Knowledge management and process innovation: the knowledge transformation path in Samsung SDI

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Abstract

Explores the connection between knowledge management (KM) and process innovation (PI). Although these are popular themes in the literature on management innovation, there is not much discussions of these issues. On the one hand, KM has been treated as a managerial fad that is mainly focused on knowledge generation, dissemination, and utilization. Moreover, the advocates of KM seem to be concerned with building knowledge management systems (KMS). On the other hand, PI is regarded as an efficiency-oriented process redesign and re-engineering (or BPR), which seems to be nothing to do with KM. However, the case study of Samsung SDI shows that in the real world KM is deeply linked with PI. For illustrating the KM strategy of Samsung SDI, uses the term "PI-based KM". Sheds light on two points: the features of process knowledge can be studied in the sense that knowledge associated with process is dubbed "process knowledge"; and socio-cultural features of KM should be illustrated in terms of knowledge transformation path in the information space.

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Introduction

It is argued that the aims of knowledge management (KM) are not to build knowledge management system (KMS) but to enhance organizational competitiveness through capitalizing the potential value of knowledge (Kim, 1999; Wiig, 1997). But many studies in this field are simply concerned with building KMS rather than enhancing competitiveness itself. Thus, we explore KM strategy ways in which we can review the literatures on KM research critically. And we have also undertaken our own case study.

For this purpose, we need to search for KM strategy with regard to gaining sustained competitive advantage for companies. According to the resource-based view of the firm, the sustained competitive advantage is inimitable and historical so that the nature of KM should fit to these constraints (Mata *et al.*, 1995). In this study, we contend that the process innovation-based (PI-based) KM strategy provides the sustained competitive advantage. We can highlight knowledge transformation path (KT-Path) leading the chain reactions of innovation. This study is based on our own case study of Samsung SDI and other case studies.

PI-based knowledge management strategy

Since the 1990s, many Korean companies have tried various types of management innovation practices, notably PI. Nevertheless, these endeavors are more or less fruitless in the end. The reason why this has failed is that these innovative efforts are not properly and carefully practiced, but are hastily implemented as a managerial fad.

Thus, it is necessary to search for connection and relationship between KM and management innovation practices. In this sense, we try to make connection and to find out solutions of implementation of KM, simultaneously. We call this strategy the PI-based KM in the sense that this connects PI and KM.

So far, there are not many studies relating these two together. For instance, recently one study criticized the current trend on KM researches in the sense that the themes of KM and PI could not be linked properly (Choi

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and Lee, 1999). But, they also cannot give us the connection of these two in a concrete and explicit manner. On the other hand, other researchers suggest that business process reengineering (BPR) can provide us with good resources for KM (Hwang *et al.*, 1998). Probably BPR can be a methodology for enhancing the process efficiency. But our study is rather different in that both PI and KM should be linked and we are stressing the significance of the complementary nature of the two.

This study highlights the value of PI concerning the viewpoint of KM. Unlike other researches, we try to connect PI to KM in which the two should be implemented in parallel. The main theme of this paper is that KMS should be implemented with connection to PI in parallel, in order to realize the real value of knowledge in companies. We want to make the two points as follows: first, KM strategy should be considered with connection to the characteristics of process knowledge, which are produced through PI and process implementation; and, second, KM strategy should be considered socio-cultural features of process knowledge.

Knowledge management implementation strategy based on the characteristics of process knowledge

Process knowledge is the knowledge and information that are produced as the outcome of process innovation process and innovative process practiced. These values of process knowledge are represented to be the reduction of lead-time, enhancement of management efficiency, reduction of information search cost so as to enhance the competitiveness of the company.

As a global company Samsung SDI (formerly Samsung Display Device) has practiced PI for building core competency and competitiveness. From the initial stage, the company has kept introducing and adopting advanced processes using SAP R3 (ERP package) rather than innovating their own established systems and processes. There are so many documents and manuals of PI practices so they need to have effective ways of handling these kinds of knowledge and information. Afterward, they have realized their needs of introducing KM and implementing PI-based KMS. The whole picture of Samsung SDI's KM process is presented in Figure 1.

