between the creation of a knowledge organization system by an information professional whose expertise lies in the creation of ontologies and taxonomies and a system created by the members of a community or organization using their own “rules” for which knowledge structures are complementary and which are unrelated. This classification approach has the advantage of being useful in the creation of new knowledge, which is often the case when disparate knowledge structures are combined by those with a great deal of existing knowledge in the field. Johanson (1997) suggests that researchers, and cartoonists, both create their best work by combining ideas and concepts that usually are not considered together.

The domain-specific, ecological knowledge organization approach is particularly well suited to modern businesses operating in a knowledge-intensive environment. Knowledge is a particularly strong tool in the creation of competitive advantage, and in order for knowledge to be valuable it must be differentiated and protected from the competition. In order to differentiate knowledge, it must be unique and difficult to replicate. This requires that the knowledge created and applied by the firm be organized according to its specific beliefs and processes.

### **2.1.2. Knowledge organization in a business environment**

In an organization that must exist in a competitive environment, knowledge takes on the importance of many other organizational assets. With this, the definition of knowledge organization often includes a mention of its purpose. For example, Augier and Knudsen (2004) describe knowledge organization as “an architecture that may help boundedly rational agents make better choices.” In this definition, the value of organizing knowledge is only found through its usefulness to the organization, and that usefulness is often derived within the framework of the organization and its characteristics. Thus, the manner of knowledge organization is not its only characteristic influenced by the organization, but its applicability and utility are also driven by the organization.

Knowledge organization literature in a business or organizational context tends toward two main streams: the type of knowledge generated and stored, and the mechanisms and tools used to store it. Much of the knowledge stored in corporate or organizational knowledge systems is either knowledge of the process or knowledge needed for the process. By process, I refer to the organizational activities that take place in the course of fulfilling the organization’s strategy. These might range from manufacturing processes to administrative processes to customer service processes. In each case, organizations tend to collect and organize knowledge pertaining to their direct and immediate needs.

Kang, Park, and Kim (2003) describe a knowledge organization system in which knowledge created by, and supporting, the organizational workflow is sought and applied. They further categorize organizational knowledge as input, output, applied, and parallel. Input knowledge is required for the task at hand to be started. This might include basic knowledge of

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setup (for a manufacturing firm) or customer needs (for a service firm). This knowledge might be accumulated in tasks upstream of the current task. Output knowledge is that which is created during the task's completion that might be useful if this task is repeated. This knowledge might include process improvement knowledge. Applied knowledge is that knowledge created in the current task that might be useful in subsequent tasks. In a product creation process, for example, knowledge of a product might be generated during the design phase that might be useful during the manufacturing phase. Last, parallel knowledge is that knowledge created during a process that might be useful on other tasks not directly attached to the current task. Keeping with the product creation process, it is possible to learn something during the creation of a product that might prove useful in the creation of a completely new product, such as experience with certain materials or results from a market analysis.

### **2.1.3. Knowledge strategy literature**

Zack (1999) explicitly defines knowledge strategy as “balancing knowledge-based resources and capabilities to the knowledge required for providing products or services in ways superior to those of competitors.” This definition, though slightly modified over the years, directly links the knowledge characteristics of the organization with performance and competitive advantage. Zack (1999) continues on to identify certain traits of the knowledge-based organization such as being a creator or exploiter of knowledge and whether knowledge is sought inside or outside the firm.

Bierly (1999) takes a similar approach to knowledge strategy when he defines four basic drivers involved in the creation of a knowledge strategy: internally vs. externally sourced knowledge, enhanced vs. new knowledge, fast vs. slow speed of learning, and depth vs. breadth of knowledge base. With these dimensions, Bierly (1999) proposes four generic knowledge strategies: explorer, exploiter, imitator, and passive learner.

The literature presented thus far has provided a basis for the further study of knowledge strategy. Up to this point in time, very little in the way of empirical analysis on knowledge strategy had been accomplished. One of the first large-scale studies on the nature of knowledge strategy and its impact on the manner in which firms manipulate their organizational knowledge was performed by Kasten (2006). This study of knowledge strategy in organizations ranging from healthcare to financial services and insurance provides evidence to support a number of findings. First, knowledge strategy is quite often an informal, emergent set of guidelines rather than a formal set of rules. Second, there is a discernable relationship between a firm's business strategy type and the characteristics of its knowledge strategy. Third, knowledge strategies can be categorized along a number of dimensions, including the organization's propensity to embed knowledge in humans or technology, the tendency of a firm to be proactive or reactive in its knowledge development or gathering, and the breadth with which it searches and develops knowledge.

