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How Information Systems Provide Competitive Advantage: An Organizational Learning Perspective

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Abstract

This study explains how information systems provide competitive advantage in terms of organizational learning. Competitive advantage is based on organizational capabilities. Organizational capabilities are produced by organizational learning processes. Organizational learning processes obtain knowledge from information systems, interpret, distribute to the organization, and memorize the knowledge. During the iterative processes, knowledge may be unlearned, enhanced by the higher level knowledge acquisition processes, or used to produce organizational capabilities. In addition, organizational learning influences information systems and vice versa. Meanwhile, information systems are regarded as composite resources for competitive advantage.

Introduction

To obtain competitive advantage, most companies should have unique resources and capabilities. According to the resource-based theory, resources indicate any available factors of a firm that satisfy the four conditions; value, heterogeneity, immobility, and no strategic substitute (Amit and Schoemaker, 1993; Mata et al., 1995; Andreu and Ciborra, 1996; Grant, 1991). However, resources themselves cannot provide competitive advantage. Resources should be combined with capabilities, especially organizational capabilities. Organizational capabilities are the outcome of knowledge integration or the product of learning processes (Ulrich and Lake, 1990; Collis, 1994; Grant, 1996; Moingeon and Edmondson, 1996).

On the other hand, O'Brien (1993) and Burstein (1986) take five components of information systems: people resources, hardware resources, software resources, data resources, and information products. *People* have competencies (Lado and Wilson, 1994). Effective and strategic use of information technology by people who have competencies is a way to obtain competitive advantage (Kettinger, et al., 1994; Clemons, 1991). Generally, information technology implies *hardware* and *software resources*. Information technology can provide competitive advantage (Mata et al., 1995). Changing switching costs by information technology can also be a cause to provide competitive advantage (Adcock et al., 1993). *Data and information* are critical resources for competitive advantage (Nanda, 1996; Gopal and Gognon, 1995; Skyrme, 1995). Thus, information systems can be regarded as composite resources to provide competitive advantage.

By the way, most studies do not account for the process how information systems, as composite resources, provide competitive advantage. They analyzed only the relationship between capabilities and competitive advantage or between information systems and competitive advantage, respectively. They regard information systems and capabilities as sources for competitive advantage on the same level. They do not elaborate on the relationship between capabilities and information systems.

Framework and Definitions

Figure 1 shows the relationship among information systems, organizational learning, organizational capabilities, and competitive advantage. Each component of information systems provides organizational learning processes with knowledge. Through learning processes, the organization can have capabilities. The capabilities are underlying source of competitive advantage. At the same time, organizational learning influences information systems and vice versa.

Literature shows that organizational learning implies three common ideas. The first idea is that the organization acquires knowledge and skills through learning processes. Most definitions refer to skills (Prahalad and Hamel, 1990; Henderson and Lentz, 1996) and knowledge or information (Henderson and Lentz, 1996; Smolowitz, 1995; Fiol and Lyles, 1985) as the output of organizational learning. The second idea is that organizational learning is related with information systems. Schroeder and Congden (1995) and Prahalad and Hamel (1990) imply that organizational learning is enhanced by information systems, especially information technology. The third idea is that the organization gets benefits from learning. Organizational learning provides the organization with advantage to understand and realize the new opportunities (Pollalis, 1996; Schroeder and Congden, 1995). From literature review, organizational learning for this study can be understood by the processes to accumulate knowledge or skills through the information systems, so that those processes can influence organizational performance and subsequently bring about competitive advantage.