As shown in Figure 1, the huge amount of information and knowledge has been generated as the outcome of PI implementation. The output of PI includes various kinds of knowledge, namely, knowledge on process itself, knowledge on business contents and methods, relationship of business and people concerning process, know-where, know-what, know-how, and so on. These types of knowledge are automatically updated.

In Samsung SDI, knowledge is not stored in the paper-forms, but is automatically stored in the electronic knowledge store system. But the knowledge that cannot be stored in the system such as PI-related know-how is registered selectively by means of the knowledge monitoring system. The knowledge registered in the knowledge store is available for those who want to use it at anytime and anywhere through the Internet as well as the intranet. The company also organizes many forums such as the forum of knowledge sharing and the forum of the "best practices" by which knowledge has been disseminated and illustrated as the cases of management innovation.

Meanwhile, management innovation related knowledge is shared with other members of the company who are working in the dispersed places across the country and across the world. They are working in the same functional areas and the similar tasks in the company. Moreover, they are improving actively their productivity by means of these interactive practices. And they are continuously looking for a new innovative management practice. Likewise, Samsung SDI has employed KMS for knowledge as a valuable asset based on the characteristics of knowledge as argued in this paper.

Methodological knowledge of PI

We coin the term the "methodological knowledge of PI" for representing the knowledge that is produced through PI. Specifically, this type of knowledge derives from analytical knowledge about process and improved process based on internal consensus. This process knowledge includes the contents of specific tasks and their

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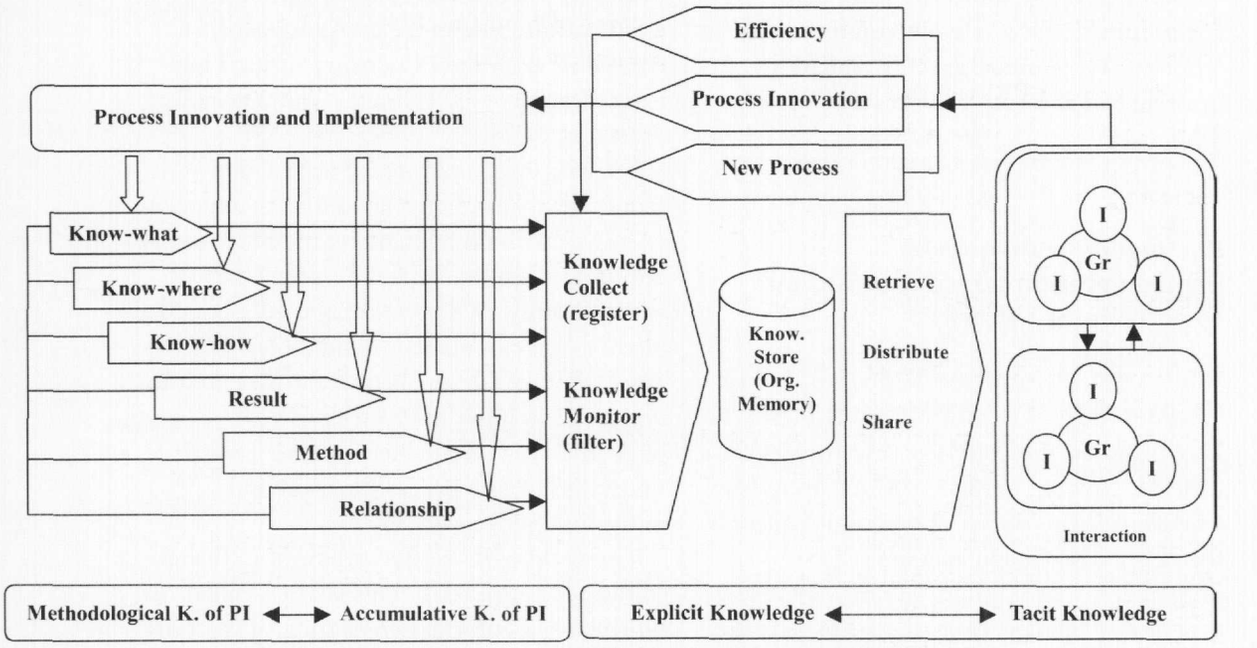
Figure 1 Process innovation-based knowledge management in Samsung SDI



relationship, departments concerning task, process-related information system, and output knowledge in this stage.

