

Radical Innovation in Strategic Partnerships: A Framework for Analysis

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Abstract

The study proposes a conceptual model of the phenomenon of a radical innovation partnership and examines particular partner attributes affecting its performance. Borrowing from the paradox perspective in organizational studies, the model argues that a radical innovation partnership features several paradoxes - the paradox of a partnership structure, the paradox of partnership resources, and the paradox of partnership processes and that particular partner attributes affect the competing demands within each paradox. The paper further argues that contribution of each partner attribute is specific and differentiated. Deficiency in any attribute leads to imbalances across the paradoxes and less than optimal performance.

Keywords: Radical innovation, strategic partnerships, paradox perspective

“The paradox as a proposition or description may border on the seemingly absurd, while at the same time prove itself a well-founded statement”.
Slaatte, 1968

1. Introduction

In recent years, companies have been increasingly under pressure to develop and introduce radically new highly-innovative products (Shah & Swaminathan 2008, Sood & Tellis 2005) and actively collaborate to pursue those ambitious projects (Sampson 2007, Shah and Swaminathan 2008). The decision to select partners represents an essential strategic choice directly linked to the performance of innovative, technology-intensive partnerships (Hoang and Rothaermel 2005, Moverly et al 1998). Yet, a deep understanding is still lacking about how value is created in the partnerships pursuing breakthrough innovations and how partner attributes influence this process (Schoenmakers & Duyster 2010, Weber & Weber 2007).

This paper proposes a conceptual model structuring the phenomenon of a radical innovation partnership and examining partner attributes linked to its performance. For the

purpose of this study, radical innovation is defined as the one incorporating rapidly developing technology, absolutely new to a firm, representing a substantial challenge to existing organizational knowledge and practices, and requiring substantial financial investments (Green et al. 1995, one of the most widely adopted definitions in the field). The model utilizes the paradox perspective adopted in organizational studies (i.e. Lewis 2000, Poole & Van de Ven 1989) and argues that the phenomenon of a radical innovation partnership features multiple paradoxes, including the paradox of alliance structure, the paradox of alliance resources, and the paradox of alliance processes. The partner attributes influence the forces within those paradoxes, and the contributions are specific and differentiated. A deficiency in any partner attribute leads to imbalances across the paradoxes, resulting in less than optimal performance.

2. Paradoxes in Radical Innovation Alliance

Extant literature suggests that a paradox lenses can be a fruitful approach to study the phenomenon of firm innovation. Organization and management theories define paradox as a set of the conflicting, yet interwoven statements logical in isolation, but irrational when appearing simultaneously (Poole and Van de Ven 1989). The opposing trends are “equally necessary to convey a more imposing, illuminating, life-related and provocative insight into truth than either factor can muster in its own right” (Slaatte 1968). Paradox logic is based on “both/and”, rather than “either/or” thinking, which may become a source of something new, emerging opportunities and intuitively relates to the innovation phenomenon (Smith and Tushman 2005). For example, March in his seminal work (1991) discusses innovation as a tension between the exploitation and exploration trends. Lewis and Andriopolus (2013) discuss organizational ambidexterity as a necessary condition to leverage explorative and exploitative efforts and boost firm innovativeness. Leonard-Bart (1992) analyzes the paradox of core capabilities and core rigidities in innovation management. Bidault & Cummings

(1994) and Ritala & Hurmelinna-Laukkanen (2012) both refer to the cooperation and competition trends co-existing and influencing firm innovation.

Radical innovation projects represent a particular case of firm innovation as those are dramatic departures from existing products in terms of technology and often require more, than the limited internal organizational resources can offer (Bayus et al. 1998). They generate great knowledge demands and require radical change in organizational thinking, structures, and activities (Leifer et al. 2000). Those projects are difficult to manage due to a poor match between the needs of cutting-edge research and scarce organizational resources (Molina-Castillo et al. 2011). Not surprisingly, companies increasingly collaborate to pursue radical innovation. The benefits of conducting R&D in partnerships are multiple, including access to unique resources and competencies of partners, sharing of risks and development costs, enhancing firm innovativeness and reducing time to the market (Gulati et al 2012, Rindfleisch & Moorman 2001, Sampson 2007).

