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The Success Criteria for Implementing Knowledge Management Systems in an Organization

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Abstract

The main objective of this dissertation is to explore both the technological and organizational aspects of the success criteria of Knowledge Management Systems (KMS), and focus on the process of building an organizational knowledge base for operational knowledge reuse.

In a time of change, more organizations are deploying a variety of Knowledge Management Systems to enhance business processes and performance. Information and communication technology (ICT) has provided abundant tools and utilities to enable such systems. After nearly a decade of practice in knowledge management, the results are mixed at best and the type of systems utilized are very diverse and often fragmented in infrastructure. In identifying these enabling criteria in a knowledge management system, the author wishes to aid in the future analysis, design, and evaluation of successfully utilizing such systems.

This study is divided in two parts. Part I focuses on building a knowledge process model in the framework of information systems (IS) and acquiring all the functional and structural attributes. The model uses information systems commonly utilized in providing products or services to enlist most of the organizational and technological attributes. A generic knowledge management system is characterized as an input-system-output workflow with which a knowledge worker can interact to enhance the service or product. Part II validates the criteria identified in the model and analyzes data gathered utilizing surveys of knowledge workers in various industries. The analysis of the data collected in exploratory interviews also gave us the opportunity to see how much the industry was still fragmented and what was most important in terms of implementing a KMS.

The key findings are both the technological and organizational enablers / criteria that make the KMS more effective, or encourage the knowledge workers to more routinely interact with the knowledge base. Technologically, we found scalability, adaptability, transparency, dependability, and personalization to be most important when specifically referring to the KMS itself. Organizationally, time and monetary resources, corporate culture, evaluation, business alignment, and training influence the effectiveness of KMS initiative the most.

The main contribution of this thesis is the development of the KMS success model and criteria. The unique aspect of this research is the utilization of the knowledge worker perspective as opposed to the managerial point of view most commonly used in this type of research.

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Introduction

1.1 Motivation of the Study

Organizational change is inevitable and it can certainly wreak havoc on an organization, even when the change is for a greater good. Budget cuts, program shifts, consolidations, program/site openings and closings for one reason or another can lead to a reduction of employees, or more specifically knowledge workers. These knowledge workers can change departments or relocate to different office locations within the organization, around the country, or around the world. In the fall of 2001, during the economic downturn that strangled the New York City, many companies were performing serious staff reductions, including JBFCS a not for profit health care organization located in Manhattan. There was a turn over of social workers, councilors, and other employee positions. Even their 'Non-Profit' nature couldn't shield them, and other companies, from the hardship, nor could it shield many employees from the staff reductions. Government funding was cut back in an attempt to keep the city / state afloat. As the stock market was stumbling, private donations were getting more difficult to acquire. Unemployment was beginning to reach levels that had not been seen in years.

Being a member of the Information Technology department of this organization, I saw from a central perspective how many of these changes affected our operations. It was at this point that I began to search for ideas on how Knowledge Management (KM) could benefit my rapidly changing department. I then started looking at it from a broader perspective. How could it benefit the entire organization? As I studied, I began to develop

questions, and the questions led to a more specific area of research. Questions arose from the review of the literature. Despite all of the books that have been written about how KM is the next organizational performance booster, there are still many obstacles, and only some have been identified and discussed. Certainly the benefits are highlighted by consulting firms so why aren't firms everywhere taking the plunge? If some areas like the government are investing in KM, why has it not permeated to other sectors and if so, to what extent? All of these questions, what I've noticed in the publications, and what I saw in my organization, prompted the formalization of this research study.

> *"The growing importance of knowledge as a critical business resource has compelled executives to examine the knowledge underlying their business, giving rise to knowledge management (KM) initiatives"* – Atreyi Kankanhalli [48]

1.2 Statement of the Problem

There are ways in which KMS can be implemented that can lead to a more successful knowledge base. Reading about KMS tends to generate more questions than it answers. Even if a company realizes the benefits of a KMS infrastructure, there are factors that influence KM implementations and consequently the practice of KM as a whole. More importantly, discussions on the lack of structure to manage knowledge in its most basic sense are more commonly found. "The sharing of information in healthcare is notoriously poor" as stated by Morvin Miller [15]. This is the general feeling attained from reading KMS articles, and gathered from attending the E-Gov KM conference in April 2003. Organizations have individual knowledge sources that are not integrated.

They repeat mistakes, and fail to make proper use of the knowledge that already exists within the organization [107].