## 2.2. Research questions

The first sections of this literature review established the importance placed upon knowledge organization, especially in a business or any other organization that depends on organizational knowledge to accomplish its mission. Some authors have cautioned that there must be a link between the business strategy driving a firm and its development and management of organizational knowledge (Klischewski, 2006). Moreover, Kasten (2006) provides insights into the relationship between business strategy, knowledge strategy, and some of the knowledge-centered activities of the organization, primarily knowledge seeking and knowledge storage. However, this research does not address the effect of knowledge strategy on knowledge organization. Therefore, the present study seeks to address the following research questions:

1. *Does knowledge strategy influence knowledge organization methods or approaches?* Kasten (2006) found that knowledge strategy determines many of the knowledge seeking and storage activities of an organization. It makes sense that knowledge organization methods might also be driven by knowledge strategy.
2. *Are there any organizational factors that influence knowledge organization?* There are many environmental factors that affect knowledge seeking activities such as industry environment and type of knowledge (Zack, 1999), so there might be factors outside of the knowledge strategy that affect knowledge organization as well.

Answers to these research questions will increase our understanding of how organizations translate their goals and objectives into knowledge-based decisions and actions. This, in turn, should encourage the development of more effective knowledge organization and storage methods and mechanisms.

## 3. Methodology

The research questions detailed in the previous section both call for the collection of data that require, at least initially, the use of qualitative research methods. As discussed in the literature review, there is very little empirical research in this area so that the opportunity to create and test hypotheses is very limited. Without some foundational research upon which to base the development of questionnaires or surveys, it seems that the benefit of quantitative methodologies is minimal.

The research requires that semi-structured interviews be performed with people involved in the strategic planning of large organizations. Semi-structured interviews allow the researcher to obtain information that is not assessable with a simple yes or no answer. This method is appropriate for gaining an understanding of complex and situationally-dependent information. This approach is also useful for gaining an understanding of a phenomenon that has yet to be extensively studied. By providing the researcher with an understanding of the underlying issues, this methodology is useful in the development of subsequent research methodologies such as those used in a quantitative study.

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With the permission of the participants, the interviews were recorded and transcribed. The transcriptions underwent a content analysis. The process of content analysis is described very differently across the qualitative research literature. In this study, I followed closely the writings of Berg (2004). The content analysis was conducted with the research questions playing a central role. This involved a very close reading of the transcripts while continually looking for evidence that would help to address those questions. The unit of analysis is a phrase or sentence, but whole passages were flagged if they were centrally concerned with one or more research questions. The goal of this process was to develop a dataset from which conclusions can be drawn about the research questions.

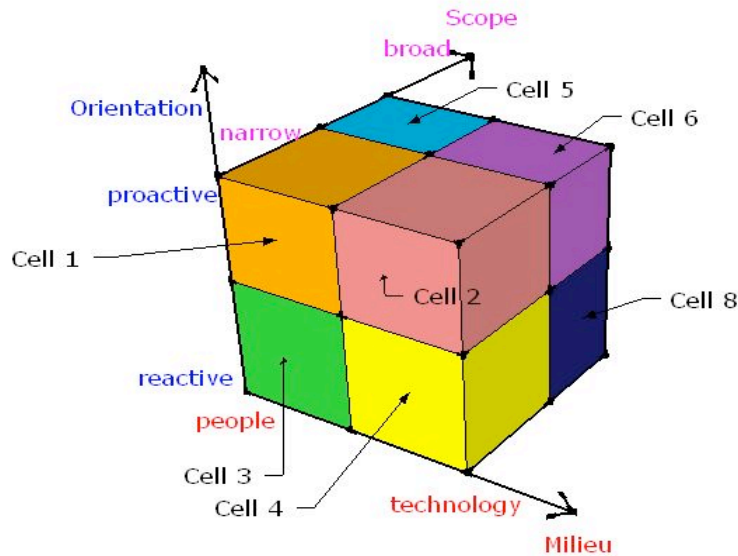
There are five organizations represented in the study: two hospitals, one accounting firm, one bank, and one financial services firm. Each organization provided at least one representative to participate in the research, with one hospital and the financial services firm providing two. Each participant was a Director, Chief Operating Officer, Vice President, or President of their respective organization, meaning they each played a role in business and knowledge strategy formulation. They each were also deeply involved in the development and application of their organization's knowledge.