Extant literature suggests that strategic alliances are complex inter-organizational entities, where the factors of alliance structure (Das and Teng 1996, Parkhe 1993), alliance resources (Lyn et al 2009, Sampson 2007), and alliance processes (Hoang and Rothaermel 2005, Zollo et al. 2002) are directly linked to alliance performance. The paradox of radical innovation alliance structure, the paradox of radical innovation alliance resources, and the paradox of radical innovation alliance processes are proposed; how they affect alliance performance is analyzed.

2.1. Paradox of Alliance Structure: concurrent demands for a strong formal administrative system and managerial flexibility.

In classical management theories organizations are often depicted as control systems organizing and coordinating members' actions to achieve organizational goals (Bouchikhi 1998). The recently emerged stream in innovation research proposes that a strong

administrative control is vital to success of highly-innovative partnerships as it helps manage multiple uncertainties inherent in those projects (Grant & Baden-Fuller 2002, Lambe et al. 2009). Uncertainty in radical innovation partnerships originates from the hard-to-estimate potential of discoveries and differences among the partners. Breakthrough innovation can shake industries, changing their competitive landscape (Dyer & Singh 1998). An invention could be beneficial to one of the partners, but make another one more vulnerable if he does not fit into the newly emerged competitive environment. Diversity in strategic orientations and organizational cultures of the partners can lead to mismatch in organizational values and beliefs and mutual misunderstanding, resulting in growing dissatisfaction and intensifying inter-partner conflicts. A strong administrative system designed in the innovation partnership helps reduce confusion and align administrative structures of the partners (Lambe et al 2009). A central authority can become a source of charismatic leadership and provide better motivation of the partners (Nord & Tucker 1987), streamline the process of outlining research priorities and reduce role ambiguity (Nygaard & Dahlstrom 2002). Having clearly defined research goals and explicit guidelines, partners feel more confident about the future and may exhibit more willingness to commit to the alliance. Also, strong administrative mechanisms speed up the development of new communication channels in a partnership (Sivadas & Dwyer 2000). Rich media channels facilitate emergence of cooperative patterns of information exchange and high-quality knowledge-sharing routines, foster synchronization and coordination of collaborative activities, thus enhancing the radical innovation partnership' performance.

The alternative perspective in organizational studies focuses on organic versus mechanistic organizations and emphasizes the importance of organizational flexibility and ability to adapt continuously. The importance of flexibility in innovation management is well-established in the literature (Evans 1991, Fredericks 2005). For example, Argyris (1999)

contends that learning processes require ongoing transformations and adaptations and can be facilitated greatly if an organization employs decentralized, flexible governance structures. Young-Ybarra & Wiersema (1999) argue that in the context of innovative partnerships strategic decisions often require continuous re-considerations and adjustments to respond to emerging changes in the project directions and timelines. Although the general idea and “grand” direction of the research are typically outlined at the outset, at each stage partners must be prepared to re-adjust plans based on the discoveries (or absence of such) of the earlier phases. In the face of uncertainties, greater flexibility in partnership management allows for smoother coordination and more efficient utilization of organizational resources. Administrative apparatuses that are too rigid, limit high-level creativity and do not allow for innovative spurs. Organizational flexibility leads to a more spontaneity and improvisations in what Aulakh & Madhok (2002) call “unsystematic and non-linear process of discovery”. It enables partners to position for a greater number of emerging strategic alternatives, mitigate unanticipated hazards, and capitalize on lucky chance of exploration into unknown.

Extant literature suggests that there is a concurrent quest for a strong administrative mechanisms and managerial flexibility in innovative activities (Kyriakopoulos & Moorman 2004, Lambe et al. 2009). In the context of a radical innovation partnership, the balanced combination of the two creates an environment conducive to innovation. Strategic flexibility enables more efficient integration and utilization of the diverse partner resources and enhances inter-firm learning, enabling a greater array of explorative strategies (Kandemir & Acur 2012). The partners continuously recalibrate the research directions and refocus resources through the successive stages of a project to maximize its innovative potential. The strong formal administrative structure provides the concentration of power and clarity of directions. It ensures that the newly created knowledge stocks are organized and incorporated into the fabric of the partnership smoothly and effectively.