Some organizations are doing some things right. Giant Eagle, a grocery retailer and distributor is a good example. Utilizing *Livelink*, a KMS by the Open Text Corporation, the company was able to encourage employees to spread good ideas throughout the organization. This company is a good example of a positive KM environment supported by a technology package. What makes Giant Eagle worth mentioning is the fact that they steered a competitive corporate environment from the 'best sales figures' to the 'best shared discovery'. To be more specific, although the company didn't have a history of having the most computer savvy staff, they recognized the importance of their initiative. There are various strategies on implementing KM, as it is not an easy task [93]. They didn't want their efforts to fail despite the obstacles, the competitive culture, lack of computer experience, and the difficulty of employees finding the time to actually use the system. Management modified the culture ever so slightly to make their KM initiative work. Management encouraged employees to post ideas and they began to get competitive about it. One department, for example, posted a discovery. They found a way to display an item to maximize sales and impulse buying of the item. This successful idea was shared and another store tried it and also found it successful [81].

- If Giant Eagle can apply this kind of framework, why can't every organization?
- Is there something special about the nature of the grocery retail industry that lends itself to make initiatives of this sort successful?

- Is it as simple as just stumbling on the right combination of managerial direction and technology, or does it have something to do with their historically competitive corporate environment?
- What characteristics / criteria can enable an organization to apply knowledge management to improve competitiveness in this forever changing environment?

With all the theory out there on KM and KMS implementation, it would be advantageous to have a concise description of how the structure should look, and how the components, or group of KM components, interact [91]. Knowledge Management Systems (KMSs') are referred to as a group entity, like Information Systems, which can be a conglomeration of various technologies. There are key characteristics that can be identified that can contribute to a successful implementation. There are examples of successful implementations that can be referenced as a guide.

In addition to technical characteristics there are also non-technical issues that have been discovered that could act as enablers to a successful KMS implementation. KM as we know is not just about the technology. As learned from reading the literature, you cannot simply install a Portal and call it the 'KM initiative' [91].

1.3 The Scope of This Study

The primary scope of this work is to study the various KM Systems that could make up a company's Knowledge Base and analyze how knowledge workers can best interact with them. Simply, the objective of this dissertation is to identify *criteria* that can enable KMS practices in an organization.

1.3.1 KM, KMS, KS relationship

Figure 1-2 illustrates the relationship between Knowledge Management (KM), a Knowledge System (KS), and Knowledge Management Systems (KMS). You can see as shown in the diagram that Knowledge Management encompasses both KMS and KS. Knowledge Management is the most general and it utilizes hardware and software of a KMS and the overall management of the corporate knowledge. Ideally there would be one integrated KMS that would contain all of the knowledge in the organization, but the diagram is designed to illustrate common, or possible, configurations. This diagram represents real world systems where they may be multiple knowledge management systems, multiple portals or KMS products in global organizations that may not work together. Smith and Farguhar state "For the knowledge representation community to have an impact on knowledge management, it is important that the tools and ontology's are plug and play compatible to other knowledge management technologies" [91].

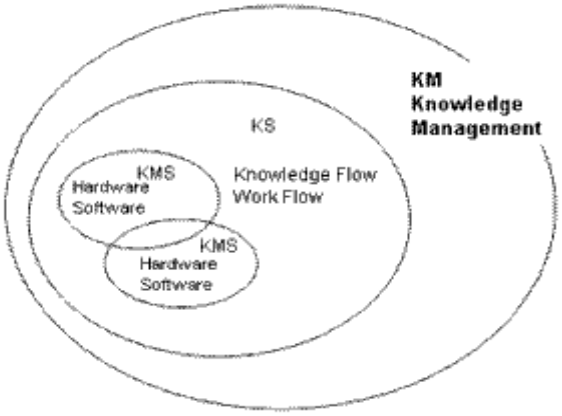

Figure 1-1 KS and KMS Relationship

It is difficult to design a system without taking into account some of the human factors that influence Knowledge Management Systems, such as getting people to share their knowledge for example. The main thrust of this work is the following:

- To examine various Knowledge Management Systems (KMS) that have been developed and that have evolved in various organizations.
- Identify the characteristics and components that make up an organization's KMS.
- Develop a model based on the discovered characteristics.
- Analyze the model to isolate the enablers that facilitate the success and utilization of an organization's KMS.
- Validate the model with data gathered through surveys of Knowledge Workers.

