



Dynamic resource allocation for exploitation and exploration with ambidexterity: Logical mechanism and simulations



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ARTICLE INFO

Article history:

Available online 29 October 2013

Keywords:

Team creativity
Exploitation
Exploration
Ambidexterity
Logical mechanism
Knowledge creation

ABSTRACT

Strategy and organizational theorists have emphasized the importance of balancing exploitation and exploration for organizations' sustainable success in regards to organizational learning and adaptation. However, few researchers have addressed the mechanisms or criteria in regards to an organization's resource allocation for exploitation and exploration with an ambidextrous balance, although previous researchers agree that exploitation and exploration are important for organizational success and that a balance between the two should be achieved in order to obtain sustainable competitiveness. The main purpose of this research is to make a logical argument on how team creativity evolves from the creativity revelation processes through knowledge creation by balancing exploitation and exploration. Specifically, this research presents a new logical mechanism to allocate a team's limited resources to exploitation and exploration, keeping a balance between the two activities. We prove the validity of the proposed logical mechanism by conducting longitudinal simulations.

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1. Introduction

In regards to today's global market competition, companies tend to face a highly competitive business environment because their technological dominant position could be easily copied by competitors and their differentiation of products and services could be imitated. Furthermore, companies might suddenly confront a critical market situation involving new entrants equipped with innovative products and business models, possibly driving several companies into a crisis situation. Therefore, companies are constantly required to have innovative products, services, and business models. At the same time, they face the pressures of appropriate time-to-market strategy for survival itself as well as for sustaining market leadership. For example, Apple Inc. changed the distribution structure and competition structure of the music market with an innovative business model related to the iPod, and consequently, competitors were forced to deal with the crisis. In addition, the introduction of the Smartphone led by Apple Inc. and Google Inc. changed the structure of the mobile phone market from a hardware manufacturer centric market to a software and service centric market. Consequently, traditional mobile phone manufacturers (e.g., Nokia, Motorola, Samsung Electronics, and LG Electronics) were faced with less than optimal business performance. Companies are required to enforce their competitive position by enhancing existing products

and services while simultaneously increasing competitiveness by developing new products, services, and innovative business models. However, the resources within companies for creating competitiveness are limited, and companies must allocate limited resources in order to secure a sustainable competitive advantage.

In response to this problem, strategy and organizational theorists have emphasized the strategic importance of balancing exploitation and exploration in regards to companies' sustainable prospects and organizational adaptation. According to several researchers, exploitation is being used to find new solutions by utilizing existing knowledge, and exploration involves developing new solutions by searching for new knowledge (Lazer & Friedman, 2007; March, 1991; Reagans & Zuckerman, 2001). Researchers have argued that companies should pursue exploitation and exploration simultaneously in order to sustain their competitiveness and that they should also balance the resources allocated to exploitation and exploration because of resource limitation within companies (Cohen & Levinthal, 1990; Levinthal, 1997; March, 1991). In other words, organizational and strategic management theorists have stressed the importance of the exploitation/exploration choice and the importance of resource balancing between exploitation and exploration in order to maintain organizations' success and competitive capability (Cohen & Levinthal, 1990; Levinthal, 1997; March, 1991). In order to find appropriate methods to achieve balance, previous researchers have mainly focused on organizational design or behavioral and social means. Most researchers studying the balance of resources between exploitation and exploration have argued that ambidexterity (Andriopoulos & Lewis, 2009; Benner &

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Tushman, 2003; Burgelman, 1991; Levinthal, 1997; Raisch, Birkinshaw, Probst, & Tushman, 2009) or punctuated equilibrium (Burgelman, 2002) could be adopted in order to achieve balance between exploitation and exploration from an organizational structure perspective.

However, although previous research on organizational adaptation regarding exploitation and exploration indicates that simultaneously pursuing both exploitation and exploration has strategic importance for organizations' prospects and that a balance between them should be achieved (Feinberg & Gupta, 2004; Gupta, Smith, & Shalley, 2006; Liu, 2006; March, 1991), research on the mechanism of resource balancing between exploitation and exploration is scarce (Gupta et al., 2006). More specifically, previous researchers have mainly addressed the balancing mechanism at the macro-level, such as the organizational or inter-organizational level. In other words, previous research on the balancing mechanism from a micro-level perspective, such as the individual or team level, is scarce (Gupta et al., 2006). In addition, there is little research presenting established mechanisms or concrete criteria to allocate limited resources between exploitation and exploration in a balanced manner. That is, previous organizational theory or strategic management theory researchers have focused on the strategic necessity of exploitation and exploration or on the balancing mechanism from the perspective of organizational architecture and management at the macro level (Gupta et al., 2006).