2.2. Paradox of Alliance Resources: long-term resource commitment vs. timely termination of failing projects.

The major objective of radical innovation projects is to expand and deepen organizational knowledge to create game-changing products. This necessitates broad “probing” scientific research, resource-intensive and associated with high risks of failure (Lewis & Andriopoulos 2013). The more innovative technology is created in the partnership, the more new knowledge must be synthesized and more learning happen. Thus, radical innovation alliances are essentially long-term endeavors often with no immediate economic gains (Wu & Cavusgil 2006). Added to that, costs of projects performed across organizational borders are more difficult to control in comparison to those executed internally. Not surprisingly, the overall expenses of collaborative projects tend to be higher, than those for in-house developments (Bidault & Cummings 1994). To realize their value creation potential, radical innovation alliances require partners to prepare themselves to commit substantial resources with long-term outlook, in the absence of immediate returns and under the pressure of high uncertainties.

Firms possess limited organizational resources and have to allocate those to the most promising research projects. In case of radical innovation, identifying the “right” projects can become a daunting task. Clear performance metrics to estimate the future commercial potential of radical innovation are unavailable due to its great novelty (Shah & Swaminathan 2008). Since the market value of the research is uncertain, it is difficult to say whether the alliance performs satisfactorily. Prior studies have shown that as resources and efforts invested into research increase, partners may find it difficult to terminate unsuccessful projects because stakes are so high (Biyalogorsky et al. 2006). A “failure trap” - sunk costs of previous investments motivates partners to continue with their commitment even in the face of escalating losses. Managers engaged in the development of radical innovation often tend to

be emotionally involved with the projects, feel very enthusiastic about their brain-child and positively biased in their decision-making (Sandberg 2007, Schmidt & Calantone 1998). The consequences of such emotional commitment with failing “pet” ideas can be devastating: missed opportunities, unwarranted investments, and overall poor alliance performance. To avoid deadweight losses of over-commitment, partners in radical innovation alliance should be able to recognize and react promptly when the direction of the research should be changed and/or failing projects terminated.

In radical innovation partnerships, the long-term horizons of the research projects and substantial risky investments required necessitate that companies can afford the long-term resource commitment, while being able simultaneously to recognize and terminate unsuccessful projects early on. Any imbalance of the two would result in the waste of valuable resources and unsatisfactory radical innovation alliance performance.

2.3. Paradox of Alliance Processes: cooperative knowledge co-creation vs. proprietary knowledge protection

Radical innovation alliances are essentially learning ventures where the objective is novel knowledge creation (Zollo et al 2002). Partners creatively combine and synthesize distinctive competencies and skills to generate new insights and original knowledge resources. Extant literature suggests that the process of knowledge development in cooperative arrangements is shaped by the specific benefits, private and common, accrued to the partners (Khanna et al. 1998). Common benefits of a newly created knowledge are available to all partners and encourage cooperation. Private benefits accrue to one partner, when what was learned from others is applied to develop a competitive advantage outside the partnership, and intensify competition among partners.

Cooperation is a fundamental element of collaborative arrangements, necessitated by the mutual goals of value-maximizing partners. Collective economic rents exceed the gains

available to the partners, if pursued separately. In the radical innovation alliance, cooperation becomes especially important for several reasons. First, as the explicit objective of those partnerships is novel knowledge creation, learning processes run faster and more efficiently when diverse partners pool together their distinctive competencies and skills (Grant & Baden-Fuller 2002). Second, since the performance outcomes are much less certain, partnering helps firms secure their positions and warrant large investments cutting-edge research requires. Partners share risks and more willingly embark on ambitious projects that they would not dare to pursue individually. Cooperation promotes intense and comprehensive interactions among the partners. Higher frequency and quality of information exchanges positively affect the outcomes of innovative initiatives (Larson 1992) Firms are better positioned to access the original knowledge stocks of each other, faster and more efficiently, thus increasing the innovative potential of a radical innovation alliance. Close and frequent partner interactions stimulate a development of informal information exchange network to complement formal communication channels (Sivadas & Dwyer 2000). Informal communications not regulated by official protocols and guidelines enhance personal one-to-one interactions and facilitate the transfer of complex, rich and context-specific knowledge that is a critical element in radical innovation research (March 1991). This stimulates faster inter-partner-learning and speeds up the process of knowledge advancement.