When implementing a KMS there are factors that have to be considered, such as with the Giant Eagle example, it is easy to see how they had to take the competitive culture and make it work to their advantage. Even though they implemented a KMS technology geared to the users, with the competitive culture the way it was, it would have surely meant the technology's doom.

Knowledge management is a growing field and a KM department may depend on many constructs in order to become a recognized structure in an organization, but that is beyond the scope of this research. The intention is not to create a checklist for designing a KM department in an organization, but to analyze the interaction between knowledge workers and the technology designed to help them create, retrieve and disseminate knowledge. KM implementation involves an analysis of business strategy, and that is outside the scope of this research [93]. The following definitions are included to further outline the scope of this research.

What is knowledge?

There can be no discussion about knowledge without first identifying which form of knowledge is being referred to. Philosophers may argue that there is no need for this argument, that once knowledge has left someone's mind then it is something else, maybe documented information. Organizationally we have come to accept the idea that there are multiple forms of knowledge, tacit, and explicit. The former we know as the 'know how' or 'know what' retained in someone's mind or an "individuals mental models consisting of maps, beliefs, paradigms, and viewpoints"[7]. The latter is the attempt to document or otherwise communicate/share that knowledge with others, or store it for later use [7]. This research will focus on explicit organizational knowledge.

What is Knowledge Management?

Knowledge management is the management of an organization's knowledge resources. In order to retain vital knowledge, organizations have begun to study tacit and explicit knowledge in an attempt to understand them, and predictably control the flow of knowledge within an organization. Professor Becerra-Fernandez states "The need to acquire Intellectual Capital created the Knowledge Management (KM) movement" [12]. Knowledge Management is an entire field that has many organizational aspects that would be studied by students at Business Schools. Issues such as how to provide incentives for employees to share knowledge are typically KM organizational issues. It should also be measured in order to be "managed effectively"[4]. In the words of Alavi and Leidner, "Knowledge Management refers to identifying and leveraging the collective knowledge in an organization to help the organization compete" [7]. R. Mack considers

capturing knowledge from knowledge workers as they go about their regular work, and attempting to make that knowledge available to others, a fundamental aspect of KM. Zhu et al defines it similarly but adds the 'organization' of the intellectual assets [107].

When we look inside the box of KM, we find many subsets, such as content management, communities of practice, knowledge retrieval, taxonomies. There are also non technical factors such as organizational processes, and social / cultural factors [47, 56]. Marwick seems to think KM contains many subsets. In his article he states that "Effective knowledge management typically requires an appropriate combination of organizational, and managerial initiatives along with, in many cases, deployment of appropriate technology" [60].

What is a Knowledge Management System KMS?

A KMS generally refers to the technology set in place to capture, disseminate, and retrieve knowledge. A Portal or Intranet could be referred to as a KMS depending on how it was designed. A KMS is a special class of information system applied to managing organizational knowledge [7]. In general a KMS is designed to aid in the overall "application" of organizational knowledge. Put simply "Collaboration for KMS users, takes the form of shared access to a database of knowledge "artifacts" such as articles, plans, reports, and memos."[104]

What is Knowledge System (KS)?

For the purpose of this paper, Knowledge Systems are defined as the conglomeration of both the knowledge flow required to accomplish a business process,

and the KMS used to manage them in the organization. They are tightly coupled in the sharing of knowledge. There is a fine distinction between KM and KS, as KS is a subset of KM and can contain all the same components, but a Knowledge system revolves around the workflow and the flow of knowledge out of and back into the KMS or group of KMSs'. The term 'Knowledge System' implies how the knowledge would flow through the organization, in and out of the software, and hardware that a company has employed, Portal, document management, etc. In addition, it could include the flow of knowledge through an organization's knowledge workers. Most importantly it would include Knowledge workers and the processes that they use to interact with the KMS. Another way to phrase it would be a Knowledge Management Infrastructure. Everything that might be put in place to try to aid the flow of knowledge, such as capturing knowledge, supporting knowledge sharing, and aiding communication among knowledge workers. Back in 1987 Smith [90] described a Knowledge System as a conglomeration of Knowledge Bases that can be accessed by a single entity. Today, we have begun to be a little more specific about the KM terminology in an effort to make things less convoluted and standardize certain concepts.

