THE EFFECTS OF SCIENCE BASED VERSUS MARKET BASED PARTNERS ON DIFFERENT TYPES OF INNOVATION PERFORMANCE

ÜNİVERSİTE VEYA PAZAR ODAKLı İŞBİRLİKLERİNİN İNOVASYON TÜRLERİ ÜZERİNE ETKİLERİ

Res. Assist. Dr. Ebru ÖZTÜRK

Gaziosmanpaşa University Faculty of Economics and Administrative Sciences Department of Business

Abstract

Accessing external knowledge is beneficial for firms’ innovation performance. External knowledge brings novelty and diversity to the firm which is less likely to be accessed internally. Therefore, firms interact with different partners inside the innovation process, such as customers, competitors, suppliers and universities. These partners can be classified as science-based and market-based partners. Science-based ones are associated with universities and research institutes whereas market-based partners are linked to customers and suppliers. These two partners become essential for firms in terms of accessing different kinds of knowledge. In particular, these partners are important for producing different kinds of innovation whether it is radical or incremental. Radical innovation requires to access novel and basic knowledge while incremental innovation requires to access market and applied knowledge since it improves and extends existing knowledge. Although previous studies have investigated the relationship between partner types and innovation performance, there is inconsistency in the literature explaining the impact of different partner types on different types of innovation performance. Hence, this study reviews the literature by discussing the characteristics of science-based and market-based partners and their effects on different types of innovation performance, such as radical and incremental. In doing so, this paper suggests two propositions that need to be further investigated by future studies. First proposition suggests that there is a link between science-based partners and radical innovation whereas second proposition suggests that there is a link between market-based partners and incremental innovation.

Keywords: Science-Based Partners, Market-Based Partners, Innovation Types, Radical Innovation, Incremental Innovation

Öz

Dış bilgiye (external knowledge) ulaşma firmaların inovasyon performansları
Ebru ÖZTÜRK


Anahtar Kelimeler: Üniversite Odaklı İşbirlikleri, Pazar Odaklı İşbirlikleri, İnovasyon Türleri, Yeni İnovasyon, İyileştirilmiş İnovasyon

1. INTRODUCTION

The benefits of external knowledge have been highlighted in the innovation literature (Chesbrough, 2003: 43; Laursen and Salter, 2006: 132). Firms interact with partners to gain access to complementary resources and capabilities, improve market access and spread the risks and costs of new developments (Powell, Koput and Smith-Doerr, 1996: 117; Hagedoorn, 2002: 478). External partners, such as suppliers, competitors and customers are of particular importance for the innovation system because they provide a wide range of resources that firms are less likely to access internally (von Hippel, 1998). Investigating how firms benefit from such partners has been a burgeoning topic. Previous studies have examined the impact of different partner types on innovation performance (Miotti and Sachwald, 2003: 1484; Faems, Van Looy and Debbckere, 2005: 241; Nieto and Santamaria, 2007: 369; Un, Cuervo-Cazurra and Asakawa, 2010: 675; Ozer and Zhang, 2015: 1107). However, they have provided conflicting findings and thus there is no consensus regarding their effects on innovation.

Existing studies have suggested that collaborations with customers result in incremental innovations (Faems et al., 2005: 241). Since customers’ needs are limited to familiar products within their bounded context, they cannot see the world through the world of technologists (Lukas and Ferrell, 2000: 240). Firms that listen to carefully their customers are hence less likely to launch radical products (Tether, 2002: 951; Chatterji and Fabrizio, 2014: 1432). Regarding the effects of suppliers on innovation, previous studies have suggested that suppliers enable firms to produce incremental innovations (Faems et al., 2005: 241; Song and Thieme, 2009). Suppliers can enable firms to access existing and relatively standardized resources to ascertain potential areas of improvement in existing products. On the other hand, suppliers are also linked to the production of radical pro-
ducts (Li and Vanhaverbeke, 2009: 845; Un and Asakawa, 2015: 144). In addition, existing studies have found conflicting results on the impact of scientific partners on innovation performance. Some have argued that collaborations with universities and research institutes result in improvements (Cohen et al., 2002: 21). In contrast, others have suggested that they can provide radical changes in products (Faems et al., 2005: 241; Todtling et al., 2009: 66). Compared its positive effects, there are studies that found negative effects of science related collaborations on innovation performance (Miotti and Sachwald, 2003: 1496; Colombo et al., 2009: 350).