Competition is an indispensable part of partnerships. Strategic partnerships can be seen as another form of competition because the goals and objectives of the partners are not entirely compatible (Ritala & Hurmelinna-Laukkanen 2012). Firms collaborating in one industry might remain direct competitors in other markets or become rivals in the future. Revealing the core competencies may result in asymmetrical inter-partner learning and an emergence of a stronger competitor. Knowledge-intensive partnerships are especially sensitive to the competitive tendencies (Ritala & Hurmelinna-Laukkanen 2012). The

dynamics of the radical innovation alliance are fluid and the outcomes are uncertain. The balance of mutual dependence among the partners can change dramatically at any moment. This motivates the firms to absorb strategic knowledge from each other as much and as fast as possible and, at the same time, limit the access to their own critical knowledge assets (Munksgaard et al. 2012). Hazards of knowledge spillovers, real or perceived, and fears of losing control over the proprietary information escalate inter-firm rivalry.

Co-existence of cooperative and competitive tendencies positively affects value creation potential of the radical innovation alliance. Without sufficient cooperation, a partnership cannot operate smoothly and efficiently. At the same time, an absolute cooperation can be disadvantageous. Fully cooperative partners have no incentives to increase their knowledge ahead of each other. Focused on the collective benefits, they tend to avoid conflicts and develop behavioral patterns similar to “group thinking” (Lado et al. 1997). Strong “group thinking” and limited diversity in perspectives dampen “out-of-the-box” creativity, slow down the pace of innovation and destroy its competitive potential because in the case of radical innovation, time to market plays a critical role. A moderate competition stimulates more rapid inter-partner learning (Bengtsson & Kock 2000), while cooperation motivates them for more proactive knowledge development, enhances joint rents, and boosts innovative potential of a partnership.

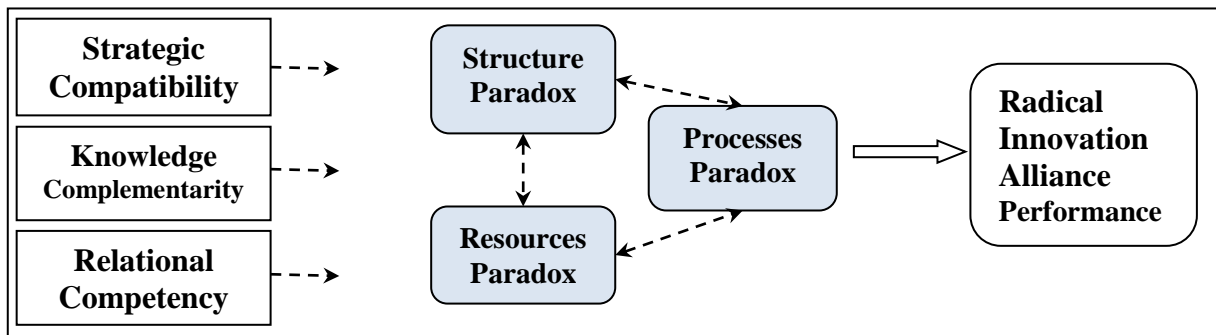
2.4. Cross-effects among the paradoxes

The pairs of the competing demands, tensions, shape the performance of a radical innovation partnership. Those tensions are dynamic and interactive, where the competing demands within one tension affect the demands within the other tensions. Prior studies have shown that partnerships successfully managing one pair of the competing demands might be better positioned to deal with the other tensions. Firms who acknowledge and exploit the competitive-cooperative tendencies in a partnership, develop a stronger capability for

flexibility in alliance management (Lado et al. 1997). Companies effectively blending managerial flexibility and a strong administrative controls in technology-intensive alliances enjoy a greater transparency and better control over information flows in a partnership (Sivadas & Dwyer 2000). Partners feel more confident about the intentions of each other, more willingly cooperate and readily invest in the relationship. Continuous investment flow ensures sufficient financing and allows for more flexibility in the directions of research, when responding to the unforeseen changes and hazards of experimentations (Bidault & Cummings 1994, March 1991). A greater transparency over the research stages promoted by the strong administrative system allows for a more accurate assessment of the performance and prompt withdrawal in the case of accumulating losses.