1.3.2 Knowledge Worker

Knowledge workers for the most part are employees that spend most of their day creating knowledge, solving problems, or assimilating knowledge [36]. At various times, depending on their task, any employee could be referred to as a 'knowledge worker', but for the most part, the term is generally held for problem solvers, analysts, or researchers. Knowledge workers need systems to aid them to work with existing knowledge, create

new knowledge, and add their own. This differs from other employees who may work with Information Systems, processing orders, adding data and information into the system. A better way to define a knowledge worker is by the work that they do. Knowledge work is "solving problems and accomplishing goals by gathering, organizing, analyzing, creating and synthesizing information and expertise" [56]. Drury and Farhoomand [27] state that "Knowledge workers are high-level employees who apply theoretical and analytical knowledge acquired through formal education to develop new products and services". It seems as though this definition has expanded some to include various workers because as mentioned, at times just about any employee can take on the role of a knowledge worker.

1.3.3 Definition of a "Successful" KMS

Jennex [46] bases the development of an Organization Memory Information Success Model, on Ackermen's [1] theory that states that the success of a system can be based on user expectations. For the purpose of this study, I will base all analysis, and the development of the survey tool to probe an organization's KMS on this theory. A successful system is one in which the capabilities of the system meets or exceeds user's expectations [1]. This point drives the development of the survey instrument as a tool to probe an organizations system and more importantly determine what specific needs must be considered when designing and implementing a system. One way to determine the success of a system is to utilize the model developed by Delone and McLean [23], illustrated in Figure 1-1.

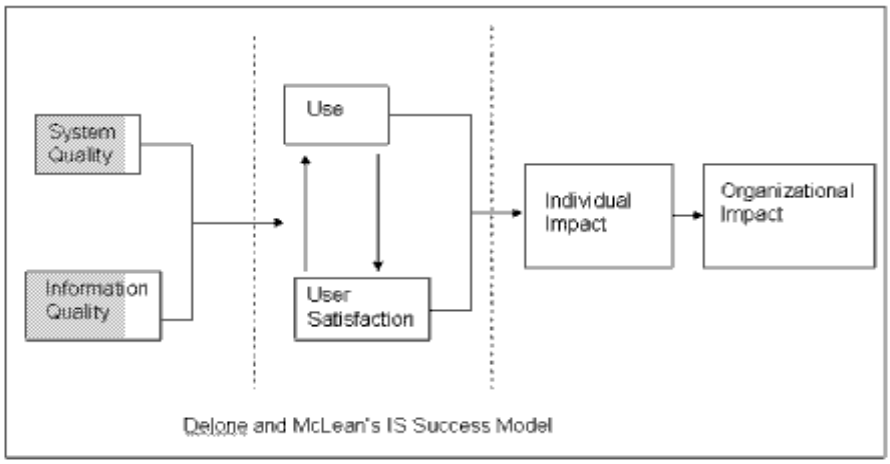

Figure 1-2 IS Success Model [22]

1.4 Outline of This Study

This thesis is divided into several chapters beginning with a general overview and background in Chapter 2. Chapters 3 and 4 then delve more deeply into constructing a KMS model by performing comparative studies of Knowledge Management Systems and information systems. Also in these chapters enablers of a successful KMS are also extracted. By analyzing factors that contribute to the success of a KMS implementation, as well as the barriers that prevent one, more complete framework can be built based on current accepted theory as well as what has worked in the field. Then, in Chapter 5, surveys are conducted with knowledge workers from areas like the business service sector to validate the success criteria developed in Chapter 4, and the associated characteristics.

Chapter 2

Overview of Knowledge Management Systems

2.1 Introduction

As an attendee of the April 2003 E-Gov conference in Washington D.C. I've noticed that KM has taken hold and is evolving into an integral part of the way we do business. The intense focus that it is receiving from enormous government agencies like the Department of Homeland Security, the Department of the Navy, and Air Force, as well as private industry, speaks volumes about its importance to the way things are to be done in the near future. Infrastructures are being put in place to support KM activities such as search engines, document management systems, data mining tools, and general systems to support overall collaboration [85]. The goal of this chapter is to analyze current Knowledge Management System (KMS) practices, to note where they are derived from, and how they reflect KM's current state / KM theory.

