Journal of Business Research 88 (2018) 222–233

Contents lists available at ScienceDirect

Journal of Business Research

journal homepage: www.elsevier.com/locate/jbusres

A critical view of knowledge networks and innovation performance: The mediation role of firms' knowledge integration capability

Ming-Chao Wang[a], Pei-Chen Chen[b,*], Shih-Chieh Fang[c]

[a] College of Management, Yuan Ze University, No.135, Yuandong Rd., Zhongli Dist., Taoyuan City 32003, Taiwan, ROC
[b] Department of Information Management, National Kaohsiung University of Science and Technology, No.142, Haijhuan Rd., Nanzih Dist., Kaohsiung City 81157, Taiwan, ROC
[c] Department of Business Administration, National Cheng Kung University, No.1, University Rd., Tainan City 701, Taiwan, ROC

ARTICLE INFO

Keywords:
Knowledge governance
Knowledge flow
Knowledge networks
Network structure
Knowledge heterogeneity and cognition
Knowledge integration capability

ABSTRACT

Employing knowledge-based theory, this study builds upon social network theory and investigates the influence of knowledge networks on firms' innovation performance. This study incorporates the structural view of social networks and interorganizational interactions to develop the dimensions of knowledge networks, as well as to demonstrate the effects of firms' knowledge integration capability between knowledge networks and innovation performance. Investigating high-tech firms in Taiwan science parks, this study employs the social network research method to establish the boundaries of knowledge networks. The results show that each dimension of knowledge networks improves firms' innovation performance, and that firms' knowledge integration capability has a fully mediating effect on the relationship between knowledge cognition and innovation performance, but only a partial mediating effect on the relationships among firms' network centrality, knowledge heterogeneity, and innovation performance. Consequently, this study provides suggestions and comments for firms on how to engage in inter-organizational cooperative relationships.

1. Introduction

The effects of interorganizational network relationships on firms' strategic behaviors and performances have been discussed extensively (Brennecke & Rank, 2017; Guan & Liu, 2016; Shipilov, 2009; Stam & Elfring, 2008; Wang & Chen, 2015). In addition, a firm's position within a network structure is regarded as its most valuable network resource (Gulati, 1998) since it can exploit its favorable position in the network to acquire information, knowledge, or technical resources from its partners. This indicates the concept of network centrality, i.e. that the closer a firm is to the center of the network (Freeman, 1979; Shipilov, 2009), the more opportunities it has to contact its partners in the network, thereby enabling it to acquire more knowledge from multiple knowledge sources (Villasalero, 2014). Therefore, a firm can exploit its structural position in the network to obtain a significant amount of knowledge and technical information, thereby strengthening not only its knowledge and technical capabilities, but also its innovation output. It is obvious that the structural position that a firm occupies in the network can enhance its capacity to acquire resources for increasing its innovation output and performance (Ahuja, 2000; Fang, Wang, & Chen, 2017; Wong & Boh, 2014).

The cooperative relationship between firms is defined as a strategic process where, through the mutual exchange of resources, a firm and its partners obtain various value-creating resources (Hoang & Antoncic, 2003; Wincent, Anokhin, Ortqvist, & Autio, 2010). This strategic behavior is one of the key aspects of knowledge governance among organizations. In the formation of organizational relationships, this strategic behavior constitutes a network governance model of mutual trust and reciprocity (Grandori, 1997) whereby value-creating knowledge and resources are shared with one another. It implies the concept of knowledge and network governance, i.e. that the firm will obtain knowledge from, and share and transfer knowledge with, its cooperative partners by constructing network relationships in governing knowledge activities (Alkhuraiji, Liu, Oderanti, & Megicks, 2016). Guan and Liu (2016) suggest that a firm's innovative activities are embedded in knowledge networks constructed by integrating knowledge and cooperative relationships with other firms. This process indicates that when considering whether or not a firm's value and advantages are successfully created, the ability of the firm to process acquired knowledge has to be taken into account. Therefore, determining how firms efficiently incorporate the knowledge activities obtained from such organizational relationships has become a critical issue in knowledge

* Corresponding author.
E-mail addresses: mcwangedu@gmail.com (M.-C. Wang), pcchenedu@gmail.com (P.-C. Chen), fangsc@mail.ncku.edu.tw (S.-C. Fang).

https://doi.org/10.1016/j.jbusres.2018.03.034
Received 21 July 2017; Received in revised form 23 March 2018; Accepted 27 March 2018

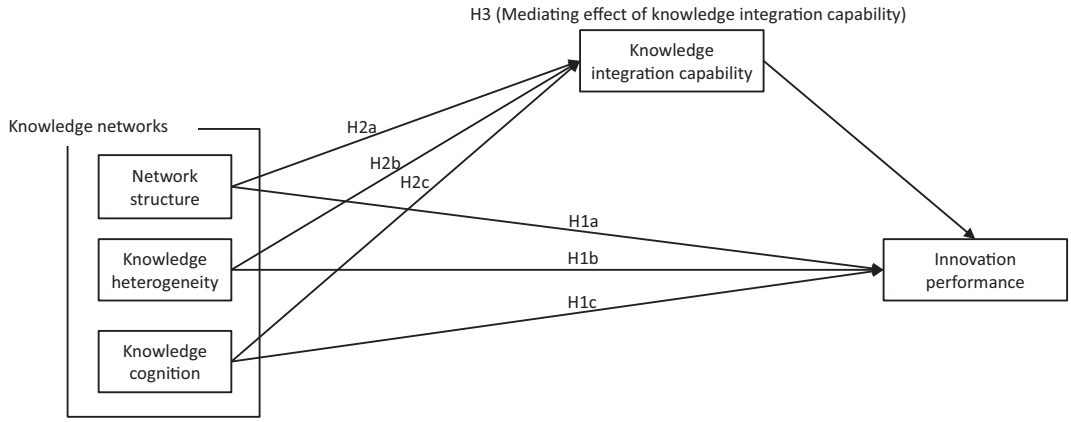

Fig. 1. Theoretical model of knowledge networks and innovation performance.