We may also point out the three main characteristics of this knowledge. First, this type of knowledge is produced through externalization that is transformed from tacit knowledge to explicit knowledge (Nonaka and Takeuchi, 1995). Second, the value of this knowledge is capitalized when the knowledge is distributed, shared and internalized by the members who are in charge of the task. Third, this type of knowledge is bound to the given context due to the characteristics of knowledge. When the context has been changed instantly, the process knowledge has been restructured and adjusted to the changed context. Therefore, the KMS should be implemented and infrastructure is constructed toward the direction of capitalizing the value of the process knowledge. Moreover, it is essential for the KM implementation to distribute process knowledge and to secure the places for sharing.

Accumulative knowledge of PI

As a coined term, the "accumulative knowledge of PI" refers to the knowledge that is an outcome of innovation process. It is automatically registered in the knowledge store. For instance, after practicing the improved bidding process we can get the list of company names participating in bidding, the documents submitted for bidding, evaluation papers for the bidding process, the final evaluation paper, the information about the personnel in charge of bidding, and so on. In Samsung SDI, this knowledge is called "utilized knowledge". It is reused by other members of the company and by someone who is in charge of these tasks outside the company in order to facilitate more effective and efficient task performance.

The characteristics of this sort of knowledge can be summarized in two points. First, this is not the process itself, but the tasks related to performance. Second, unlike the capitalizing of the values of the explicit and tacit knowledge, this type of knowledge should be combined with tacit knowledge that is embodied in someone working for the task, and explicit knowledge that is collected in the knowledge store. Therefore, the implementation of KMS should be constructed considering the features of process knowledge.

Nevertheless, what we have argued is not only the significance of the features of process knowledge, but also the interactions of individuals and groups. As shown in Figure 1, the significance of process knowledge is tightly related to the human and organizational interactions. Otherwise, we may not get to the point of the lesson

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from the case of Samsung SDI. This is why we want to move on to the next theme of socio-cultural factors concerning the KM strategy. The human aspects of KM are nothing but the socio-cultural factors of KM.

Knowledge management implementation strategy based on socio-cultural factors

When implementing the KMS, we should consider the socio-cultural factors of process knowledge in the cognitive and utilization process. Boisot (1995, 1998) has long been working for the theme about socio-cultural factors of knowledge and the KMS implementation method. He mints his own theoretical framework as the I-Space, which is using three dimensions, i.e. concrete-abstract, diffused-undiffused, and codified-uncodified. Based on the framework, he suggests the I-Space can extend to various themes. In this paper, when we explain the features of process knowledge, we use the notion of the I-Space as shown in Figure 2.

The I-Space is a theoretical framework for explaining and analyzing the dynamic knowledge flow. The I-Space is basically a three dimensional cube with regard to culture and organization.

First, the dimension of codification deals with the subject of categorization. It sheds light on the theme of whether it can categorize the subject of phenomena and experiences. And the categorization means "coding". Through this, it is codified and formalized. Therefore, when we can codify more, we can get fewer exceptions. In contrast, the more exceptions, the less codification. Therefore the dimension is paralleled with the dimension of tacit and explicit knowledge (Nonaka and Takeuchi, 1995).

Second, the dimension of abstraction (concrete-abstract) is related to someone who is dealing with understanding the phenomena requiring cognitive and conceptual categorization. What we categorize as some phenomena can make it a higher level of abstraction. And the abstraction is related to understanding the basic structure of phenomena, whereas the concrete leads us to understand more or less practical and individual things.

Third, there is the dimension of diffusion (diffused-undiffused). This is often called the dimension of information sharing. If we share more knowledge, the knowledge is more diffused. And it can be applied to differences among the national cultures, such as Korean and Japanese culture.