Organizational learning has four processes; knowledge acquisition, information distribution, information interpretation, and organizational memory (Huber, 1991). *Knowledge Acquisition* means the process to get information or knowledge. *Information*

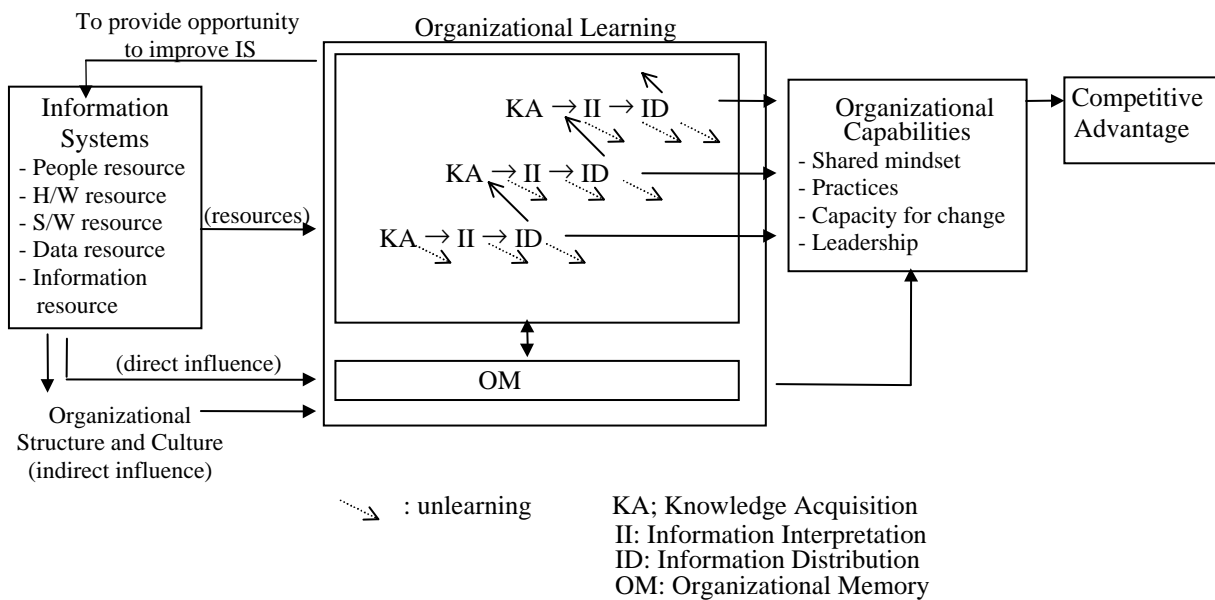


Figure 1. Relationship among Information Systems, Organizational Learning and Competitive Advantage

distribution refers to the process that information is spread and shared by the organization members. *Information interpretation* is the process that distributed information is understood. Finally, *organizational memory* indicates the way that information or knowledge is stored, so that it can be retrieved later.

Information Systems and Organizational Learning

Information systems influence organizational learning processes directly or indirectly, while organizational learning provides opportunities to improve existing information systems. Information systems influence organizational structure and culture. Changes in organizational structure and culture influence organizational learning processes. This is indirect influence. Learning at the centralized structure is relatively slow, compared with that at the decentralized structure (Nicolini and Mezner, 1995). Romme (1996) says that structure is composed of team and hierarchy. Teams are the key learning units to produce and understand new information, while hierarchies process and store learning results. Therefore, information systems influence the structure. The structure facilitates organizational learning. On the other hand, organizational culture refers to “internal ideologies and pattern of behavior” that encourage or discourage employees to learn (Nicolini and Mezner, 1995). Information systems may change organizational culture positively or negatively. In positive culture, employees are encouraged to learn and ready to accept new information or strategies. But, in negative culture, it is difficult to expect smooth learning and successful implementation of strategies. Regardless of direct or indirect influence, organizational learning is affected by information systems. The advanced information technology enhances the *knowledge acquisition* speed, increases the amount of information, and varies the methods to collect knowledge. DSS or richer media facilitate *information interpretation* processes (Balasubramanian, 1995). Since information interpretation processes rely on its own organizational schema, new schema by the acquired knowledge may produce different interpretation from existing understanding. Information systems influence *information distribution* processes by expanding boundaries such as geographical boundary, psychological distance, and so on. All the knowledge during those processes stores in *organizational memory*. Information systems improve capacity and speed to memorize and retrieve stored knowledge.

