Network structure, organizational learning culture, and employee creativity in system integration companies: The mediating effects of exploitation and exploration

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ABSTRACT

To maximize employee performance in today's increasingly competitive environment, companies must enhance individual creativity through the effective management of organizational network structures and learning cultures. This study is an empirical analysis of how firms should design these structures and improve individual creativity according to employees' working styles. We propose a research model that delineates the effect of organizational learning culture on working styles and creativity. For organizational social network structures, we measured degree centrality and structural holes. Employees' working styles were represented as either "exploitation" or "exploration." To validate the model, we collected questionnaires from 137 individual members of 25 recently organized teams in several large system integration companies in South Korea, analyzing the data using a structural equation model. We found that most constructs, with the exception of social network structure, positively influenced individual creativity. With respect to organizational network structure, degree of centrality had a significant effect on both exploitation and exploration.

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1. Introduction

With intense competition in today's businesses, employees' individual creativity has become an essential factor in enhancing an organization's competitiveness and performance. Therefore, organizational cultures and creativity-enhancing structures have become paramount. Guilford (1950) stressed the importance of creativity and argued that its study is rooted in psychology. Since then, research on creativity has been conducted in several disciplines. Early studies tended to focus on creativity as an individual trait. However, investigations have now shifted to how contextual factors affect an individual's creativity (Perry-Smith & Shalley, 2003). In this paper, we studied contextual factors of creativity that have not received as much attention: social network structure and organizational learning culture.

Because of the development of digital IT devices (e.g., smart phones), we live in a smaller world in which information spreads rapidly around the globe (Lazer & Friedman, 2007), and people now recognize the inefficiency of working or studying alone. As the value of knowledge exchange through organizational networks has received more attention, researchers have begun to identify social network parameters that shape creativity in the workplace (Burt, 2004). Acknowledging that cognitive limits and biases may constrain creativity, studies have examined employees' social networks as possible sources of knowledge and creativity (Zhou, Shin, Brass, Choi, & Zhang, 2009).

Although the need to enhance creativity through the efficient management of an organization's network structure has increased and study culture has become more common, little research has been conducted in this area. Therefore, our research questions are as follows:

1. Can we maximize individual creativity according to an individual's working style by adjusting the network structure at the organizational level?
2. Does organizational learning culture affect creativity by influencing an individual's working style?

To address these questions, we carried out an integrated research study on individual creativity, including organizational learning culture and network structures. Our first purpose was to empirically analyze how we should design the network structure in an organization to increase individual creativity according to individual working styles. We used the concepts of centrality and structural holes as the knowledge network structure with respect to the social network, and used exploitation and exploration as individuals' working styles. Secondly, we analyzed whether organizational learning culture influenced individual working styles and

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creativity. Finally, we confirmed the multidimensional relationship of centrality and structural holes as the knowledge network structure variables with organizational culture, exploitation and exploration, and individual creativity. We also confirmed the validity of the hypotheses based on structural model verification, which describes how each factor relates to the others.

This study is presented as follows: In Section 2, we discuss the theoretical background and existing literature regarding individual creativity, exploitation, exploration, network structure, and organizational learning culture. In Section 3, we suggest a research model based on the theoretical background and propose a set of hypotheses. Section 4 presents the empirical evaluation of the research model and verifies it through the analysis of the research results. Section 5 addresses the limitations of the research and directions for future research.

2. Previous studies

2.1. Individual creativity

Guilford (1950) argued that the study of creativity is rooted in psychology. Creativity researchers have made an effort to understand why some individuals are more creative than others, and their studies have focused on the cognitive and motivational processes that explain individual differences in creativity (Perry-Smith, 2006), a complex concept that has been defined in several ways (Shalley, Gilson, & Blum, 2000). Typically, it is defined as an idea that is both novel and useful, such as the development of ideas about products, practices, services, or procedures (Zhou & Shalley, 2003). This definition has been incorporated in subsequent conceptual models. There have been many empirical studies on personal and contextual factors that strengthen or weaken employee creativity (e.g., Amabile, Schatzel, Moneta, & Kramer, 2004; Rodan & Galunic, 2004; Zhou, 2003). Our research focuses on personality traits, with a focus on the change in and interactions among factors that individuals face in their surroundings.