Let us move on to the issues of institutions and knowledge in the I-Space (Boisot, 1995). We refer to the diagram of Boisot's framework as shown in Figure 3. The bureaucracy is in the realm of abstract-codified-undiffused, in which diffusion process can be performed by the central control mechanism, notably, monthly financial report. The market is in the realm of abstract-codified-diffused. The typical example of diffusion mechanism is based on the price. The fief is in the realm of concrete-uncodified-undiffused. The example is personal memory and experience. The clan is in the realm of concrete-uncodified-(partially)-diffused. That is,

Figure 2 Knowledge types and process knowledge in the I-Space

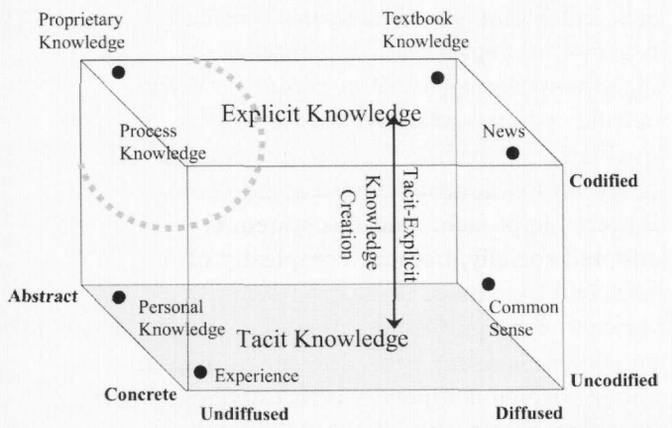
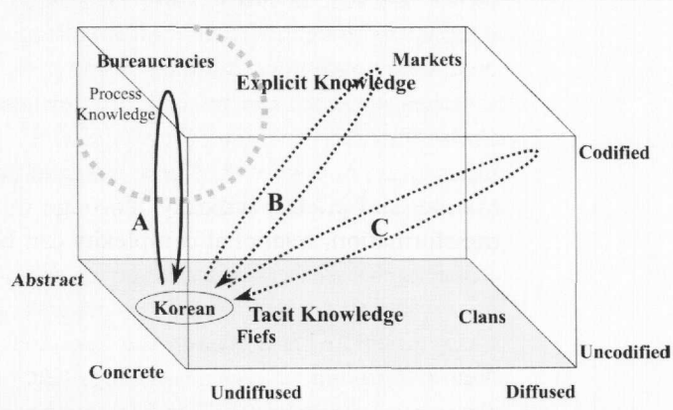


Figure 3 Cultural patterns and the KT-Path in the I-Space



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diffusion is not in the whole but in a partial subset. The example is myth and tradition.

Based on the I-Space framework, the process knowledge can be located in the codified and undiffused area which is rather similar to the proprietary knowledge as shown in Figures 2 and 3. This knowledge is the codified knowledge and the firm-specific knowledge as well. Thus, it is closely related to the societal and organizational context.

Knowledge transformation path (KT-Path) in the I-Space

The KT-Path means the transformation path of different types of knowledge in the I-Space. Especially, the significance of the KT-Path is the knowledge transformation between tacit and explicit knowledge, which is necessary for knowledge creation in the organizational level. For Korean companies, there are some possible ways of the KT-Path such as A, B, C as shown in Figure 3. It is necessary to consider the characteristics of knowledge and cultural dimension in the I-Space in order to identify the most effective and efficient ways for Korean companies. We may identify cultural differences between the European countries and the East Asian countries, furthermore the differences among Korea, Japan and China.

For instance, Boisot and Child (1999) compare the differences between the Western organizations and Chinese organizations in terms of the KT-Path. According to them, the Western organizations deploy the strategy of complexity reduction based on cognitive aspects. In the Western organizations, while the cognitive complexity is lower than others, the market-centered relational complexity is higher. Because of this feature, the market order is deployed for reducing the relational complexity based on codification and abstraction, which can be called "cognitive strategy". As an example, the transaction information in markets has been changed into number and price specifically. Through this transformation, relational complexity can be reduced, that is the Western organizations' strategy.

On the other hand, Chinese organizations deploy so-called "relational strategy" for absorbing complexity. When Chinese people manage organizations, they use the network-based strategy, especially the traditional extended family system in order to absorb the complexity. In Chinese organizations, the cognitive complexity is high, while the relational complexity like feudal and clan style complexity is moderate. Thus, they use the relational strategy to deal with cognitive complexity. In other words, relationship like the extended family system can be used for absorbing the cognitive complexity.

