Information Technology Strategy in Knowledge Diffusion Lifecycle

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INTRODUCTION

A progressive liberalization and deregulation of international trade, and the rapid development and diffusion of information and communication technology (IT) have fundamentally changed the global competitive dynamic environment (Ernst & Kim, 2002). Growing around these is a new information age economy whose fundamental sources of wealth are knowledge and communication rather than natural resources and physical labor (Kanter, 1994). The simultaneous development of the knowledge economy (Dunning, 2000) and the information technology economy (Varian, Farrell, & Shapiro, 2004) provides both opportunity and challenge for the organizations, and also requires us to develop from a comprehensive perspective by combining knowledge management with the information technology strategy.

In the knowledge economy, the importance of knowledge diffusion dynamics has been increasingly recognized in development economics over the last decade (World Bank, 1999). Knowledge diffusion can be defined as the adaptations and applications of knowledge documented in scientific publications and patents (Crane, 1972). Knowledge diffusion is part of the knowledge management process, realizing the proliferation of knowledge and information among different individuals across time and space (Chen & Hicks, 2004). According to the extent of knowledge diffusion, the knowledge diffusion lifecycle can be divided into four stages, including incubation, nurture, promotion, and popularization (Lang & Yuan, 2004). In this lifecycle, knowledge diffusion refers to promoting the innovation and core competence formation, so how to accelerate the knowledge diffusion has become an important issue for organizations.

The development of information technology establishes a solid base to accelerate knowledge diffusion. IT and related organizational innovations provide effective mechanisms for constructing flexible infrastructures that can link together and coordinate economic transactions at distant locations (Broadbent, Weill, & St. Clair, 1999). In essence, IT fosters the development of leaner, meaner, and more agile produc-

tion systems that cut across firm boundaries and national borders. The underlying vision is that accelerating knowledge diffusion can speed up the dissemination of information technology. Knowledge diffusion is an essential content of the business strategy (Borghoff & Pareschi, 2003).

However, existing theories of both information technology and knowledge have not specified the information technology strategy in the knowledge diffusion. This article introduces the information technology strategy in knowledge diffusion based on the knowledge cycle theory. The article describes how to advance knowledge diffusion by using the matched information technology strategy in a different knowledge diffusion lifecycle. The article shows how firms innovate and research to imitate knowledge and improve the diffusion of knowledge.

BACKGROUND

The relationship between knowledge and information is essential. Knowledge may be defined as information whose validity has been established through a test of proof and can therefore be distinguished from opinion, speculation, beliefs, or other types of unproven information (Liebeskind, Oliver, Zucker, & Brewer, 1996). This definition of knowledge consists of two primary classifications: information (explicit knowledge) and know-how (tacit knowledge) (Nonaka, 1991). Knowledge in this article refers to explicit knowledge. Information is knowledge that can be transmitted without loss of integrity once the syntactical rules required for deciphering it are known. Thus, knowledge as information implies knowing what something means and that it can be written down (Nonaka, 1994).

Throughout the 1990s and early 2000s, both researchers and practitioners (e.g., Cowan & Jonard, 1999; Morone & Taylor, 2004) have discussed the model of knowledge diffusion within organizations. They develop a model in the framework of graph theory. The aim of their model is to capture effects of incremental innovation and their diffu-

sion over a network of heterogeneous agents. The idea that knowledge diffusion is necessary to an organization's success has become the focal point of strategy and the strategic planning process (Liebeskind et al., 1996). Knowledge has emerged as the most strategically significant resource of the firm (Grant, 1996b).

"Lifecycle" within knowledge management exists because it is evident that organizational knowledge does indeed have a lifecycle. The knowledge is discovered, captured, utilized, and eventually retired rather than killed. Siemieniuch et al. (1999) refer to the knowledge lifecycle starting point—that knowledge is not a unitary thing and it has a lifecycle in a competitive environment. In other words, if a company is to keep competitive, it must address the issues of new knowledge generation, propagation across the organization, and the subsequent knowledge retirement. They indicate that: (1) knowledge will age as the context changes; (2) humans will be intrinsic components in all processes involving the creation, utilization, and retirement of knowledge; and (3) the management of knowledge is a critical, core competence of the organization.

Siemieniuch and Sinclair (2004) also introduced the Cross Sectoral Learning in the Virtual Enterprise (CLEVER) process framework for knowledge lifecycle management (KLM). The model was developed to help organizations in the manufacturing and construction domains to tackle ill-defined knowledge management problems. Focusing on organizational and cultural issues, rather than technological ones, the framework aids the user organization in translating vague KLM problems into a set of specific knowledge management issues.

Sakol (2002) introduces the knowledge lifecycle interplay between the user study and product development phases, and introduces a method, concept, and model for the entire design process. The three proposed solutions are: object-mediated user knowledge elicitation–OMUKE, pattern of user knowledge–PUK, and use process-based product architecture–UPBPA.

OMUKE is a method proposed for capturing user knowledge. The method is built from empirical research of existing methods (convergent perspective approach) and an experimental study with the OMUKE software agents. The method can be effectively used to capture user knowledge and use it to form the product architecture in knowledge lifecycle processes.

According to the extent of knowledge diffusion, the lifecycle of knowledge diffusion will be divided into four stages, including incubation, nurture, promotion, and popularization. The knowledge lifecycle can be represented as the curve in Figure 1. The development of a core IT and communications infrastructure supports knowledge lifecycle management.

INFORMATION TECHNOLOGY STRATEGY

Information technology strategy refers to the IT applications used to help the organization gain a competitive advantage, reduce competitive disadvantage, or meet other strategic enterprise objectives (Bergeron, Bateau, & Raymond, 1991). Clearly, this is a critical resource, as discussed earlier. It is therefore vital that a suitable IT infrastructure is in place, with the right applications implemented. There must also be the right information- and knowledge-sharing policies in place. While scholars have explained the knowledge diffusion lifecycle and information technology in knowledge management (Siemieniuch, 1999), combining the information technology strategies with knowledge diffusion will be a potential power to accelerate the knowledge use.

Information Technology Strategy for Knowledge Diffusion

According to the extent of knowledge diffusion, the lifecycle of knowledge diffusion will be divided into four stages, including incubation, nurture, promotion, and popularization. Based on the literature, this article mainly explains how to integrate information technology with knowledge diffusion effectively in the four stages of the knowledge diffusion lifecycle.

The article provides a framework in which the knowledge diffusion lifecycle can be represented from an IT perspective, as Figure 1 shows (Lang & Yuan, 2004). Different IT strategies can be matched with the different sections of knowledge development.

Firstly, in the knowledge incubation stage, the information technology strategy emphasizes the strengthening of the contact and sharing new ideas. The knowledge incubation stage is the process of the generation of knowledge. The knowledge transforms into structural knowledge and was integrated into the knowledge resources of the company.

As stated above, knowledge capture and formalization is a critical process. This knowledge becomes an intellectual asset for the organization, owned by the shareholders in theory. It also becomes a tool for others to use, with a shorter learning time than would otherwise be the case. Perhaps more importantly, it can encapsulate best practice as a standard process for the organization. In this phase, new knowledge is still in a state of non-clarity: knowledge encoding and storage systems do not have much value. So strengthening the contact and the sharing of these new viewpoints and ideas, information systems play a very important role. The Linux system succeeds in providing a platform for exchange for everyone talking about the system, so that the system's various ideas and viewpoints on the platform by in-depth discussions can be further discussed and improved.

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