Proposition 1: *Performance of a radical innovation alliance is positively affected by the fulfillment of the competing demands of the alliance structure paradox, alliance resource paradox and alliance processes paradox.*

Figure 1 Partner Attributes and Radical Innovation Alliance' Paradoxes



3. Partner Attributes and Radical Innovation Alliance's Paradoxes

The complex interplay of the tensions shapes the performance of the radical innovation alliance. How well those tensions are addressed will depend on particular partner characteristics. Extant literature identifies three broad categories of partner attributes important for understanding the inter-organizational dynamics: strategy, resources, and relations-related partner attributes. Based on the literature review, strategic compatibility,

knowledge complementarity, and partner relational competency were identified as the most relevant in the context of innovative partnerships.

Partners are *strategically compatible* when they have corresponding motivations to enter a partnership and pursue noncompeting goals (Kale et al 2000).

Partners are said to have *complementary resource bases* when those resources collectively create a synergistic effect and generate greater rents than the sum of rents obtained by the firms if utilized individually (Quintana-Garcia & Benavides-Velasco 2004).

The relational competency reflects the ability of the partners to manage the relationship for mutual benefits on a long-term basis and is defined by the combination of trust, communication and coordination (Das & Teng 1999, Sivadas & Dwyer 2000). Trust reduces fear of partner opportunism and reinforces their cooperative intentions (Norman 2004).

Effective communication enables goal adjustment, task coordination, and inter-firm learning (Bstieler 2006, Lambe et al. 2009). Coordination facilitates a concerted execution of the agreed upon activities in accordance with the needs of the partnership (Gerwin 2004). How these partner attributes affect the dynamic tensions is discussed below. Analysis of the individual effects of the partner attributes on the paradoxes allows for better understanding of how the competing demands can be satisfied in the most effective way and the innovation potential of a partnership is enhanced.

3.1. Alliance Structure Paradox (strong formal administrative structure versus managerial flexibility)

The proposed partner attributes have a mixed effect on the “administrative structure” side in the alliance structure paradox. Partner strategic compatibility reduces the need for a tight administrative structure in the radical innovation partnership. At the outset of the partnership, strategic compatibility helps clarify the partner roles, align mutual expectations and speed up the development of the routines agreeable by all the participants. Non-

competing goals allow partners to approach the decisions about research strategies and alternative course of actions from the standpoint of mutual benefits (Gulati et al. 2012). If the partnership drifts into dysfunction, mutually beneficial objectives help re-evaluate why the relationship was formed in the first place and re-stabilize the partnership (Auklakh & Madhok 2002). Partners' knowledge complementarity poses a unique coordination challenge and intensifies the need for a strong administrative structure in a radical innovation alliance. Joining diverse knowledge resources, a prerequisite for explorative research, partners have to manage multiple unfamiliar streams of knowledge, a situation which often results in confusion, information overload and unclear direction of research activities (Ahuja & Lampert 2001). Too much diversity impedes effective inter-firm communications and escalate conflicts and instability in a partnership. All these factors motivate partners to employ more stringent controls over the alliance activities and develop a more tight administrative structure. Partner relational competency reduces the need for a tight administrative structure in a radical innovation partnership. Relational literature suggests that inter-partner trust often complement the formal administrative apparatus and reinforce its positive effect (Kale et al. 2000). Those informal control measures are often less costly and more effective, than formal governance structures (Norman 2004). Trust serves as a measure of social control restricting the partners from exploiting each other vulnerabilities and taking advantage if an opportunity to do so becomes available.

The "managerial flexibility" side of the alliance structure paradox is positively affected by all the partner attributes, though in different ways. Partners' strategic compatibility ensures a more symmetrical partner commitment and stimulates joint decision-making leading to higher common benefits (Auklakh & Madhok 2002, Fredericks 2005). Common goals facilitate the development of collective identity, lead to higher transparency and improve coordination potential in the partnership (Segrestin 2005). Because less

sophisticated formal control mechanisms are required, higher managerial and operational flexibility can be achieved. Knowledge resource complementarity provides for a greater flexibility in a radical innovation alliance by multiplying strategic options available. The variety of competencies and skills committed by the partners dramatically increases the number and the spectrum of the directions for explorative, “probing” research. Partners are able to promptly address unforeseen changes in the project plans and choose the most appropriate course of action. Relational competency also infuses more flexibility into the radical innovation alliance management by providing informal governance mechanisms like relational norms and informal codes of conduct. Those informal mechanisms allow for lower administrative and negotiation costs in the continuous and complex adaptations typical for radical innovation projects. The alliance partners are more responsive to and can seize a greater number of exploration opportunities.

