

Development of Knowledge Management System for Small & Medium-sized Construction Companies in Korea

Tai Sik Lee

Professor, Department of Civil and Environmental Engineering
Hanyang University, Ansan, Korea

Dong Wook Lee

Ph.D. Candidate, Department of Civil and Environmental Engineering
Hanyang University, Ansan, Korea

Abstract

Knowledge Management has become an essential need for survival in the over-all industry, not as a simple paradigm but as a critical factor for success. Construction enterprises show a strong tendency to adopt Knowledge Management, and are developing Knowledge-based Systems for Information Technology (IT) application in Korea. But small & medium-sized construction companies have many difficulties in introducing knowledge management in contrast to the large enterprises: such as the recognition for Information Technology and financial difficulties. This study is aimed to develop Knowledge Management System for small & medium-sized construction companies not having introduced knowledge management due to these difficulties. This paper analyzes present conditions of small & medium-sized construction companies through the Information Strategy Planning (ISP) method, and provides the flexible KMS model to be used by them.

Keywords

Knowledge Management, Knowledge Management System, Information Strategy Planning

1. Introduction

Since 1990s, the interest in knowledge management has increased, as evidenced by worldwide spread of seminars, conferences, and publications (Wiig, K. M. et al., 1997). Especially, the importance of knowledge is often argued by scholars such as Toffler, A.(1991), Drucker, P. F.(1994, 2002) and Nonaka, I.(1998). The motives behind increased interest in knowledge management are improvement of the value of individuals and companies as well as survival through increased competitive power (Lee, T. S. and Lee, D. W., 2002). The construction industry in Korea also recognizes the importance of intangible asset. Since late 1990s, large companies started adopting knowledge management. This trend can be viewed as an attempt to survive in an environment of hyper-competition. Especially, IMF crisis that decreased the value of the companies also contributed to motivating companies to be interested in knowledge management (Lee, T. S. et al, 2000, 2001, Lee, T. S. and Lee, D. W., 2002). However, unlike large companies that readily adopt knowledge management, small and medium-sized general construction companies or special construction companies lack understanding of knowledge management and have hard time keeping updated with information due to financial and organizational reasons (PMnCM, 2001).

This study is aimed to develop Knowledge Management System (KMS) for small & medium-sized construction companies that have not introduced knowledge management due to that difficulties. This paper analyzes present conditions of small & medium-sized construction companies through the Information Strategy Planning (ISP) method, and provides the flexible KMS model to be used by them.

2. KMS & ISP

2.1 Knowledge Management System

KMS is an integrated computer-based system that facilitates the organizational knowledge management processes to maximize the value of organizational knowledge resources. Existing information systems, for the most part, can be classified as Data Processing Systems (DPS) and Management Information Systems (MIS). DPS enables structured decisions to be made by dealing with large amounts of data rapidly and repeatedly. Decision Support System (DSS), Expert System (ES) and Executive Information System (EIS), which were developed after DPS, enable us to make semi-structured decisions for specific operations. KMS enables us to make unstructured decisions by managing knowledge efficiently through harmoniously connecting with existing systems (figure 1).

Source: Kim, Y.G.(1998)

Figure 1: Existing Information System and KMS

Figure 2 lists the tools that are often employed to construct an effective KMS(Kim, Y.G., 1998). Those tools are 1) knowledge repository and knowledge map, which are used to store and access knowledge in order to improve knowledge recycling potentials, 2) internet and intranet, which secure access to knowledge based regardless when and where a user is located, 3) Electronic Data Management System (EDMS) and workflow management, which coordinate dispersed knowledge resources, 4) Case-Based Reasoning (CBR), which enables processing of an enormous amount of information and case studies, 5) Neutral Network and data mining, 6) audio-graphic conference system and groupware, which facilitate knowledge exchange by offering various communication channels, and 7) Decision Support System (DSS) and Executive Information System (EIS), which provide analytic and decision making tools.

2.2 Information Strategy Planning

Wiig, K. M. et al.(1997) divided ISP method for KM into 4 steps: Review, Conceptualize, Reflect and Act phase. Jeong, K.C.(2002) proposed a systematic methodology for setting up master plans of KM. The proposed methodology is developed based on both the previous KM theories and the experience from industry fields. The methodology consists of four stages: 1) setting up strategic directions, 2) analyzing the current status, 3) designing KM models, and 4) making KM master plans (figure 3). This study analyzed the present conditions of small & medium-sized construction companies by using Jeong's methodology.

Figure 2: Information Technologies for KM

Figure 3: ISP method for KM

3. Analysis of Existing KMS Solutions

Nine KMS solutions that have been for sale in Korea were analyzed for the functions they provide. As shown in table 1, it was found that the solutions for building KMS provided excellent and various functions. The most common aspect across different solutions was that most of the solutions went beyond the level of simple KMS and moved toward the level of being portal. That is, beyond of the level of knowledge management provided by simple KMS such as knowledge registration, storage, sharing, and recycle, the solutions expanded themselves to the level of portal that included functions such as electronic processing, managing daily schedules, merging with legacy systems, and connecting with PDA and cellular phones. Thus, the solutions can be characterized as having redundancies in functions because those solutions also include some of the functions provided by Management Information System (MIS), Expert System (ES), Executive Information System (EIS) that companies have been using.