On the other hand, organizational learning provides opportunities to improve the existing information systems. Through learning processes, the organization recognizes new needs for the existing information systems and requests to improve the information systems. The requests may be new trends which information systems should follow. The system developers reflect the user requirements, improve information systems, and adapt it to the organization. Those processes improve the information systems, enhance organizational learning, and accumulate and update organizational memory.

Organizational Learning Processes

Organizational learning has a role to transform resources into organizational capabilities. The acquired knowledge from information systems is processed by the information interpretation process. Newly interpreted knowledge becomes common knowledge in an organization by spreading out to the entire organization. Distributed knowledge is acquired by the higher-level

knowledge acquisition process or is unlearned during the processes. On the other hand, distributed knowledge produces organizational capabilities. Organizational memory stores all the knowledge by interacting with those processes. Stored knowledge plays a role of repository of knowledge, so that the organization can retrieve the knowledge whenever it needs.

Organizational Learning and Organizational Capabilities

According to Ulrich and Lake (1990), organizational capabilities have four components; shared mindset, management and human resource practices, capacity for change, and leadership. *Shared mindset* means common ways of thinking about goals and the means used to reach the goals. *Management and human resource practices* imply tools for sustained competency, generating competency, and reinforcing competency. *Capacity for change* indicates the ability to diagnose the organization, manage changes, and build flexible organizational arrangements. Finally, *leadership* refers to the ability to manage the organization with vision of all levels of an organization. Leadership is presented as empowerment. The following table shows that organizational learning processes generate organizational capabilities.

Table 1. Organizational Learning and Organizational Capabilities

	Knowledge Acquisition	Information Interpretation	Information Distribution	Organizational Memory
Shared mindset	to obtain knowledge of different goals and means	Existing ways of thinking are influenced by acquired knowledge of goals and means	to share common ways of thinking	to have same goals and means
Practices	to get knowledge of practice	to understand how to do	to have common ways of doing	to have the abilities to do
Capacity For change	to get knowledge of current state	to expect possible results	to set up plans for changes	to manage changes
Leadership	to acquire knowledge of all levels	to understand and establish vision	to share vision	to have organization-wide vision

Organizational Capabilities and Competitive Advantage

In order for organizational capabilities to be sources of competitive advantage, they should meet conditions like values, heterogeneity, inimitability, and no strategic substitution. Different organizations have different ways of thinking, which lead to different means to accomplish the goals. Thus, shared mindset cannot be imitate or substitute. For practices, competitors can imitate practical know-how. However, they cannot imitate the ability to generate, reinforce, and sustain competency. Different organizations are under different situations and culture because they have different ways of thinking. The fact requires different ways to manage changes. Thus, competitors that are located on different situations cannot imitate or substitute the ways to handle the changes. Leadership implies that employees have organization-wide vision and subsequently they have empowerment. Thus, leadership cannot be same or imitated. Therefore, components of organizational capabilities are sources for providing competitive advantage.

Conclusion

This study clarified the relationship among information systems, organizational learning, organizational capabilities, and competitive advantage. The relationship explains the processes how information systems can provide competitive advantage. An information system is a resource of organizational learning processes. Simultaneously, information systems influence organizational learning, so that each process of organizational learning is affected and adjusted by information systems. Acquired knowledge is interpreted and distributed. Distributed knowledge generates organizational capabilities or is acquired by the higher-level knowledge acquisition process. Organizational memory interacts with those processes. During the processes, organizational learning provides opportunities to improve existing information systems. Finally, organizational capabilities become underlying sources to provide competitive advantage. This study proposed the integrated model among information systems, organizational learning, organizational capabilities, and competitive advantage. This may give implications to managers who establish strategies to get competitive advantage. If a company wants to get competitive advantage in the market, the company should set up strategies for capabilities, organizational learning, and information systems.

References

References available upon request from Changsoo Sohn (changsoo@siu.edu).