Proposition 2: *The partner attributes have a mixed effect on the alliance structure paradox. The “administrative system” demand is positively affected by the partner strategic compatibility and relational competency and negatively affected by the knowledge complementarity. The “managerial flexibility” demand is positively affected by the strategic compatibility, knowledge complementarity, and relational competency.*

3.2. Alliance Resources Paradox (resource commitment versus timely termination)

The partner attributes have a mixed effect on the “resource commitment” side in the alliance resources paradox. Strategic compatibility motivates partners for long-term resource commitment. Partners with a mutual agreement on the strategic explorative orientation are more likely to sacrifice immediate short-term gains for achieving long-term goals and continue with substantial investments under uncertainty (McDermott & O’Connor 2002). In contrast, partner knowledge complementarity might escalate the resource demands in radical innovation partnership. The more diverse technologies are integrated in the alliance, the

broader spectrum of competencies and skills are required to handle them. A higher diversity of partner resources leads to higher developmental costs and greater need for investments. The relational competency positively affects resource commitment dynamics. Inter-partner trust and extensive open communications facilitate the emergence of the environment of mutual interdependence and reciprocity; partners are more motivated to continue investments even under high uncertainties. (Dyer & Singh 1998).

The “timely termination” side of the alliance resources paradox is positively affected by all the partner attributes. Strategic compatibility facilitates the processes of identification and termination of the failing projects. Partners with shared vision of the future are more likely to come to an agreement about appropriateness of the developments and promptly terminate questionable projects. Diverse complimentary knowledge resources committed by the partners ensure a broader vision of the future. This enables a more comprehensive interpretation of the discoveries and accurate evaluation of their commercial potential. With a better understanding of the future market potential value of research, the partners can more efficiently reallocate the resources across the projects and recognize unsuccessful ones early on. Relational competency enhances the quality of partner interactions and ensures more open and transparent information exchange (Bstieler 2006). It enables more comprehensive evaluation of the ongoing results of research, thus allowing for a shutdown of unsuccessful projects before serious losses are incurred.

Proposition 3: *Partner attributes have a mixed effect on the alliance resources paradox. The “resource commitment” demand is positively affected by the strategic compatibility and relational competency and negatively affected by the knowledge complementarity. The “timely termination” demand is positively affected by the strategic compatibility, knowledge complementarity, and relational competency.*

3.3. Alliance Processes Paradox (knowledge co-creation versus knowledge protection)

The “knowledge co-creation” side of the alliance processes paradox is positively affected by all the partner attributes. Strategic compatibility facilitates information exchange and knowledge co-creation among the partners. Strategically compatible partners have similar dominant logic and shared vision of the future. They have alike appreciations of the importance of the relationship, which minimizes risks of asymmetrical commitment. Asymmetry in commitment is problematic as it creates the situation of a hostage, where the fully committed partner contributes more and bears higher risks, than the partially engaged partner. Less openness and transparency in a “hostage” relationship erodes the co-learning potential of the partnership. Complementarity of partner knowledge bases constitutes the very foundation for knowledge co-creation in the RI alliance. A greater variety of partner knowledge allows for experimentations with a wider spectrum of technological domains (Gulati et al. 2012), resulting in greater informational advantage and strengthening partners’ capacity to generate radical innovation. Broad search generates synergistic learning effects and produces original knowledge stocks (Rindfleisch & Moorman 2001). Radical innovation often relies on integration of highly diverse and previously unrelated technologies. Over time, a single firm can accumulate a required highly diversified knowledge base. However, to generate a novel insight the firm needs the appropriate integration mechanisms to process existing knowledge stocks (Grant & Baden-Fuller 2002). Greater variety of knowledge requires a more diverse integration mechanisms. A single firm is limited in its ability to handle multiple integration mechanisms and collaborative relationships provide an advantage of more effective cross-disciplinary knowledge integration. Thus, cooperative knowledge development in a radical innovation alliance is enhanced not only by diverse and complementary knowledge bases of partners, but by a greater variety of knowledge integration mechanisms, as well. The relational competency is also conducive to cooperative knowledge development. Organizational knowledge is characterized by the two components:

explicit knowledge and tacit knowledge (March 1991). Explicit knowledge is systematized and codified and communicated via firm guidelines, and manuals. Tacit knowledge is personal and context specific and typically communicated in one-to-one interactions. Most scientific discoveries and technological breakthroughs are not codified and rely heavily on tacit knowledge (March 1991). The relational competency facilitates open communication and private information exchanges that make tacit knowledge transfer more efficient. Trust stimulates intense interactions as firms exhibit more willingness to share with trustworthy partners (Norman 2004). Free and rich communications and coordination enable more transparent and comprehensive information exchange across organizational boundaries. It helps minimize risks of knowledge gaps and neglecting unfamiliar and seemingly unimportant information, avoiding unnecessary repetition of what was developed by other others (Rindfleisch & Moorman 2001).