In this way, we can notice the differences between the Western and Chinese organizations when they deal with organizational complexity. While the Western companies prefer the strategy of reducing the complexity, Chinese organizations prefer the strategy of absorbing the complexity.

It can be argued that the differences among the national cultures are connected to the differences of the KT-Path. One of the main arguments by Boisot (1998) is to point out the differences between the Western culture like English-speaking and French-speaking cultures and the East Asian cultures like Chinese and Japanese cultures. That is to say, Anglo-American culture can be located in the diffused-codified-abstract dimension, which is market-centered knowledge; while the East Asian culture may place in the diffused-uncodified-concrete realm of the I-Space, which is called clans-centered and fiefs-centered knowledge.

Applying this argument to KM, KMS in Anglo-American culture is constructed by market-oriented, numerical and analytical approaches based on competition so as to fit socio-culturally. In other words, complexity of knowledge is decreased by means of codification and abstraction, this is called cognitive strategy.

On the other hand, KMS in the East Asian culture is constructed by relational, qualitative and wholistic strategy, which is based on relationship-centered and clan-centered approach. And this system is adopted socially, because complexity of knowledge is absorbed by the relationship-centered strategy. Therefore the East Asian people prefer using well-documented papers and absorbing complexity of knowledge based on relationship of extended family

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system to processing and elaborating information in terms of analytical perspective that is mainly practiced in the Western countries.

However, we can also illustrate cultural differences among three countries, namely Korea, Japan and China. For instance, China may be closer to the fiefs whereas Japan is similar to the clans (Boisot and Child, 1999). Korea is similar to China, but there are also many differences (Hofstede, 1991). However, it is obviously a controversial issue to be discussed further.

What, then, is the more effective and efficient way to transform the process knowledge for Korean companies? We suggest tentatively path A in Figure 3 because it is one of the shortest ways to cultural change concerning the three dimensions of knowledge in the I-Space. If Koreans follow the paths B and C, it takes a much longer time and more energy because these paths engage two or three knowledge dimensions in the I-Space. There are many possibilities for the KT-Path in the I-Space. Thus, the first thing we have to identify in this regard is to map any organization's institutional position in the I-Space. And then, we have to judge the right (or effective) KT-Path for transforming the knowledge from tacit to explicit, or vice versa. In this regard, Electronic Document Management System (EDMS) as a document-centered KM tool is a valuable tool for Korean companies in that it is able to transform process knowledge easily into explicit knowledge.

The case of Samsung SDI shows the fact that EDMS may become the infrastructure of KM and accumulate and utilize process knowledge. The company has regarded the document as an important explicit knowledge source in the organization, not simply as information and data as such. Furthermore, the company has started KM as a way of knowledge accumulation and utilization. At the initial phase, the company has simply changed its documents into the electronic format, and saved into the knowledge store. But later, the company innovates business processes and tasks in terms of KM. Especially after PI there are massively produced process documents, i.e. process knowledge so that it should be stored, transformed, shared and utilized, these are the goals of KM.

Conclusion

We conclude that the PI-based KM can provide Samsung SDI with sustained competitive advantages, which are inimitable competencies from other companies. The PI-based KM may become the firm-specific competencies because process knowledge itself has proprietary feature of knowledge for the company.

Thus, we suggest the implications of this study for implementing KMS effectively as follows:

- to bear in mind carefully the features of process knowledge when implementing KMS;
- to consider socio-cultural factors and organizational culture when searching for the KT-Path concerning knowledge cognition and utilization.

This study employs the novel notions like the I-Space, the KT-Path and process knowledge as theoretical building blocks for KM. With these notions, we also suggest the KMS implementation strategy. Along with this perspective, we criticize current researches as well. It can be said that it is very difficult to find out the universal KM strategy fitting all cultural settings and organizational contexts. Thinking more critically, we can point out problems of normative and prescriptive design perspective for KMS as a generic strategy. It is similar to the criticism against the established theories of management disciplines. These are so-called "rational" perspectives that premise the best way for managerial practices.

Although the study is an exploratory study, we attempt to show an alternative viewpoint to KM. Moreover, we certainly think this alternative perspective could be developed further.

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