Collaboration Partners, Slack Resources and Firm's Innovation Performance

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Abstract--**Firms rely more and more on external collaboration partners to reduce the R&D cost as well as shorten the product life cycle. Open innovation become a new paradigm for firms to become competitive in a highly dynamic business environment. Firm's collaboration partner extents from customers, suppliers to university , research institute, and even competitors, the resource based view hold that different partner can provide with complementary resources and add more fuel to firm's innovation while the transaction cost theory hold that the coordination ,communication traveling and the exchange of information among the involved collaboration partners will increase the innovation cost. Based on various theory foundations, this research want to highlight how does the collaboration partners influence firm's innovation performance, and how does firm's resource redundancy influence the interaction result of firms and various partners. This study underline the importance of collaboration partner in process of firm's innovation, and highlight the role of slack resource in the interaction between external collaboration partner and firm's innovation performance.**

I. INTRODUCTION

While rapid technological advances, shorter product life cycles, and the rising costs of R&D have increased the difficulty of relying solely on internally developed innovations[1],Firm increasingly seek external collaboration to reduce the R&D risks and costs, gain access to skills, technologies and markets, and reduce development times[2]. The last two decades have witnessed a surge of collaborations between firms and its external agents[3]. Although firms collaborate with external partner for a variety of reasons, important motivations include access to complementary resources, reducing transaction cost and speed up the process of innovation[4; 5], The existing literature advises that complementary resources provide potential opportunities for the firms to explore new and different ideas about product design, concepts, and development, as well as to break away from previously specified rules and procedures[4].

However, much of the existing literature is focus on why, when and how firm can benefit from collaborating with external agents, ignoring the role of slack resource, our research question is how slack resources influence firm's propensity to collaborate? And how slack resource influences the interactive process between external collaboration partner and innovation performance? The research may help to reveal the motivation of firms' collaboration behavior and help practitioner and managers have a wider lens of outbound open innovation.

The remainder of this article is organized as follows. We first introduce our conceptual framework and theoretical foundation, and then we put forward individual hypotheses. Subsequently, we illustrate the theoretical and managerial implications of the results, followed by limitations and future research directions.

II. THEORY FOUNDATION

A. Resource-based view(RBV) and its extension

From the resource-based view, cooperation relationships are driven by logic of strategic resource needs and social resource opportunities, the process of collaboration can be seen as a flow of resources among organizations. For example, a joint venture is formed when "two or more firms pool a portion of their resources within a common legal organization"[6].The resource-based rationale emphasizes value maximization of a firm through pooling and utilizing valuable resources. According to Kogut, there are two possible reasons firms choose to collaborate with external agent: either to acquire the other's organizational know-how or to maintain one's own know-how while benefiting from another's resources. Extending this approach to all types of firm resources, we suggest that there are two related, but distinct, motives for firms' external collaboration: (1) to obtain others' resources; and (2) to retain and develop one's own resources by combining them with others' resources.

Conventional Resource based view(RBV) assumes firms must own or fully control the resources to create value. In the extended resource-based view, resource accessibility, the right to employ resources or enjoy their associated benefits, enables firms to achieve advantages. Lavie extends the RBV by explaining how interconnected firms in dyadic collaboration/alliance combine external resources and internal resource endowments to achieve competitive advantage for the focal firm. According to Lavie, the competitive advantage of a focal firm participating in an alliance/collaboration includes four elements: (1) internal rent (2) appropriated relational rent, (3) inbound spillover rent, and (4) outbound spillover rent. Internal rent can be extracted from the focal firm's own shared and nonshared resources. Appropriated relational rent can be extracted only from the shared resources of both partners. Inbound spillover rent is the rent generated from the partner's shared and nonshared resources through knowledge leakage, inter-firm learning, relative absorptive capacity, and internalization of the partner's practices, whereas outbound spillover rent results from the transfer of benefits from the focal firm to the partner. The combination of internal rent, inbound spillover rent, and outbound spillover rent forms private benefits for the focal firm. Its competitive advantage depends on its private benefits and appropriated relational rent (i.e., appropriated common benefits).

In contrast, collaborative advantage is joint competitive advantage and come from a relational rent, a common benefit that accrues to collaborative partners[7]. This type of rent cannot be generated individually by either collaborative partner. In addition, Lavie's model extends prior research on joint value creation in dyadic alliance by considering unilateral accumulation of spillover rents that produce private benefits[8].