These results suggest that there are inconsistencies in terms of explaining the effects of different kinds of partners on different types of innovation performance. Therefore, it is of importance that future studies should further investigate this issue. Following prior studies (Faems et al., 2005: 239; Du, Leten and Vanhaverbeke, 2014: 829; Vanhaverbeke, Du, Leten and Aalders, 2014: 123; Gesing, Antons, Piening, Rese and Salge, 2015: 425) this paper classifies partners as science-based and market-based and discusses the effects of such partners on radical and incremental innovation performance. This study puts forward the expected propositions regarding the effects of partner types on radical and incremental innovation. In doing so it opens up the research question to be investigated by future studies. This paper is structured as follows. Firstly, the characteristics of science-based and market-based partners are discussed. Then, different types of innovations such as radical and incremental innovation are explained. Then, the expected propositions are suggested. The paper is finalized with a discussion section.

2. LITERATURE

2.1. Different Types of Partners

An increasing number of firms are interacting with different partners to tap into external knowledge outside the firm. Different partners play different roles in complementing a firm’s own resources and capabilities, related to potentially different goals of collaborations (Ahuja, 2000: 427; Baum, Calabrese and Silverman, 2000: 268; Faems et al., 2005: 241; Belderbos, Carree and Lokshin, 2006: 402; Belderbos, Gilsing and Lokshin, 2012: 1813). In line with this argument, each partner differs significantly in the type of knowledge they can provide (Danneels, 2002: 1096; Rothaermel and Deeds, 2004; Faems et al., 2005: 241; Du et al., 2014: 829). Therefore, firms engage with external partners, such as suppliers, customers, competitors and universities for different reasons and aims. Existing studies have distinguished different partners, such as vertical and horizontal collaborations (Belderbos et al., 2012: 1813), upstream and downstream collaborations (Hess and Rothaermel, 2011: 897; Un and Asakawa, 2015: 142) and science-based and market-based collaborations (e.g., Du et al., 2014: 829; Gesing et al., 2015: 425). Following prior literature (Danneels, 2002; Faems et al., 2005: 241; Du et al., 2014: 829; Vanhaverbeke et al., 2014: 123; Gesing et al., 2015: 425), this paper distinguishes between two types of partners. They are science-based partners and market-based partners.

2.2. Science-Based Partners

Science-based partners are linked to collaborations with universities and research institutes (Baum et al., 2000: 269; Du et al., 2014: 829; Vanhaverbeke et al., 2014: 123; Gesing et al., 2015: 425). Firms collaborate with science-based partners because they gain access not only to tacit scientific knowledge (Cockburn and Henderson, 1998: 158) but also to (unpublished) codified knowledge, enabling them to quickly build on the latest research findings (Fabrizio, 2009: 258). This type of partnership is often focused on generating knowledge that is more basic and less applied
in nature (Rothaermel and Deeds, 2006: 435; Alcacer and Chung, 2007: 761; Un and Asakawa, 2015: 144). The knowledge they produced may be far from application and typically requires substantial investments into developing the final products. Universities and research institutes are important contributors to the supply of new scientific and technological knowledge (Nelson, 1993; Tether, 2002: 952; Audretsch et al., 2005: 1115; Tsai, 2009: 766). Firms rely on science-based collaborations to tap into the early stage research (Hess and Rothaermel, 2011: 897). University scientists have relatively more freedom to choose their own research agenda therefore they are more likely to develop foresights on the emerging fields (Jiang et al., 2010: 60). These partners are exploratory in nature because they enable firms to tap academic experts and enhance the technological vitality of the firm’s projects (Lavie and Drori, 2012: 707). These collaboration partners are linked to firms’ upstream activities (Vanhaverbeke et al., 2014: 123). They are seen as instrumental in creating new competencies and producing novelty in their innovative outcomes. This is also explained in the alliances literature arguing that upstream alliances are associated with the motivation to discover something new and so with exploratory activities (Rothaermel, 2001: 1237; Rothaermel and Deeds, 2004: 204).