The partner attributes have a mixed effect on the “knowledge protection” side of the alliance processes paradox. Strategic alignment does not eliminate the grounds for learning competition as the partners might well remain competitors outside the partnership. Yet, it increases potential common benefits available to the partners, thus preventing inter-partner competition from “going wild” and transforming into a hostile rivalry. In contrast, complementarity of partner knowledge resources can potentially stimulate the learning race. Before the partners are able to integrate their diverse competencies and expertise, they need to learn this variety first (Khanna et al. 1998). The partners initially acquire knowledge from each other and only then process, synthesize, and create novel insights. As no one wants to be a laggard in this competition, a learning race is intensified. Partners’ relational competency can reduce the need for strategic knowledge protection. Through continuous adaptation and reciprocal adjustment to each other’s needs, the firms signal their reliability and integrity that

help stabilize learning race and achieve “positive balance in trade of knowledge” (Grant & Baden-Fuller 1998, Kale et al. 2000).

Proposition 4: *The partner attributes have a mixed effect on the alliance processes paradox.*

The “knowledge co-creation” demand is positively affected by the partner strategic compatibility, relational competency, and knowledge complementarity. The “knowledge protection” demand is positively affected by knowledge complementarity and negatively affected by strategic compatibility and relational competency.

4. Implications and conclusions

The paper explores the phenomenon of a radical innovation alliance. The proposed contributions are twofold. First, radical innovation is a topic of great importance to academia and practitioners which lacks conceptual frameworks (Schoenmakers & Duyster 2010). Second, the paper considers radical innovation specifically in the context of strategic collaborations increasingly used by firms to address their innovation objectives. A new conceptualization of a radical innovation alliance is proposed. Extant literature suggests that inter-organizational relationships can be driven by the coopetition paradox - competitive and cooperative tendencies among the partners. This paper extends the paradox perspective by arguing that radical innovation partnerships feature multiple competing demands forming the alliance structure paradox, the alliance resources paradox, and the alliance processes paradox. The identified paradoxes not only coexist, they interact and reinforce the effects of each other. The competing demands form the unity of the phenomenon of the radical innovation alliance and ultimately affect alliance performance. Recognizing and managing paradoxes, rather than resolving them is vital to alliance success. This is in line with March (1991) who states that alliances are adaptive systems balancing the multiple demands across different domains and over time. **The particular partner attributes - strategic compatibility, knowledge complementarity and relational competence are linked to the alliance paradoxes.** Remarkably,

the partner attributes affect both sides of the paradoxes. The contribution of each attribute to the particular demand is specific and differentiated. The competing demands can be satisfied through multiple routes. At the same time, because the demands are affected by all the attributes simultaneously, only the balanced combination of those attributes is beneficial and conducive to the ultimate success of an alliance. **Deficiency in any partner attribute leads to imbalances across the paradoxes, resulting in less than optimal performance.** The variance in partner attributes across organizations and the fact that each demand within the radical innovation alliance is affected by multiple attributes, positively or negatively, might help explain differences in the performance of radical innovation partnerships.

This model offers some insights for managers. First, managers should approach the task of radical innovation alliance formation and management from a dynamic perspective. Those collaborations represent composites of multiple competing demands that need to be balanced and sustained over time to ensure the success of a partnership. Second, when considering potential allies, firms need to recognize the value and the particular effects of the specific partner attributes on the alliance dynamics. The model suggests that the radical innovation alliance demands can be satisfied via multiple routes: strategic alignment, knowledge complementarity and relational competency. The differential effect of the partner attributes on the radical innovation alliance performance depends on how well those attributes satisfy particular alliance demands, concurrent and competing. Managers need to implement the whole arsenal of tools available to them to leverage the full potential of the alliance.

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