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The creation and management of organizational knowledge

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ABSTRACT

This paper explores what kinds of management actions are needed by businesses to enhance their innovation capabilities. The first step is to clarify the differences between information and knowledge. To do this, the author introduces a model that can explain an individual's mental processes in knowledge acquisition and creation. With this model, it becomes explainable in a comprehensive way how "explicit" knowledge received as information is turned into individual knowledge; how "tacit" knowledge can be successfully transferred between workers; and how new knowledge can be created by individuals. The model assumes that knowledge workers can be classified into two categories, i.e., Type-1 and Type-2. A Type-1 knowledge worker is one whose knowledge acquisition depends almost exclusively on learning. A Type-2 worker is one who has a substantial amount of self-created knowledge in addition to learned knowledge. It is quite common to find Type-1 workers, but there are not that many Type-2 workers. Successful business firms are usually led by Type-2 workers, who are more innovative. In order to enhance the innovation capabilities of business firms, rather than waiting for the fortuitous advent of Type-2 workers, management should make an effort to transform existing Type-1 workers into Type-2 workers. The author makes the assertion that such a transformation is possible by putting Type-1 knowledge workers into situations where their "insight for knowledge creation" is constantly stimulated. Constant stimulation is made possible by using an IT system based on the Timed-PDCA concept that was proposed by the author in his previous papers. When this system is deployed seriously by management, it becomes possible to facilitate workers' breakthrough efforts and to promote close collaboration among workers through information sharing and visualization.

1. Introduction

For businesses to survive, they must have sustainable growth. Sustainable growth is achieved by out-performing the competition. In order to beat the competition, products or services that are differentiated from those of the competitors have to be introduced into the market continuously. To accomplish this, we can ask, what kind of management actions must be taken by executives?

To find the answer to this question, studies on corporate culture, behavior and the actions by successful businesses have been actively studied (e.g., [5]). Especially in 1980's, because of the superior performance of Japanese industry, comparative studies on management approaches between Japanese companies and those of the Western world searched for any meaningful success factors (e.g., [2–4]). However, the conclusions derived from those studies were not general or comprehensive enough to be applicable to complex environments. For example, companies that were once considered excellent by Peters and Waterman [5] have not survived the test of time. Also, because Japanese industry lost its luster after the beginning of 1990's, the differences pointed out as success factors are not necessarily convincing now.

There was also another class of studies. This stemmed from an idea that differentiation can be achieved by the effectiveness of knowledge utilization and continued knowledge creation. This is the research on so-called Knowledge Management (KM). It became popular in 1990's, though its origins date back to much earlier time [12]. Many researchers started to work on KM especially after Peter Drucker's book, *Post Capitalist Society* [9], which pointed out that knowledge is not just another resource alongside the traditional factors of production – labor, capital, and land – but it is the only meaningful resource in the new economy.

KM studies, in the early phase, assumed that knowledge can be documented, focusing on how to learn, transfer, and share it. Gradually, a distinction was made between explicit and tacit knowledge. In the beginning, researchers' interests were in "explicit knowledge." Nonaka and Takeuchi [8,10] made a stir by asserting that what determines the competitive strength of a business is its ability to utilize "tacit knowledge." They discussed the importance of "organizational knowledge creation," pointing out that

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organizational knowledge creation can be achieved through the sharing of tacit knowledge in an organization. They indicated that Japanese companies are better at exploiting tacit knowledge utilization in an organization than Western companies were, citing different management approaches that originated from two different cultures. Since then, KM studies have been expanded to deal with both explicit and tacit knowledge. To deal with tacit knowledge, especially in handling its transfer, corporate culture and behavior have also become key issues in KM studies. Rasula et al. [21] discuss the impact of KM on organizational performance, and conclude that effective KM cannot be implemented without significant behavioral and cultural change.

As a natural consequence of recent information technology (IT) advancement, useful KM strategies can now be implemented as knowledge management systems (KMS). This has led to the integration of KM with organizational business processes [14,15,22]. Malhotra [14] discusses a way to bridge the critical gaps between technology inputs, related knowledge processes, and business performance outcomes, after comprehensive review of theory, research, and practices on knowledge management. Herschel and Jones [15] provide a thorough analysis of the difference between business intelligence (BI) and KM, establishing a framework for relating one field to the other. Shehzad and Khan [22] also claim the importance of BI and KM integration and show that the combined model of BI and KM is more useful as compared to their individual utilization.