B. Transaction cost view

Transaction cost economics (TCE) is a very influential theory that can explain relationships among firms[9]. Williamson identifies hierarchies and markets as two methods to organize. According to TCE, the decision to use either vertical integration/hierarchies or market mechanisms depends on the relative monitoring costs that arise from bounded rationality and from uncertainties due to partners' self-interest and opportunism [10].

Collaboration with external agents emerges as the third alternative to organizing, which helps avoid the problems arising from both hierarchies and markets [11]. It helps firms reduce the costs of opportunism and monitoring that are inherent in market transactions through process integration and mutual trust, thus increasing the probability that partners behave in the best interest of the partnership. Collaboration with external agents also helps firms avoid internalizing an activity that may not be aligned with their competencies.

C. The relational view

The relational view (RV) complements the RBV by arguing that critical resources may span firm boundaries[7].Ties with external agents are conduits for the flow of tangible(i.e. money or specific skills) or intangible resources(i.e. form of information, social support, or prestige).Access to outstanding partners may have great economic benefits, measured by rates of growth, profitability or survival[12; 13]. Others find that elite sponsorship provides legitimacy for entire organizational populations [14; 15]. Dyer and Singh synthesize the research on inter-organizational collaboration into four sources of competitive advantage that derives from such relationships: the creation of relationship-specific assets, mutual learning and knowledge exchange, combining of complementary capabilities, and lower transactions costs stemming from superior governance structures. Firms can earn not only internal rents (i.e., Ricardian rents from scarcity of resources and quasi-rents from added value) but also relational rents. A relational rent is defined as a supernormal profit jointly generated in an exchange relationship that cannot be created by either firm in isolation and can only be created through the joint contributions of the collaborative partners [7]. Relational rents are possible when collaborative partners combine and exchange idiosyncratic assets, knowledge, and capabilities through relation-specific investments, inter-firm knowledge-sharing routines, complementary resource endowments, and effective governance mechanisms. Collaborative advantage is based on the relational view, which elaborates on the mechanisms of joint value creation (i.e., inter-firm rent generation). It argues relational rents accrue at the collaboration level for mutual benefits. Unlike studies that acknowledge the role of both private and common benefits [16; 17], the relational view emphasizes common benefits that collaborative partners cannot generate independently.

D. An integrated view

Different theories shed various light on how firm gain its competitive advantage from various aspect. In an integrated view, firm collaborate with external agent for various benefits, firstly, collaboration enable accessing, acquiring, accumulating heterogeneous and complementary resources. Second, more centrally located firms will evince superior performance, to the extent that such location facilitates the gaining of internal rent, appropriated relational rent, inbound spillover rent, and outbound spillover rent. The embeddings of focal firm in a collaboration network have a positive effect on firm's performance (Dyer, 1996). Thirdly, the advantages that a firm can gain from its partner depend on the effective governance mode[7], such as the level of partnership synergy, which including strategic, operational, cultural as well as commercial synergy[18]. Which means that the partnership synergy effect of with external agents will have a positive effect on focal firm's innovation performance.

III. THEORETICAL HYPOTHESIS

A. Different types of collaborative partners

In the context of open innovation, firm greatly extend its scope of collaboration, from suppliers, users to knowledge intensive organizaitons, such as university and research centers. Collaborative relationships can help firms share risks[19], access complementary resources[20],reduce transaction costs and enhance productivity[21],and enhance profit performance and competitive advantage over time. Firms such as IBM, Dell, Procter& Gamble, Hair, and 3M have forged long-term, collaborative relationships with their suppliers to reduce transaction costs and achieve a stronger

Competitive position. Collaboration is attractive since it puts more emphasis on governance through relational means in addition to governance through contract means [22]. Porter hold that the industry structure and attractiveness is depend on four forces: customers, suppliers, competitors, as well the potential incomer[23], because they all related to the industry structure, collaborate with these type partner facilitate knowledge exploitation as well as opportunities recognition, there are closely related to the idea commercialization, hence we define them as industry partner. In general, university, research centers, consultancy corporations, they are knowledge intensive organizations, and is focus on knowledge production, transformation and dissemination, they are closely related to the process of knowledge exploration, in this research we call them as firm's knowledge

partner.