Since science-based partners involve basic research, the production process has quite a long time frame. They are likely to result in performance improvements only in the long term (Rothaermel and Deeds, 2004: 204; Knudsen, 2007: 120; Nieto and Santamaria, 2010: 48). Colombo et al. (2009) argue that the involvement of research organizations as partners in international R&D alliances have no short-term positive effects on new technology-based firms performance. Assessing the full value of the often tacit and casually ambiguous knowledge may only be possible through joint research activities in which university and firm scientists develop a mutual understanding and language in practice over time (Kohler, Sofka and Grimpe, 2012: 1346). This requires long-term interactions with these types of partners (Knudsen, 2007: 120). The results are not certain and perhaps not even possible to produce regardless of how much effort or resources are devoted to this purpose. These partners are hence generally characterized by high uncertainty and frequent failure (Colombo et al., 2009: 350; Gesing et al., 2015: 428). Making specialized investments in the face of uncertainty also increase the risks and costs related to science-based partners. This uncertainty can also be caused by operating in industry contexts that are different from that of the focal firm (Un and Asakawa, 2015: 144). These institutions would require an extensive amount of time and resources since the difference between profit and nonprofit institutions tend to be fundamental (Rothaermel and Deeds, 2006: 435). Overall, science-based partners are characterized with basic and exploratory knowledge, high uncertainty and long-term effects.

2.3. Market-Based Partners

Market-based partners are associated with establishing collaborations with customers and suppliers. They provide a close link to markets (Danneels, 2002: 1096; Du et al., 2014: 830; Gesing et al., 2015: 427). When firms collaborate with market-based partners, they can gain access to knowledge that is fundamentally different from the knowledge developed by researchers within firms. This interaction enables firms to access first-hand knowledge on market needs (Luca and Authane-Gima, 2007: 97; Du et al., 2014: 830). Listening to customers helps firms to better understand their needs and unfulfilled preferences, more so than a firm’s own manufacturing operations. They uncover problems related to products and suggest solutions and improvements for the products. Moreover, customers can play an important role in recommending products to others. This leads to higher sales volume of existing products but not necessarily the development of innovations. They provide the focal firm with a bet-
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In addition to customers, suppliers also enable firms to improve the product development process. In particular, firms achieve efficiency and product quality targets, because suppliers are typically selected based on their contributions to these targets. Thus, closely partnering with suppliers can enhance firms’ input quality improvements aimed at further cost reductions (Johnsen, 2009: 188).

Market-based partners provide knowledge similar to the firm’s existing knowledge and capabilities. In particular, suppliers often have similar objectives and working procedures as industrial firms. Both share the goal to serve the end market and make profits in the marketplace (Du et al., 2014: 830). Suppliers operate in industry contexts that are relatively similar or close to the industry context of operations of the focal firm (Un et al., 2010: 679; Un and Asakawa, 2015: 145). They are hence likely to have a common share and understanding. The combination of complementary capabilities and common goals between the firm and supplier leads firms to access similar knowledge to their existing ones.

Market-based partners are more likely to provide complementary knowledge for commercialization purposes rather than scientific discoveries (Rothaermel and Deeds, 2006: 435; Colombo et al., 2009: 350; Lavie and Dori, 2012: 707). In particular, they are often focused on generating knowledge that is less basic and more applied in nature (Alcacer and Chung, 2007: 761; Gesing et al., 2015: 427). Faems et al. (2005: 241) link these collaboration partners to exploitative collaborations suggesting the focus on complementarities between technologies and products already present. Vanhaverbeke et al. (2014: 123) link market-based collaborations to downstream activities of firms. This is also explained in the alliances literature which argues that downstream alliances are characterized by the union of complementary assets and exploitation activities (Rothaermel, 2001: 690; Rothaermel and Deeds, 2004: 202). This type of activity enables firms to commercialize the knowledge gained through exploration. Particularly, due to their profit motive, this type of partnership is more related to development and commercial interests (Alcacer and Chung, 2007: 761).