2.2 KMS – Functionality

In the paper by Maryam Alavi and Dorethy E. Leidner [7], which is considered by some to be a seminal work in Knowledge Management (KM), the authors put a great deal of effort in providing an in depth overview of the fundamental, and some more advanced, Knowledge Management areas. One key summary from the study concerning KM/KMS is listed in Table 2-1. In addition to the various taxonomies of knowledge, there are Knowledge Perspectives. The difference is taxonomies organizes where knowledge resides, and a perspective is how the knowledge itself is viewed. If knowledge is seen as

a process then it will be treated differently then if it is regarded as an object, as shown in the Table 2-1 [7].

Perspectives		Implications for Knowledge Management (KM)	Implications for Knowledge Management Systems (KMS)
Knowledge vis-à-vis data and information	Data is facts, raw numbers; information is processed/interpreted data. Knowledge is personalized information	KM Focuses on exposing individuals to potentially useful information and facilitating assimilation of information	KMS will not appear radically different from existing IS, but will be extended toward helping in user assimilation of information
State of Mind	Knowledge is the state of knowing and understanding.	KM involves enhancing individual learning and understanding through provision of information	Role of IT is to provide access to sources of knowledge rather than knowledge itself
Object	Knowledge is an object to be stored and manipulated	Key KM issue is building and managing knowledge stocks	Role of IT involves gathering, storing, and transferring knowledge.
Process	Knowledge is a process of applying expertise	KM focus is knowledge flows and the process of creation, sharing, and distributing knowledge	Role of IT is to provide a link among sources of knowledge to create wider breath and depth of knowledge flows
Access To Information	Knowledge is a condition of access to information	KM focus is organized access to and retrieval of content	Role if IT is to provide effective search and retrieval mechanisms for locating relevant information.

Capability	Knowledge is the potential to influence action.	KM is about building competencies of understanding strategic know-how	Role of IT is to enhance intellectual capital by supporting development of individual and organizational competencies

Table 2-1 Summary of KM and KMS [7]

Some of the KM activities that were discussed in great detail were Document Management, Knowledge Sharing, and knowledge communities. In extending their research I've discovered some areas that they did not discuss but also fall under the Knowledge Management "umbrella" or the field of KM. KM is a diverse area and there are pieces that wouldn't necessarily fall within KM, but for several reasons, they are included. Justification for the inclusions include the fact that KM is an emerging discipline whose borders are yet to be clearly defined, there is no "accepted definition", and some techniques/technologies provide such good support that they are added. There is always the popular 'band wagon' to jump on in an effort to market a product, so companies will use the term KM even if they don't really have solid justification to do so.

Knowledge Management Systems (KMSs') should follow organizational knowledge flow, to make sure once it is attained it is retained within the organization for future use. A great example of this, or more accurately the failure to do this well and the consequences realized, is demonstrated by Nakkiran N Sunassee and David A Sewry[11]. In their article they discuss the success of the Ford Taurus. The story starts bright and hopeful, but quickly takes a turn for the worse. Unfortunately there wasn't much effort put into capturing what was learned during the design, production, and rollout of the product line and as they put it, the knowledge was "lost". Ford was generally unable to reproduce what they learned or apply it to another product line. Thomas Davenport [21]

demonstrates KMS implementation at Hewlett Packard. In the HP case study, we see the importance of focusing on important KM/KMS characteristics.

2.2.1 Knowledge Acquisition / Capturing

There is a lot of research that has been done in the area of Knowledge Acquisition / Capturing. One of the biggest problems in Knowledge Management (KM) is how to collect the vital information. There are many cases in which knowledge is simply not recorded. In an ideal world, there would be mechanisms in place, like a shoulder camera/computer that recorded all of a knowledge workers experiences, sifted through it and stored it automatically, or forwarded it to others that could benefit from the newly acquired knowledge. Unfortunately no such dream world exists so capturing information is left to us. What is involved varies depending on the scenario, but an example of this is simply creating documents that capture what may need to be 'remembered' by the individual or organization. Liou [55] describes knowledge acquisition as " the process of extracting knowledge from experts and structuring this knowledge into a computer readable form". He goes on to say that the techniques utilized in doing this are "interviewing, observations, protocol analysis, discourse analysis, repertory, grid analysis, brainstorming, nominal group technique, Delphi-technique, consensus decision making, and computer aided group sessions that are reviewed"[55, 96]. White and Sleeman [98] state that "To acquire knowledge that is fit for a specific purpose, it is very desirable to have a structured, declarative expression of the knowledge that is needed". Their tool called COCKATOO is an example of a knowledge acquisition tool. It is designed to parse the language like a programming language parser or compiler and then