B. Different compact of partner

Existing literature hold that collaboration within supply chain not only provides benefits in identifying market opportunities for technology development and reduces the likelihood of poor design in the early stages of development, but also helps firms identify potential technical problems, thereby speeding up new product development and responses to market demands [24]. Although some literature show that collaboration with competitor may lead to the leakage of key know-how and may have a negative effect on firm's innovation performance[25] ,other literature hold that collaboration with competitors enables firms to acquire and create new technological knowledge and use the knowledge [26; 27], firms can accelerate their capability development by R&D cooperation with competitors, which allows them to reduce the time and risk involved in technological innovation. It seems the advantage of collaboration with competitors will outweigh the cost and risk it takes to the firm.

Proposition 1: collaboration with industry partner will have a positive influence on firm's innovation performance.

Firms interact formally and informally with universities and research institutes to acquire new scientific knowledge to benefit their product or process innovations [28].Several studies suggest that collaboration with research institutes and universities positively affects firm's innovation performance[29; 5; 30; 31] , The main findings in these study indicate that the technology novelty of industrial innovation is positively related to the collaboration relationship with university and research centers, i.e. the more the collaboration, the higher the technology novelty of the innovation. however, others hold that collaboration with universities and research institutes has a negative effect on product innovation performance[28; 32; 33] .It seems lack a consistent conclusion considering the various study research context that different paper refers.

In general, firm collaborate with university for accessing to complementary research activity and research results as well as key university personnel. Cohen et al. emphasizing the studies that public research enhances firms' sales, R&D productivity, and patenting activity[34]. Several studies suggest that technological innovation relies heavily on knowledge from scientific partners, such as universities and research institutions [35-37].

The analyses of industry–university links usually ignore other, perhaps complementary sources of specialist knowledge, such as consultancies and private research institutes, although the contribution of these has been the focus of a parallel literature[38; 39].Specialist knowledge providers such as consultants, private research organizations are also firms' potential collaborative partners, the collaboration with these agents will tend to complement firms' own internal knowledge production and interpretation activities as well as other knowledge sources that firm might use(such as suppliers, customers, competitors, etc.); Secondly, the use of these agents can enhance the firms' innovative capability for it provide benefits-such as accessing the experience of consultants and greater social capital. The forging of stronger links with these agents, may well be positively associated with the development of more radical innovations[40]. This is especially likely to be the case with links to private research organizations. Consultants, on the other hand, may be used to help firms rapidly catch up or imitate innovations introduced by their rivals, however excessive collaboration with these agent may consume firm's resources, and may have negative effect on firm's performance since it lack appropriate supervisory capability[41]. Hence, we put forward the following proposition:

Proposition 2: collaboration with knowledge partner will have an inverted U shape effect on firm's innovation performance.

C. The moderation effect of Slack resource

Nohria and Gulati define slack as the pool of resources in an organization that is in excess of the minimum necessary to produce a given level of organizational output[42]. Slack resources include excess inputs such as redundant employees, unused capacity, and unnecessary capital expenditures. They also include unexploited opportunities to increase outputs, such as increases in the margins and revenues that might be derived from customers and innovations that might push a firm closer to the technology frontier. Singh distinguished between unabsorbed slack, which is easy to recover, and absorbed slack-which is not easy to recover[43]. In this work, we focused on unabsorbed slack: excess resources that can be recovered within a year. Our focus was on short-term, or unabsorbed slack because such resources should be more easily deployable in support of innovative activity than long-term, or absorbed slack.

In organization theory, slack resource can be a facilitator of strategic behavior, which allows the firm to experiment with new strategies such as introducing new products and entering new markets[44], in the process of innovation, ,firm generally collaborate with external partners for joint research or developing new product or services, slack resource can help the firm buffer the risk that inherent exist.

Scholars have argued that organizational slack is an important catalyst for innovation for two reasons, slack causes relaxation of controls and represents funds whose use may be approved even in the face of uncertainty. Slack allows pursuit of innovative projects because it protects organizations from the uncertain success of those projects, fostering a culture of experimentation [45].

While collaboration with external agents often requires resource input and the uncertainty of outcome, a firm with greater slack resource can buffer these risks better. Slack resource will influence firms' collaboration with external agents in two hands. On the one hand, in an increasingly dynamic world, firms are being forced to become more

innovative. Hence, organizational slack has come under sharp scrutiny as organizations facing increasingly intense global competition feel pressured to eliminate all forms of slack. It will stimulate firms' propensity to collaborate with external agents, both industry partner as well as knowledge partner. Because fierce competition environment stimulate firm have the most use of slack resources. On the other hand, it will moderate the relationship between collaborator and firm's innovation performance, for it will buffer the uncertainty and risk that inherit in the collaboration results. Hence, we put forward the following proposition：

Proposition 3: firm with greater slack resource will have a greater propensity to collaborate with external collaborative partners,

Proposition 4: firms' slack resource will moderately influence the relationship between collaborator and firm's innovation performance.