governance related to knowledge flow (Alkhuraiji et al., 2016; Villasalero, 2014). Furthermore, although there are numerous studies on the relationship between network structure and firms' innovation performance, how cooperative relationships between firms influence their respective innovation performance, i.e. the nature of those cooperative relationships and the ways they have positive effects on firms, as a topic which still remains relatively overlooked (Grigoriou & Rothaermel, 2017; Hoang & Antoncic, 2003; Wincent et al., 2010). Rodan and Galunic (2004) point out that the value of a social network not only exists within the network structure, but also in the cooperative relationships between firms, whereby diverse knowledge can be extracted from partners. Thereby, firms are able to broaden their acquisition of heterogeneous knowledge, thereby increasing their own knowledge capital for future technology and new product development. Grigoriou and Rothaermel (2017) present that a firm's internal capability related to governing knowledge recombination and coordination affects its external knowledge sourcing activities with partners on generating knowledge outcomes. It shows that firms can extract and incorporate knowledge from the organizational network and store it in their own organizations for future utilization.

The structural view of how firms utilize their positions in a cooperative relationship network to obtain knowledge can explain the means through which they exchange knowledge, but not the content of the exchanged knowledge or the nature of their cooperation (Brennecke & Rank, 2017; Fang et al., 2017; Guan & Liu, 2016; Wincent et al., 2010). This represents a gap in social network studies, i.e. how they affect a firm's strategic activities in the network without disclosing its knowledge base in cooperative relationships and combining knowledge (Alkhuraiji et al., 2016; Guan & Liu, 2016; Paruchuri & Awate, 2017). Knowledge networks are knowledge-based structures of interorganizational relationships in dealing with knowledge assimilation and exchanges (Dong & Yang, 2016). Therefore, in exploring the purpose of firms engaging in network activities and the content of their interactions in knowledge mobilization, this study consolidates social network theory and knowledge governance view to explicate the concept of knowledge networks. Supplemented by the knowledge governance perspective, this study examines the knowledge networks shaped by interorganizational activities and the methods that firms use to process, incorporate, and integrate acquired knowledge for achieving enhanced organizational performance. Differing from social networks, which focus on the structural position regarding how a firm receives diverse information from interactive relationships (Wong & Boh, 2014), the activities based on heterogeneous knowledge and comprehending such acquired knowledge are critical network activities in explaining why a firm wants to build up knowledge networks with other firms (Briscoe & Rogan, 2016).

Exploring the concept of knowledge networks by focusing on high-tech industries in Taiwan makes sense since they not only are the locomotive of Taiwan's economy and technology development, but also enjoy prominence globally. Adopting the snowball sampling technique commonly used in social network research method (Wasserman & Faust, 1994), this study chose major science parks in Taiwan (Hsinchu, Taichung, and Tainan) as the core samples to establish the boundaries of knowledge networks. In total, 344 firms were sampled, to which the following questions were directed: (1) What is the content of the knowledge networks? (2) What are the effects of the content of knowledge networks on firms' innovation performance? and (3) What influence does firms' knowledge integration capability exert on the relationship between the content of knowledge networks and firms' innovation performance? The answers to these questions would not only clarify the relationships among the content of knowledge networks, firms' knowledge-processing mechanisms, and firms' innovation performance, but also extend the existing literature on knowledge networks in the realm of social network research, focusing on why firms interact with partners and how firms benefit from cooperative relationships (Brennecke & Rank, 2017; Guan & Liu, 2016; Rodan & Galunic, 2004; Wincent et al., 2010). This research contributes to the construction of knowledge networks by exploring the role of interactive content between firms (increasing knowledge cognition and accessing knowledge heterogeneity) and structural characteristics of networks (interacting via network structure). Moreover, knowledge integration capability is also presented in relation to the critical role played in utilizing a firm's knowledge stock for improving innovation performance, when a firm exchanges knowledge in the knowledge networks. Fig. 1 shows the theoretical model and hypotheses of this study.

2. Literature review and research hypotheses

2.1. Exploring knowledge networks: Network structure and the content of firms' interactions

Social networks reflect the social interactions within the set of firms. These interactive channels show the exchange process in how firms in the network deliver diverse resources, technologies, knowledge, and ideas to each other (Guan & Liu, 2016). For a firm, interactive relationships are a way to create potential value and accumulate capital because it can access these diverse resources for generating knowledge creation and improved performance (Brennecke & Rank, 2017; Fang et al., 2017; Martin-Rios & Erhardt, 2016; Nahapiet & Ghoshal, 1998; Schilling & Phelps, 2007; Shipilov, 2009; Villasalero, 2014; Wang, Rodan, Fruin, & Xu, 2014). According to this perspective, two critical directions are used to explain the overall structure of a social network (Dong & Yang, 2016; Fang et al., 2017; Wang et al., 2014). The first direction is based on the “structural characteristics” of the networks, as revealed by exploring the degree to which firms utilize their positions in the networks to acquire and incorporate resources. This process