In addition, market-based partners are associated with the low level of uncertainty and lower risk (Gesing et al., 2015: 427). Uncertainty is reduced when the product is ready to enter development and commercialization stage. These partners are mainly directed at improving and complementing existing products incrementally. Therefore, they generate short and mid-term revenues and certain profitability (Knudsen, 2007: 120). Overall, market-based partners are characterized with applied knowledge, low uncertainty and short-term effects.

2.4. Different Types of Innovation Performance

Each type of partner differs in the kind of knowledge they provide. Such partners are important particularly for different kinds of innovations since firms rely on specific knowledge types when they prefer to produce different degree of novelty in their products (Lane, Koka and Pathak, 2006: 846; Todtling, Lehner and Kaufmann, 2009: 62; Kohler et al., 2012: 1345). Innovative products are associated with different degrees of novelty. According to the extent and magnitude of the novelty of innovation, radical innovation and incremental innovation are two important types of innovations (e.g., Ettlie, Bridges and O’Keefe, 1984: 683; Abernathy and Clark, 1985: 5; Dewar and Dutton, 1986: 1424; Damanpour, 1996: 694).

2.5. Radical Innovation

Radical innovation is a shift to a different knowledge domain with the aim to adopt
or create new processes and products (Benner and Tushman, 2002: 679). This type of innovation is likely to depart from existing knowledge and make prior competences obsolete (March, 1991: 72; Levinthal and March, 1993: 97; Benner and Tushman, 2003: 243). It changes the technology of process or product in a way that imposes requirements that the existing resources, skills and knowledge satisfy poorly or not at all. The effect is thus to reduce the value of existing competence and produce new and novel products to market segments (Atuahene-Gima, 2005: 63). This type of innovation is associated with distant search, increased-variance, experimentation, divergent thinking and flexibility (Smith and Tushman, 2002: 523). Tushman and Smith (2002) describe radical innovations as explorative since exploration activities include “things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation” (March, 1991: 71). For this type of innovation, firms tend to search for novel knowledge and skills. Radical innovations require access to and absorption of new insights and knowledge at a larger cognitive distance (Nooteboom, Vanhaverbeke, Duysters, Gilsing and Oord, 2007: 1018).

Radical innovations are riskier, slower and more costly to produce (Damanpour, 1996: 694). They are hence uncertain in their payoffs and their performance effects usually occur in the long run. They require commitment of more resources including financial ones (Bierly, Damanpour and Santoro, 2009: 488). Radical innovations are uncontrollable by its nature and therefore require non-routine problem solving activities. Thus, the greater control and managerial efficiency may not be useful for this innovation type (Bierly et al., 2009: 488). Overall, radical innovation is not about efficiency of current activities, but rather forms an uncertain process that deals with the search for new opportunities (Rowley et al., 2000: 374). In order to develop radical innovations, firms first need to generate disruptive ideas and knowledge that will create real opportunities. If firms gain access to overlapping knowledge, they are less likely to generate breakthrough ideas and more likely to extend their existing knowledge. Therefore;

Proposition 1: Science-based partners are expected to positively influence radical innovation performance rather than market-based partners.