IV. CASE STUDY

The development of Shanshan can be categorized into three stages , the first stage is accumulation stage, during 1989-1998, Shanshan won the first bucket of gold by manufacturing business suits, it absorb the elements of western-style suit into the Chinese suits and introduced the foreign fabric to meet the suits "light, thin, soft, pretty, washed deformation" requirement. It then first introduce the brand into its suit and become the Chinese first brand of suit. Then, it extent its brand to female fashion, children's clothing, knitting underwear and jeans, home textile, leather. It coordinate with many kinds of other international brand and learned the modern management practice from the foreign corporations, such as the franchise with its brand resources. At this stage, Shanshan become the first private enterprise in the suits' industry and earn its reputation for its environment protecting production mode.

Shanshan accumulate the first fortune in the clothing industry, the slack resource stimulate firm's collaboration with external knowledge partner. It entered into the second stage: exploration stage. In 1998, as more and more competitors come into the suits' industry, and the profit space decreace. Shanshan began its strategy transformation. It entered into the high tech industry by collaboration with college or research institute for the commercialization of research findings. It have wide range of collaboration with external research partners, such as chemical and Design Institute, Harbin Institute of Technology, Fudan University, Chinese Academy of Sciences,etc. It was estimated that more than 100 million RMB was invested as seed fund or angel investment during 1998 to 2008. Although only less than one-tenth projects turned out to be successful and profitable, the only one-tenth success project already took enough revenue for Shanshan, such as the battery material and new energy project. The first success project is the Lithium battery cathode materials, it filled the domestic blank and become the largest Lithium battery cathode material manufacturing enterprise in China. Shanshan building its core competences by collaborating firms such as Changchun Heat-shrinkable material Ltd, Joint copper foil Ltd , Matsubara oilfield Ltd, Songjiang Copper Ltd,Western Union Copper Foil Ltd. Some of them are competitors of Shanshan. It entered into the field of new material and new energy. During 1998 to 2008, the Chinese government strongly support private enterprises to enter the field of new energy and new materials. It issued many preferential policies and projects which triggered investments into those fields. Therefore, Shanshan carried on 863 national projects to make technological breakthrough in high-tech industry. Furthermore, Shanshan integrated the whole industrial chain by purchasing mineral resources internationally and broadening its international market channel by setting up joint venture company worldwide.

The third stage is platform building stage. By developing private science and technology park and incubator such as Shanshan Fashion Hub, Zhongke langfang technology park , high-tech incubator. it building the habitat for new ventures as well as a facilitator for collaboration with various types of partners. Shanshan Fashion Hub put its twenty subsidy firms and twenty-two clothing brand into the park and realized the ecosystem effect. Zhongke langfang technology park introduce scientific talent , and cooperate with famous college and research institute to develop the high-tech new-energy, new materials, IT, biotechnology industry. Through providing value added services such as financial aid , management training seminars , science services for the new ventures, Shanshan not only provide the necessary nutriment that new ventures needs, but also nurture an environment that facilitate collaboration. It build its own innnovation network, from research and development to production and marketing. By collaboration with industry partner as well as knowledge partner, It greatly expand its own R&D capability , manufacturing capability, marketing capability. The collaboration with industry partners promote firm's innovative capability for it enable the absorption of new ideas which come from customers, suppliers, and competitors. While the collaboration with knowledge partner enable Shanshan timely gain advanced scientific knowledge, the slack resource facilitate the commercialization process of scientific achievements.

V. CONCLUSION

Innovation is driven by a firm's external partnerships as well as firm's internal capabilities. While open innovation show that valuable ideas can come from inside as well as outside the firm ,this research focus on how various type of external partnership influence firm's innovation performance and the role of slack resources. It provide a integrated theory framework for why firm choose to collaborate, and propose several hypothesizes regarding the collaboration partner and firm's innovation performance, however, further empirical studies and more in-depth case studies considering different management background(such as country, sectors)

should be provided to verify the hypothesizes.

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