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Facilitating Sticky Knowledge Transfer in Supply Chain Networks: Influencing Factors and Strategies

Ishana Kulkarni[1], Advait Deshmukh[2]
La Salle University, Philadelphia, USA[1],La Salle University, Philadelphia, USA[2]
IshanaKulkarnilo@gmail.com[1], Advaitpokm@gmail.com[2]

Abstract: In the realm of supply chain networks, enterprises encounter the challenge of managing substantial volumes of sensitive and critical knowledge that exhibits a property known as "stickiness" during acquisition, transfer, and application. This phenomenon is influenced by factors such as knowledge attributes, innovation capabilities, trust, and strategic considerations. This paper examines the inter-organizational transfer of sticky knowledge, identifying its causes, influencing factors, and proposing strategies to facilitate its transfer. It also presents research findings on the transfer of sticky knowledge between organizations and outlines future research directions in this area.

Keywords: Knowledge transfer, sticky knowledge, supply chain network structure.

1. Introduction

At present, the whole world is in the era of knowledge economy, where knowledge has become an indispensable element to build the core competitiveness of enterprises. Knowledge has surpassed traditional production factors such as land and labor force and become the primary production factor in the most creative and strategic sense [1]. Entering the new economic era characterized by customers, competition and change, "the competition between enterprises has become the competition between supply chains". For enterprises in the supply chain network, as being influenced by factors such as the knowledge attributes, innovation capabilities, trust and strategy, a large amount of non-strictly classified confidential and critical knowledge becomes sticky in the process of acquisition, transfer and application [2]. Knowledge sticky and sticky knowledge reflect the difficulty of knowledge flow, which evolved from the sticky information and information sticky concepts proposed by Professor Schipper of Massachusetts Institute of Technology in 1994 [3]. The presence of sticky knowledge reduces the flexibility and integration of the supply chain network and damages the communication and cooperation between enterprises, as well as leading to the lack of the ability of the whole network to adapt to the dynamic competitive environment. Therefore, it is of great significance to study sticky knowledge transfer from the perspective of supply chain network structure.

Since the 1990s, researches on sticky knowledge have been carried out from the perspectives of the technological innovation process, the intra-organizational transfer and the inter- organizational transfer [4-5]. From the perspective of the technological innovation process, it focuses on the impact of sticky knowledge on the technological innovation process, with discussion about how to properly deal with sticky knowledge to achieve efficient innovation and corresponding innovation management tools being put forward [6-8]. From the perspective of intra-organizational transfer, it focuses on the causes and influencing factors of sticky knowledge from the intra-organizational perspective, the obstacles to transfer, the transfer process and the measures to promote its transfer [9-11]. From the perspective of inter-organizational transfer, it lays the emphasis on the causes, the

influencing factors and the countermeasures to promote the transfer of sticky knowledge when transferring knowledge between organizations [12-15]. This paper focuses on the research results of inter-organizational sticky knowledge transfer.

In 1999, Simonin studied the marketing knowledge transfer among multinational companies within the international strategic alliance, and found that the factors, such as the reticence, asset specificity, previous experience, complexity, partner protection tendency, cultural distance, organizational distance, have the same influence on the knowledge fuzziness [12]. In the same year, Anderson clearly pointed out that technical knowledge is environment- dependent and sticks to the local environment. The presence of sticky knowledge makes development activities tend to be carried out in the local environment, which further strengthens the stickiness of knowledge. The statistical results of the questionnaire survey on Danish companies show that companies that actively participate in internationally-oriented (i.e. not limited to local environment) products and process development tend to adopt more the forms such as personnel exchange and electronic data exchange between companies when compared to the behavior of other companies, which exactly serves the purpose to promote the transfer of sticky knowledge between companies [13]. In 2002, Bhagat et al. discussed cultural factors more in depth and proposed an analytical framework for the impact of inter- organizational cultural differences on knowledge transfer [14]. In 2003, Cummings and Teng explored the key influencing factors of R&D knowledge transfer among research and development partners, and found that knowledge characteristics, relationship between partners, knowledge gap and transfer activities all affect the success of knowledge transfer [15]. In recent years, some scholars began to study the sticky knowledge and its transfer in various network structures. In 2008, Wijk et al. used meta-analytical technology to divide the influencing factors of sticky knowledge transfer into three aspects: knowledge, organization and network characteristics, and evaluated the influence degree of the sticky knowledge transfer on the important results as well as the influence of sticky knowledge transfer within and outside the organization [16]. In 2009, Wada et al. studied the knowledge sharing behavior among teachers majoring in information and communication technology, and proposed a knowledge network social system based on three sticky elements of knowledge, that is, the relational capital, the reputation and the personalization [17]. In 2011, Margaret further expanded the research scope of sticky knowledge, by discussing the problem of sticky knowledge in the laws of intellectual property rights, patents and trade secrets, and studied under which circumstances sticky knowledge transformation can be encouraged, or in other word, the realization of the goal of copyright "encouraging learning" [18].

In 2001, Wang and Wu defined sticky knowledge, with analysis of the causes of sticky knowledge in industry-university-research cooperation, They also discussed the ways to overcome the sticky knowledge and proposed the theoretical model of sticky knowledgetransfer, which was the first time for domestic scholars to study sticky knowledge [19]. In 2003, Peng Can studied the importance, obstacles and causes of sticky knowledge transfer from the perspective of regional innovation system, and proposed countermeasures to promote sticky knowledge transfer in the regional innovation system in China [20]. In 2012, Yan analyzed the characteristics of distributed innovation, such as high geographical dispersion, diversity of nodes in the network and loose organization, and believed that the specific factors leading to the stickiness of distributed innovation knowledge were spatial distance, knowledge absorption capacity and the instability of innovation network [21]. In recent years, domestic scholars have gradually focused attention on to the problem of inter-enterprise sticky knowledge transfer, and studied the influencing factors, causes, transfer mechanism and transfer countermeasures of sticky knowledge from the perspectives of enterprise cooperative innovation [22], alliance enterprise [23], scientific research team [24-25], and industrial cluster enterprise [26-27]. There is only one literature found in the research which discusses on sticky knowledge transfer from the perspective of supply chain. In 2010, Zeng Deming et al. based their research on the network density, network connection strength and network centricity three structure variables to study the supply chain network structure on the influence of the sticky knowledge transfer. However, the variables they selected for their study of the supply chain network structure is so less that they are not sufficient enough to reflect all the attributes of the supply chain network, and only qualitative analysis and discussion was conducted on the impact of the three structural variables on the sticky effects of knowledge transfer, without being validated by method

of using quantitative analysis [28].

Compared with the sticky knowledge transfer within the organization, the inter-organizational situation is more complex and bears more practical and promotional value. However, so far as it is observed, scholars at home and abroad focus on multinational enterprises and industrial clusters, while studies on inter-organizational sticky knowledge transfer from the perspective of supply chain network are not only few but also incomplete. Some research theory about sticky knowledge transfer within the enterprise, between multinational enterprises and among industrial clusters cannot be directly applied in the supply chain between upstream and downstream enterprises, due to some reasons. First, the enterprises as nodes in the supply chain is usually located in a different region of different, time zone. The objective existence of the cultural differences and geographic distance makes the operation of the supply chain environment more complex, and what is different from multinational companies is that there is no subordinate relationship between the enterprises as nodes in the supply chain; Secondly, knowledge management is essentially a complex process of both explicit and implicit dynamic collaboration and knowledge promotion. In addition, due to the knowledge protection and other factors, the process of sticky knowledge sharing and sticky knowledge transfer is more complicated than that within the enterprise.

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