The present research proposes resource allocation criteria and a concrete mechanism for achieving a balance between exploitation and exploration from a micro-level perspective with the assumption of a team environment. Specifically, the knowledge creation structure was approached as a creativity revelation process based on exploitation and exploration in the perspective of ambidexterity with mathematical modeling and simulations. Therefore, the main purpose of this research is to propose a logical argument on how companies should allocate limited resources to exploitation and exploration in order to achieve resource balancing in a strategic way. The present research mainly focuses on a team level analysis to utilize concrete criteria and a direct mechanism to allocate resources between exploitation and exploration.

This paper is organized as follows. First, the literature review is presented with two perspectives related to the purpose of this research: (1) the relationship and balancing between exploitation and exploration from a strategy and organizational perspective; and (2) achieving a balance between exploitation and exploration from an analytical perspective, including simulation methods. Second, we present the knowledge creation model theoretically based on a creativity revelation process that involves balancing exploitation and exploration. This model explains how team knowledge can be created by balancing exploitation and exploration, which are important processes that reveal team creativity. The evolution pattern of team knowledge creation is presented over time based on the results of the simulation experiment. Finally, we discuss the implications of our model for management and further research.

2. Literature review

Researchers and theorists from the organizational theory and management strategy fields have insisted that both exploitation and exploration are important sources for organizational adaptation, and that the choice between the two should be determined strategically because both could affect organizations' short-term success and long-term prosperity (Cohen & Levinthal, 1990; Levinthal, 1997; March, 1991). Furthermore, researchers have addressed the balancing mechanism between exploitation and exploration using two main perspectives – organizational structure

and organizational behavior (Andriopoulos & Lewis, 2009; Benner & Tushman, 2003; Raisch et al., 2009) – and have empirically investigated organizations' performance based on the choice between exploitation and exploration (He & Wong, 2004; Liu, 2006; McNamara & Baden-Fuller, 1999). Since March's (1991) seminal paper on the organizational adaptation mechanism based on balancing exploitation and exploration, research on this topic has been conducted from various perspectives: perspectives with organizational structure and management behavior (Andriopoulos & Lewis, 2009; Benner & Tushman, 2003; Raisch et al., 2009), empirical investigations based on case studies and field research (He & Wong, 2004; Liu, 2006; McNamara & Baden-Fuller, 1999), and mathematical modeling and simulation methods based on organizational solution finding and knowledge creating processes (Fang, Lee, & Schilling, 2010; Garcia, Calantone, & Levine, 2003; Lazer & Friedman, 2007).

2.1. Strategy and organizational perspective

The strategic importance of balancing exploitation and exploration has been extensively discussed in the organizational structure and strategic resource allocation literature (March, 1991; Teece, Pisano, & Shuen, 1997). Although the definitions of exploitation and exploration still vary depending on the researchers and their respective fields, there is agreement that the strategic balancing of exploitation and exploration is extremely crucial for organizational performance in the short- and long-term perspectives (Gupta et al., 2006). Among many theories about this important issue (i.e., how to balance exploitation and exploration), the most popular approach is to seek such balance through ambidexterity or punctuated equilibrium. This approach is based on the notion that organizational structure is an important vehicle for achieving a balance between exploitation and exploration. There are two approaches for determining the balance between exploitation and exploration. The first involves balancing the two through ambidexterity, in which the maximum performance should be sought in both exploration-specific and exploitation-oriented subunits without placing emphasis on either one of them. In contrast, the punctuated equilibrium approach involves giving initial emphasis to either exploration or exploitation, and then giving priority to the other after a certain level of performance is accomplished. A temporal cycle between the exploration- and exploitation-focus is thus inevitable in the punctuated equilibrium approach.

Raisch et al. (2009) studied the three perspectives related to accomplishing the organizational ambidexterity aimed at balancing exploitation and exploration for the sake of sustainable organizational performance: how to obtain ambidexterity (differentiation or integration), level of pursuing ambidexterity (individual level or organizational level), and temporal perspective (static or dynamic). As He and Wong (2004) noted, empirical studies emphasizing the effect of ambidexterity on firm performance are rare. In that sense, He and Wong (2004) used an empirical approach to show that ambidextrous organizations placing emphasis on technological innovation yield better performance than punctuated organizations. In other words, ambidextrous firms show stronger sales growth trends, supporting conventional arguments that organizational balancing between exploitation and exploration is essential for organizational success. Andriopoulos and Lewis (2009) proposed two kinds of materializing ambidexterity. The first is architectural ambidexterity, which focuses on the use of organizational structure and strategy to enable proper differentiation of exploitation and exploration. The second is contextual ambidexterity, which involves utilizing more behavioral and social means to integrate exploitation and exploration. Using the single case of a firm that centered only on exploitation for growth and almost faced bankruptcy, McNamara and Baden-Fuller (1999) suggested that it

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