2.6. Incremental Innovation

Incremental innovation is a focus on the firm’s existing knowledge base to improve its existing processes and products (Benner and Tushman, 2002: 679). This type of innovation is not about producing new products or technologies, it is about refining a firm’s existing products and improving its processes (Jansen, Van Den Bosch and Volberda, 2006: 1662; Greve, 2007: 947). It thus refers to minor changes in the existing products or services (Dewar and Dutton, 1986: 1423; Henderson and Clark, 1990: 9). It does not require a radical departure from the established norms and routines since it does not disrupt an existing technological trajectory (Henderson and Clark, 1990). This type of innovation is associated with local search, decreased-variance, efficiency, convergent thinking and focus (Smith and Tushman, 2005: 523). In addition, Tushman and Smith (2002) describe incremental innovations as exploitative since exploitation activities include “such things as refinement, choice, production, efficiency, selection, implementation, execution” (March, 1991: 71). Firms that are aiming at producing products or services new to the firm are likely to search more local and neighbourhood information (Benner and Tushman, 2003: 243; Sidhu, Commandeur and Volberda, 2007: 23). This form of innovation entails fine-tuning an existing product, process, or service for which a dominant design has already emerged and the market for the innovation expands.

Since firms are engaged in refinement, efficiency and implementation (March, 1991: 72), incremental innovations are quicker and less costly to produce (Damanpour, 1996:
Incremental innovations are limited in scope and newness and therefore generate less uncertainty. Their results can be obtained in the short term and often positive (March, 1991: 72). They are controllable by its nature like a problem-solving process (Greve, 2007: 947). In other words, they are monitored by formalized coordinating and control mechanisms (Bierly et al., 2009: 488). Overall, incremental innovations concern the knowledge application rather than knowledge creation. For that reason, firms do not look for novelty while searching for the knowledge. They look for more general information rather than specialized knowledge (Grant and Baden-Fuller, 2004: 66; Laursen and Salter, 2006: 137). That is, this type of innovation does not require knowledge at a larger cognitive distance. Otherwise, extending variety and novelty of knowledge sources firms access can create cognitive distance which cause uncertainty and complexity. This distance can be undesirable for firms trying to make minor adaptations (Nooteboom et al., 2007: 1019). Therefore,

Proposition 2: Market-based partners are expected to positively influence incremental innovation performance rather than science-based partners.

3. DISCUSSION

This paper discusses the relationship between science-based and market-based partners and different types of innovation performance. Clearly, different partner types are important for firms because each partner enables them to access different types of knowledge and therefore produce different degree of novelty in their products. Existing studies have investigated the effects of partner types on innovation performance but produced contradicting results (Faems et al., 2005: 240; Todtling et al., 2009: 62; Li and Vanhaverbeke, 2009: 845; Colombo et al., 2009: 347). Therefore, it is important to further investigate such issue. This study extends existing studies by suggesting that future studies should classify different partners into groups. This study has thus specified different partners as science-based and market-based ones and examined their effects on types of innovation performance - radical and incremental innovation.

Such examination has implications at the theoretical and managerial level. This research advances the understanding of open innovation and interorganizational collaboration literatures by suggesting that a contingency approach is important for investigating the effects of partners on innovation performance (Huizing, 2011: 5; West and Bogers, 2014: 828). That is, this study suggests that it is important to investigate partners as market-based and science-based because each provides different resources and knowledge. In doing so, this study follows previous studies which have also leveraged such classification (Faems et al. 2005: 241; Du et al. 2014: 829; Gesing et al. 2015: 425). This paper also provides insights into the management of firms. This research suggests that managers should know that not all partner types have the same influence on innovation performance. That is, market-based and science-based partners contribute to different types of such performance. In addition, managers should know that they need certain capabilities and resources to benefit from such partners. Science-based partners are associated with scientific and basic knowledge which is provided by universities and research institutes. Market-based partners are associated with applied knowledge which is provided by customers and suppliers. This study hence suggests that science-based partners positively influence radical innovation rather than incremental innovation because such partners provide novel knowledge which is essential for producing radical innovative products. On the other hand, it suggests that market-based partners positively affect incremental innova-
tion rather than radical innovation because such partners enable firms to improve their existing knowledge/products. Overall, this paper proposes two propositions that serve as useful guides for future research, especially empirical tests. Future studies should help understand to what extent science-based and market based partners influence radical and incremental innovations.

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