#### **4. Findings**

The findings section is divided into two parts. The first part presents the evidence collected during the interviews that identifies each firm's knowledge strategy. This evidence allows the knowledge strategy of each organization to be classified and provides a broad view of the guidelines followed during many of its knowledge-based decisions. Once the knowledge strategy has been identified and described, the knowledge organization processes utilized by each organization are described.

##### **4.1. Knowledge strategy identification**

In order to better visualize the various elements of a knowledge strategy, Kasten (2006) developed a 2 X 2 X 2 matrix that serves as a model of the generic knowledge strategies identified in that study. That model is reproduced here as Figure 1. These dimensions represent the three primary aspects of knowledge strategy identified in the study. They do not represent an exhaustive list of knowledge strategy characteristics, but they provide a useful overview of those that are easily observed and described. However, a few constraints of the model must be kept in mind. Though only the endpoints of each dimension are shown, each is actually a continuum of values. Moreover, most organizations do not fall neatly into one of the endpoints shown, but rather somewhere in between. Last, many organizations will fill multiple spaces on the model with divisions and departments following their own knowledge strategy rather than having one for the entire organization.



**Figure 1. Model of Knowledge Strategy Dimensions**

Both hospitals are located in Cell #1 of the model. They both showed a great deal of proactive knowledge seeking and development, though these activities are somewhat tempered by ever-present budget restrictions. The hospitals, and the doctors who staff them, are continually seeking new techniques and procedures to provide better, and more efficient, care. Many of these procedures are not clinical in nature, but often represent enhancements in other support services such as the pharmacy or operating room scheduling. One of the hospitals has employed a Six Sigma approach to problem solving with great success. Their location in Cell #1 is also in response to their propensity to embed knowledge in people rather than formal storage devices such as manuals or an intranet. Both of these tools exist in some form, but the emphasis is on learning rather than referring. As the COO of one hospital, who was until recently the Head Nurse, put it, they want people to react in an emergency without having to refer to a book. More importantly, they feel that having knowledge in their people will contribute to the creation of new knowledge as they are exposed to new experiences. As with all of the organizations in the study, both hospitals confine their search for knowledge to that which directly contributes to their current mission.

The financial services firm falls into Cell #2 by virtue of its proactive approach to knowledge as well as a higher likelihood that the knowledge obtained will be embedded and stored in some form of information technology. It is very aggressive in its pursuit of new knowledge, due in large part to the level of competition in its industry. The pressure to introduce

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new products and services, along with more innovative ways to deliver them, creates great pressure to develop or acquire new sources of knowledge. However, unlike the hospitals, it is much more likely to deploy their newly developed knowledge in a software tool. It is also the only organization in the study with a knowledge management system under development, again demonstrating its desire to utilize information technology as a knowledge storage device.

Due to its more reactive approach to knowledge gathering, the accounting firm is located in Cell #3. Its approach to knowledge development is less aggressive due to the nature of the accounting industry. While there are significant developments from time to time, those changes that materially affect the way it does business are rarely a surprise, so that the firm is able to wait until the revised procedures are published rather than having to develop them internally. It is also very concerned with educating its staff so that their knowledge level is very high as well as being consistent throughout the firm. This is in keeping with its business strategy of superior customer service.

The bank tends to employ a follower strategy in most aspects of its business, and their acquisition of knowledge is no exception. It is much smaller than some of its rivals, so it does not have the same resources to devote to new product or process development. It is content to let the other banks pioneer new products that it then introduces after they become standardized throughout the industry. It is also less likely to spend a great deal on training. Rather, it provides a full set of procedures and rules to its employees in both paper and electronic form, allowing them to look up knowledge when it is needed. These two factors place the bank in Cell #4.

#### **4.2. Knowledge organization processes**

With few exceptions, the knowledge captured and stored by these organizations is directly related to their internal processes. There was not a single instance of an organization organizing knowledge that was not specifically tied to, or derived from, an existing organizational process. Most of the knowledge stored is input knowledge, that is, required to perform the processes of the organization (Kang, Park, and Kim, 2003). For the healthcare organizations, this includes knowledge needed to perform medical, logistical, and clerical processes. The financial services firm stored knowledge necessary to predict movement in various markets, execute certain transactions, or otherwise manipulate their clients' investments. Accounting processes and rules are the main knowledge types for the accounting firm, and banking procedures and regulations fill the knowledge needs of the bank.