Despite all of these useful efforts to improve organizational productivity, there are still few satisfactory answers to the above basic question, "What kind of management actions must be taken (additionally) by executives to grow their companies and attain product differentiation?" The SECI-model introduced by Nonaka and Takeuchi [10] might have been effective in explaining at what stages in the innovation process tacit knowledge was converted to explicit knowledge and how new tacit knowledge was created from sharing explicit knowledge for reviewing the innovation actually happened, but it is hard to tell how to make the innovation happen by this model. Therefore, business executives still have difficulty in figuring out how to generate innovation within the model of their daily management procedures.

The author, as a management executive, initially thought that use of KM might be helpful in nurturing innovation capabilities in his organization. Inspired by KM papers describing the usefulness of sharing knowledge and information in the organization, he developed a database system for knowledge and information and conducted trials to promote their utilization [18]. However, he soon realized that even though sharing knowledge and information in an organization is useful for conducting daily work efficiently, it was not helpful for promoting the knowledge creation necessary for innovation. Reading KM papers and books not only did not provide answers to the above managerial question, but it also did not help with such very basic questions like "what is knowledge?" and "how is knowledge created?"

Realizing this, the author decided to research the details of knowledge management more carefully. His first study dealt with an application to improve knowledge work productivity [19]. The application helps visualize "sales processes" and assists sales people's thinking to improve sales progress. This approach was based on the author's proposed timed "Plan, Do, Check, Analyze" (Timed-PDCA) concept, which is a revised and systematized version of the conventional Plan, Do, Check, and Act (PDCA) cycle used in team manufacturing processes [6,7]. Then, the author generalized the concept to be applicable to any "knowledge work" [20]. These two publications assumed that the use of the Timed-PDCA was effective for developing the innovation capabilities of knowledge workers. However, they did not address how innovation actually took place.

This current paper is intended to provide an answer to the question "what kind of management actions must be taken by executives to be productive and ensure differentiated products?" In Section 2 below, we will first clarify the differences between information and knowledge. Then, we will examine an individual's mental processes using functional diagrams. With this model, questions such as how explicit knowledge received as information is turned into one's own knowledge; how tacit knowledge can be successfully transferred between workers; and how new knowledge can be created by an individual are explained comprehensively and systematically. Section 3 introduces the categorization of knowledge workers into two classes, i.e., Type-1 and Type-2, depending on their degree of development of "insight for creation," one of the functional elements introduced in the mental model. How such segregation occurs is described in detail. Section 4 discusses how organizational knowledge is acquired, managed, and enhanced, thereby indicating why it is important to include Type-2 workers in the organizational management. Then in Section 5 we will discuss first what kind of Type-1 knowledge workers can be transformed into Type-2 workers by training through PDCA cycles. This is shown with reference to the success of Japanese industry from the 1960's through 1980's. Next, we will discuss what management actions should be taken by business executives to enhance their organizational innovation capabilities for winning in the marketplace. Section 6 is a summary of our findings.

2. Knowledge acquisition by individuals

2.1. Defining knowledge

Before discussing the acquisition, the creation, and the transfer of knowledge, let's make the distinction between knowledge and information clear. Many KM researchers have tried to distinguish between data, information, and knowledge. Awad and Ghaziri compiled the definitions of this research in a summary form (Fig. 2, page 62, [17]). They showed a variety of definitions for knowledge, implying there is no commonly established definition of knowledge yet.

One common element to existing definitions is that they all tried to define knowledge as a resource utilized only by humans. This may be related to the ancient Greek philosophers who tried to define knowledge as the human mind soaring. However, knowledge and information are not a monopoly of humans. All living organisms respond to information and knowledge. Highly developed human knowledge is the result of step-by-step accumulation of knowledge over generations. If we think of information and knowledge at a very primitive level applicable to any living organism, we may be able to differentiate information and knowledge and define them in related yet mutually exclusive expressions. Table 1 shows the author's attempt at such an approach. The table also includes examples showing how the definition works in a concrete manner. With these definitions, information and knowledge can be understood as different resources. Their difference may be clear from the following description: Although we can receive someone's knowledge as information, if we cannot understand it to be usable for one's own purpose, the received information remains just information and does not become one's own knowledge. A lack of understanding of this very point is the reason for the frequent confusion about the difference between information and knowledge.

2.2. Classifying knowledge

All knowledge can be classified according to its complexity along a continuum from explicit to tacit [16]. It was Michael