4. Developing KMS for Small & Medium-sized Construction Companies

4.1 Data Source

The survey has implemented for 7 small & medium-sized construction companies in Korea during 17 months: from April, 2002 to August, 2003. Interview and questionnaire have been used as the tools for the survey. The subjects of interview are officers and representatives of the department. The questionnaire was distributed for whole staffs. Productions through the survey are the knowledge to be acquired, user's requirements, the KM vision, and the KMS model.

**Table 1: Functions of Existing KMS Solutions:
Solutions' Common Functions (left) and Optional Functions (right)**

Common Functions	Contents	Solution Name	Optional Functions
Personalization	- My page - Portlet - Registration of contents	ACUBE	- Document Life-Cycle: Document Mgt. - XML/SOAP based EAI Package - Real-time Information Alert Server/Adaptor
Security	- Single Sign-On - Setting up access authority	KWave	- Viewing for attachment file
		e-novator EKP.NET	- Mobile Device
Administration	- Statistics Manager - Reporting - Container Manger	iKEP	- Sound Messaging - Mobile phone
		Destiny KMS III	- Various Knowledge Assessment
Retrieval	- Advanced search - Full text search	Hanwha EIP	- Web-crawling - PDA & Cellular phone
Groupware	- E-mail - Electronic processing - Daily schedules - Address book	Knowledge Plus 4	- Version Management
		WYZ EKP	- Video conference
Collaboration	- Merging with legacy systems - Instant messaging	Jasmine Portal	- Co-work: whiteboard - Multiple language
Repository	- Setting up K-Map - Registration, storage etc.		- Video conference

4.2 Designing KM model

The KMS for small & medium-sized construction companies is denominated as 'eCon'. The information of the eCon consists of the common information and company's information. The common information is concerned with whole companies, and is divided into Network, Education, Technology & Policy, Culture, Expert Q&A, Community of Practice (CoP) (figure 4). The company's information is concerned with a company, and is divided into the standard information, optional information, and personal information

(figure 5). The users can be divided into 9 levels: system administrator, company administrator, company member, individual member, CoP administrator, CoP member, expert Q&A administrator, expert Q&A member, and guest. Table 2 shows the authorities of Users for information categories.

4.3 Developing KMS

Figure 6 shows the KMS for the small & medium-sized construction companies; the left figure is the picture of common information, and the right is that of ‘my page’ in company’s information. The KMS for small & medium-sized companies: *eCon* is based on the Microsoft SharePoint Portal Server 2001, MS Exchange Server 2000 and Public Folder.

Figure 4: Common Information in S&M KMS: *eCon*

Figure 5: Company Information in S&M KMS: *eCon*

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Figure 6: S&M KMS: *eCon*; Common Information (left), My Page in Company (right)

5. Conclusions

To develop KMS for small & medium-sized construction companies, interviews and questionnaire had been implemented. The subjects of interview are officers and representatives of the department. The questionnaire was distributed for whole staffs. The information of the *eCon* consists of the common information and company’s information. The common information is divided into Network, Education, Technology & Policy, Culture, Expert Q&A, Community of Practice (CoP). The company’s information is divided into the standard information, optional information, and personal information. The KMS for small & medium-sized construction companies: *eCon* is based on the Microsoft SharePoint Portal Server 2001, MS Exchange Server 2000 and Public Folder.

Table 2: The Authorities of Users

		User								
		Admin.	Co. Admin.	Co. Member	Indivi-dual	CoP Admin.	CoP Member	Expert Admin.	Expert Member	Guest
Common Info.	Network	CRUD	R	R	R	R	R	R	R	-
	Education	CRUD	R	R	R	R	R	R	R	-
	Tech/Policy	CRUD	R	R	R	R	R	R	R	-
	Culture	CRUD	R	R	R	R	R	R	R	-
	Expert Q&A	CRUD	RU	RU	RU	RU	RU	RUD	RU	-
	CoP	CRUD	-	-	-	CRUD	RU	-	-	-
Standard Info.	Notice	CD	RU	R	-	-	-	-	-	-
	Colleague	CD	RU	R	-	-	-	-	-	-
	Know-how	CD	RU	RU	-	-	-	-	-	-
	Forms	CD	RU	RU	-	-	-	-	-	-
	Q&A	CD	RU	RU	-	-	-	-	-	-
	Schedule	CD	RU	R	-	-	-	-	-	-

	Bylaws	CD	RU	R	-	-	-	-	-	-
Optional Info.	Category	C	CRUD	R	-	-	-	-	-	-
	Department	C	CRUD	RU	-	-	-	-	-	-
Personal Info.	Address	CD	-	CRUD	-	-	-	-	-	-
	E-mail	CD	-	CRUD	-	-	-	-	-	-
	Business Diary	CD	-	CRUD	-	-	-	-	-	-
	Schedule	CD	-	CRUD						

Note : C; Create, R; Read, U; Upload, D; Delete

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