There are a few examples of both parallel and applied knowledge to be found. The accounting firm maintains a "best practices" knowledge base that provides its employees with a resource to learn how certain situations should be addressed. In addition, the financial services firm is in the process of implementing a knowledge management system that will provide for the collection and dissemination of newly developed experiential knowledge in order to improve the performance of its employees, but due to its proprietary nature I was not allowed to inspect it.

Because of its highly applied nature, most of the organizations employ an "application-centric" knowledge organization approach. Knowledge is grouped and stored in such a way that it is convenient for those who use it most and decidedly inconvenient for those who might only need to access it occasionally. For instance, nursing references are kept in the various nursing



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“hubs,” such as nurses’ stations or the offices of nursing leaders. It is often organized by specialty or specific application (e.g. surgery, pediatrics) and kept in the area those specific activities take place in. In the healthcare cases, both used primarily paper-based reference material, with any electronic material being accessed over the Internet.

The financial services firm takes a similar approach to knowledge organization, except that much of its knowledge is electronically based. However, it is equally difficult for outsiders to access since much of it is embedded in highly specialized software. Thus, organizational knowledge regarding, for example, derivatives pricing, is locked into the electronic tools used to estimate those prices. Certainly, certain aspects of this knowledge reside in the financial professional as well, but its most complete form lies in the software.

In both the hospital and the financial services firm, knowledge is organized by process, but it is also organized by organizational entity. It is difficult to separate whether the functional specialty or the organizational separation creates this situation. The healthcare executives each admitted that theirs is a highly “siloesd” industry, with little interdisciplinary knowledge exchange. They also lament the loss of growth that this situation brings.

The accounting firm and the bank had more centralized knowledge structures. Both had searchable knowledge bases containing the rules and regulations governing their respective industries, as well as procedures for carrying out various tasks. Neither organization seemed to organize its knowledge by discipline or department, allowing all employees easy access to the entire organizational knowledge base. The reason for the more centralized knowledge base might stem from the increased homogeneity of task requirement within these organizations, or it might be the result of their reactive approach to knowledge acquisition.

## **5. Discussion**

With the exploratory nature of this research, it is difficult to draw many strong conclusions, however, two trends do become evident with a third as a possibility as well. To begin, it appears that both the accounting firm and the bank practice a rather centralized form of knowledge organization. It is also clear, from their knowledge strategy, that they are both somewhat reactive in their knowledge creation activities. This reactivity is driven largely by the relative stability of their industry as well as the knowledge required to exist within that industry. It follows, then, that these same factors might be responsible for the centralized nature of their knowledge base. Without a need for rapid updating or pruning, there is less incentive for locally tended knowledge bases when a universally maintained structure is sufficient. This central knowledge base might also be the result of a less-differentiated organizational structure. Neither firm relies on specialized knowledge to the same degree as the other organizations in the study such as healthcare, thus, their internal structure is less finely divided, reducing the need for highly diversified knowledge bases.

The accounting firm might obtain any flexibility they require through the use of human-based, rather than machine-based, knowledge. Its knowledge strategy identifies it as a firm more reliant upon human-centered knowledge and this reliance might provide them with the capability of rapid knowledge acquisition in cases where that is necessary. However, these cases are relatively rare and thus do not require a suitably designed knowledge organization system.

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The second apparent trend is actually the converse of the first. Both the hospitals and the financial services firm rely on relatively decentralized knowledge bases. Each of these organizations also practices a rather proactive knowledge strategy, in that they are aggressive in their pursuit of new and useful knowledge. It is likely that this aspect of their knowledge strategy, which exists to support their business strategies of innovation and customer service, requires a decentralized knowledge structure if for no other reason than a centralized knowledge base would be much more difficult to maintain given the rapid rate with which it must be updated. Who better to tend this knowledge base than the local subject matter experts? In the healthcare case, these are the doctors and nurses in charge of specific activities and, in the financial services firm these are professionals assigned to very specialized investment vehicles or analysis processes.

