Chapter 97
Exploring the Process of Adaption of Employee Creativity:
Based on Kauffman's NK Model

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ABSTRACT

NK model describes a system of N elements. The complexity of the system is modeled as the interdependency among its elements. Such interdependency is represented by parameter K, which denotes the number of elements that affect the function of a particular element. NK model can be used to simulate the adaptive behavior through the fitness landscape. The authors collected data from 217 employees in five organizations from different industries in China. They empirically examine the role of six factors, namely, proactive personality, creative process engagement, coworker support, supervisor support, freedom or autonomy and resource supply, in developing employee creativity. Based on empirical findings, the authors then use the NK model to simulate the process of adaption of employee creativity. Their simulation results show the different adaptive processes of employee creativity in the five organizations from different industries. The theoretical and practical implications of their study are discussed in the final part of this paper.

1. INTRODUCTION

Employee creativity, which has important impacts on the development of novel products, service qualities and procedures (Çokpekin and Knudsen, 2012), becomes crucial to the survival of an organization (Amabile and Pillemer, 2012; Wang and Rode, 2010). Through employee creativity, organizations can efficiently utilize their human resources to develop novel and useful products and services that enhance

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their competitive advantages (Shalley et al., 2009). Many organizations aim to identify their employees' creative potential, and reconfigure group or organizational factors to enhance employee creativity (Hirst et al., 2011; Shalley et al., 2009). However, such influencing factors for employee creativity are not yet fully understood (Oldham and Cummings, 1996). Therefore, research on such factors and their roles in the development of employee creativity is highly significant.

The existing literature has identified various antecedents of employee creativity, such as employees' personal characteristics and perceived work environmental factors (Oldham and Cummings, 1996; Wang and Rode, 2010; Woodman et al., 1993). However, most empirical studies are based on the traditional "cause and effect" or linear thinking, which proposes that the relationships between these antecedents and employee creativity are directional while the causality is linear (Kim et al., 2010). Given that the antecedents of creativity may interact in complex way, some scholars argue that the interdependencies among these creativity antecedents are the source of novelty and creativity (Regine and Lewin, 2000; Rose-Anderssen et al., 2005). In this vein, the existing literature suggests that the generation of creative behaviors is a non-linear dynamics of complex system which consists of creativity antecedents (Regine and Lewin, 2000). Simply defined, complex systems are composed of many elements that are interdependent in complex ways. Therefore, it is necessary to go beyond linear assumptions to explore the non-linear process of generating creative behaviors from complex systems thinking.

The literature on complex systems thinking indicates that creativity is the result of blind variation and selective retention process, through which employees execute trial-and-error reconfigurations of creativity antecedents to pursue superior creative solutions (Chen and Kaufmann, 2008). For example, the trial-and-error recombinant search can help employees identify problems, generate alternative solutions, and select the preferred solutions (Chen and Kaufmann, 2008). Such trial-and-error recombinant search, therefore, results in the adaptation of employee creativity (Chen and Kaufmann, 2008). To characterize the adaption of employee creativity, some scholars have used complex systems thinking with computational model to design a theoretical fitness landscape wherein the adaptive processes take place (Levinthal and Warglien, 1999). Although the computational model can effectively reduce uncertainty and enhance computational productivity, it cannot easily reflect the landscape in real situations (Levinthal, 1997; Fan and Lee, 2012). Therefore, to more precisely characterize the adaptive process of employee creativity, the computational model should be combined with empirical study.

To address the above mentioned gap, this study aims to combine the survey method and a complexity science approach–-the NK model–-to investigate the adaptive process of employee creativity. The NK model is a stochastic, combinatorial optimization model, which focuses on the number of elements in a system (N), and the extent to which these elements are correlated (K) (Kauffman, 1993). K forms a rugged fitness landscape that allows path searching for optimization and strategy planning (Fan and Lee, 2012). Based on the existing literature, we identify personal and perceived work environmental factors as the interdependent elements of a complex system. We conduct a survey to empirically test whether these factors are critical to employee creativity. Then, we use the survey results to build the NK model based on complex systems thinking, with the aim of characterizing the adaptive process of employee creativity in real situations. In the NK model, the adaption of employee creativity can be driven by incremental improvements, which is determined through conducting a trial-and-error within the agents' local domain on the landscape. The previous literature attests to the NK model's suitability in investigating the evolutionary dynamics, since the NK model is conducive not only for understanding past and present situations, but also for providing a landscape view of possible paths for future situations (Frenken,