Individual creativity can be divided into three categories. The first category is personal characteristics. For instance, Baer, Oldham, Hollingshead, and Jacobsohn (2005) concluded that creativity is enhanced in groups whose members have many siblings, small age gaps between siblings, and a balance between boys and girls. Some researchers have studied the relationship between creativity and motivation (Eisenberger & Aselage, 2009), positive and negative creativity and emotional states (Madjar, Oldham, & Pratt, 2002), and roles and effort (Hirst, van Dick, & van Knippenberg, 2009). The second category includes the contextual characteristics or circumstances that affect individual characteristics. Primarily, these include relationships among interested parties (Shin & Zhou, 2003), reward and appraisal (Eisenberger & Aselage, 2009), and group character (Hirst et al., 2009). The last category contains the interaction factors between situational traits and creative individuals. Some studies have suggested that creative acts occur during interaction processes, and are developed gradually through feedback. For example, Zhou and Oldham (2001) showed that individuals exhibited the highest creative performance when they expected a self-administered assessment. Also, Baer, Oldham, and Cummings (2003) divided workers into two groups—adaptive and innovative—and distinguished jobs as either complex or simple, studying employees' characteristics and the nature of their jobs affected creativity.

The increasing popularity and importance of social networks has attracted the attention of many scholars. For example, Baer (2010) found that individuals were most creative when they maintained idea networks with an optimal size (weak strength or high diversity). Zhou et al. (2009) showed that the optimal number of weak ties was related to elevated levels of creativity only when individuals placed little importance on conformity, a personal trait likely to coincide with reduced levels of openness. However, few studies have focused on the complex interplay between an individual's personality and his or her social network (Baer, 2010). Therefore, we introduced the concepts of degree centrality and structural holes with respect to social network, and examined how they affect creativity through subjects' working styles—either exploitation or exploration.

2.2. Exploitation and exploration

March (1991) defined exploitation and exploration as follows: "Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution. Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation." Thus, he categorized exploitation as "the use of already known" and exploration as "the pursuit of new knowledge."

March (1991) emphasized that business performance may depend upon the use of exploitation and exploration despite the implicit trade-off relationship between the two factors. Similarly, previous studies have found that a strategy that balances exploitation and exploration positively influences organizational performance. For example, Katila and Ahuja (2002) showed that when exploitation and exploration were used simultaneously, the effects on new product development were positive. He and Wong (2004) also found that the same strategy positively influenced sales growth. However, other researchers have produced conflicting results. Bierly and Daly (2007) regarded exploration and exploitation as separate constructs, showing that pursuing both simultaneously negatively affected performance.

Some researchers have used these constructs as independent variables to analyze corporate performance. Rosenkopf and Nerkar (2001) investigated the domain and overall influence of exploration on technological evolution within or across organizational or technological boundaries and distinguished between different exploration types. Nerkar (2003) investigated the effects of temporal exploitation and exploration on later knowledge creation, showing that balancing current knowledge with that acquired over the long term is important in influencing new knowledge. Further, Ahuja and Lampert (2001) examined the effect of exploratory strategies on the number of breakthrough inventions by a firm over time.

Other studies have considered exploitation and exploration as dependent variables. For example, Benner and Tushman (2002) studied the influence of process management on both types of innovation. When firms conduct many process management activities, exploitative innovations outstrip exploratory innovations. Network researchers have investigated the effects of social capital and network structure on exploration and exploitation. "Social capital" indicates the potential benefits that individuals derive from interpersonal relationships (Adler & Kwon, 2002), including the diversity of information and perspectives provided by others. At the heart of the notion of social capital is social network analysis (Brass, Galaskiewicz, Greve, & Tsai, 2004), which assumes that individuals do not exist in isolation but are part of a network of relationships (Zhou et al., 2009).

Vanhaverbeke, Gelsin, and Duysters (2007) researched the influence of direct or indirect ties on exploration and exploitation, and also examined redundant or non-redundant ties between firms regarding technological exploitation and exploration using data from technological alliances. Several other studies have focused on the relationship and processes of exploitation and exploration from the perspective of social network structure (e.g., Lazer & Friedman, 2007).