One inconsistency between these two industries is the dependence upon human knowledge by healthcare and the heavy use of technology to store knowledge in the case of financial services. This difference is even more striking when the newly created knowledge management system is considered. This system, when launched, will provide access to specialized knowledge, including best practices and lessons learned, to wide swaths of the firm, leading to the conclusion that the organization is turning toward a more centralized form of knowledge organization. If that trend reveals itself to be true, then a third result of the study might be that firms relying on technology to store knowledge, such as the bank is currently and the financial services firm might be, tend toward the central storage of knowledge. This might be the result of the increased flexibility inherent in current technology or the tendency of large organizations to want to manage power, which in this situation is embedded in the vast stores of knowledge available.

## **6. Conclusion**

Organizations that use knowledge to support their processes and as a means of improving their position in their industry will tend to develop, over time, a knowledge strategy. This knowledge strategy is evident in the decisions made relating to the development, gathering, storage, and application of organizational knowledge. Specifically, knowledge strategy can be defined in terms of the organization's knowledge storage medium, aggressiveness of knowledge acquisition, and the scope of knowledge sought. This study analyzes the knowledge strategy of five organizations in order to identify a relationship between their knowledge strategy and the manner in which they organize their knowledge.

Two trends are evident. Organizations that are more reactive in their knowledge acquisition tend to centralize their knowledge organization while those with a more proactive approach tend toward a distributed knowledge base. Likewise, firms that are more proactive tend toward more distributed knowledge organization methods. However, the application of information technology seems to influence organizations toward a more centralized knowledge organization scheme. Further study is necessary to fully understand these relationships.

The application of these results is in the optimization of knowledge organization methods to the knowledge strategy in use. The more closely the knowledge organization method matches the use of knowledge by the organization, the more effective the application of that knowledge.

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However, this study is limited in scope and is exploratory in nature. It extends the work of Beghtol (2003) in providing deeper understanding of the influence of the organization upon knowledge organization, but the depth of understanding necessary to influence the design of knowledge organization systems for specific organizational strategies and characteristics will only come after much more research is completed.

## References

- Albrechtsen, H. and Pejtersen, A. M. (2003). Cognitive work analysis and work centered design of classification. *Knowledge organization*, 30(3/4): 213-227.
- Augier, M. and Knudsen, T. (2004). The architecture and design of the knowledge organization. *Journal of knowledge management*, 8(4):6-20.
- Berg, B. L. (2004). *Qualitative research methods*. Boston: Pearson. 5<sup>th</sup> ed.
- Bierly III, P. E. (1999). Development of a generic knowledge strategy typology. *Journal of business strategies*, 16(1): 1-26.
- Hjørland, B. (2003). Fundamentals of knowledge organization. *Knowledge organization*, 30(2): 87-111.
- Johanson, G. (1997). Information, knowledge and research. *Journal of information science*, 23(2): 103-109.
- Kang, I., Park, Y. and Kim, Y. (2003). A framework for designing a workflow-based knowledge map. *Business process management journal*, 9(3): 281-294.
- Kasten, J. (2006). *Knowledge strategy drivers: An exploratory study*. Unpublished Ph.D. dissertation. Long Island University.
- Klischewski, R. (2006). Ontologies for e-document management in public administration. *Business process management journal*, 12(1): 34-47.
- Mai, J. (2002). A postmodern theory of knowledge organization. In M. J. López-Huertas (Ed.), *Challenges in knowledge representation and organization for the 21<sup>st</sup> Century: Integration of knowledge across boundaries; Proceedings of the 7<sup>th</sup> Annual International ISKO Conference*. Würzburg: Ergon-Verlag.
- Mai, J. (2004). Classification in context: Relativity, reality, and representation. *Knowledge organization*, 31(1): 39-48.
- Pejtersen, A. M. and Albrechtsen, H. (2002). Models for collaborative integration of knowledge. In M. J. López-Huertas (Ed.), *Challenges in knowledge representation and organization for the 21<sup>st</sup> Century: Integration of knowledge across boundaries; Proceedings of the 7<sup>th</sup> Annual International ISKO Conference*. Würzburg: Ergon-Verlag.
- Smith, A. (1976). *An inquiry into the nature and causes of the wealth of nations*. Oxford: Clarendon Press.
- Zack, M. H. (1999). Developing a knowledge strategy. *California management review*, 41(3): 125-145.