



Science-to-Business collaborations: A science-to-business marketing perspective on scientific knowledge commercialization

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ABSTRACT

Exchange between science and industry is a prerequisite for innovation (Kaufmann & Tödting, 2001; Pittaway, Robertson, Munir, Denyer & Neely, 2004) and has attracted considerable interest to the role of relationships and interactions in the process of bringing ideas to the market and commercializing knowledge (Pittaway et al., 2004; Porter & Ketels, 2003; Story, Hart & O'Malley, 2009). Despite enormous government financing, artificially supporting the development of such collaborative partnerships has proved difficult. This study extends industrial marketing's B-2-B model by looking at public sector participants in collaborations in order to examine the process of establishing scientific–knowledge–commercialization collaborations. It is based on 82 interviews in 17 collaborative–research projects in both Ireland and Germany. The findings suggest that retention is a catalyst for improving established collaborations to facilitate the commercialization of scientific knowledge through repeated projects. Retention results from loyal collaborators. Collaborators become loyal and committed because they are content with the overall relationship, commercialization service and quality. It is fundamental that all collaborators understand each other's roles and motive as incongruities hamper the development of productive collaborations. In addition, universities need to develop a greater appreciation of the role of satisfaction. Overall, the study shows the importance of repeat collaborations and the development of mutual benefits which facilitate scientific knowledge commercialization. The study also demonstrates how contextual differences impact on scientific knowledge commercialization in both Ireland and Germany.

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1. Introduction

It is widely recognized that knowledge is central to economic development. Universities play an amplified role in expanding knowledge economies (Etzkowitz, Webster, Gebhardt, & Terra, 2000, Porter & Van Opstal, 2001, von Hippel, 1988) by becoming actively involved in commercializing scientific knowledge (Clark, 1998, Etzkowitz, 2001, Etzkowitz, Webster, & Healey, 1998, Etzkowitz et al., 2000). Scientific knowledge can be transferred to the market in different ways: (a) education and training; (b) contract research; (c) industrial consultancy; (d) licensing; (e) spin-off companies; (f) spin-off joint ventures; and (g) collaborative research (Cripps, Yencken, Coghlan, Anderson, & Spiller, 1999 p11). On the one hand, governments and policy-makers seek direct returns from investment in third-level research by prioritizing licensing (Lambert, 2003) and spin-out activity (Bray & Lee, 2000, Jensen & Thursby, 2001). On the other hand, industry partners and academics see collaborative research and other forms of industry engagement as more essential (Cohen, Nelson, & Walsh, 2002, D'Este & Patel, 2007, Faulkner & Senker, 1994,

Perkmann and Walsh, 2009). Mowery and Sampat (2006) report that industrial R&D managers attach very little importance to measurable performance-metrics, such as licensing and patents. They describe the “economically important ‘outputs’ of university research” (ibid p212) as soft outputs, those outputs being: (a) scientific and technological information that improves industry R&D efficiency; (b) the use of equipment and instruments by industry; (c) skills or human capital of students and researchers; and (d) collaborations of scientific and technological competences for the diffusion of new knowledge. “[A]cademic research rarely produces ‘prototypes’ of inventions for development and commercialization by industry – instead, academic research informs methods and disciplines employed by firms in their R&D facilities” (Mowery & Sampat, 2006 p 224). Collaborative research refers to projects where universities and businesses work together on shared problems (Martinelli, Meyer, & von Tunzelmann, 2008). Collaborations can be defined as “all forms of agreements between firms, universities, and research institutes whereby two or more organizations share the commitment to research a common goal by pooling their resources and co-ordinating their activities” (European Commission, 2002 p15). As collaborations and, above all, strong prior relationships between organizations impact on the successful transfer of knowledge (Harmon et al., 1997, Kaufmann & Tödting, 2001), it is important to study Science-to-Business (S-2-B) interaction for scientific knowledge commercialization.

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Relationships and interactions have enjoyed increased acknowledgement in marketing literature. Business-to-Business (B-2-B) marketing is concerned with the mutual benefit that all participants gain by being in a long-term relationship and collaborations. The B-2-B literature emphasizes the prominence of interactions in facilitating shared R&D goals (Håkansson 1982, Möller & Svahn, 2003). To date research has primarily focused on business relationships within private industry (Dwyer, Schurr, & Oh, 1987, Håkansson 1982, Möller & Svahn, 2003). While acknowledging the role of science partners, most studies focus on B-2-B collaborations and networks (Pittaway et al., 2004) and only look at the benefits for firms. In so doing, current research ignores other collaborators such as public sector participants (Plewa & Quester, 2008, Rampersad, Quester, & Troshani, 2010). Thus theoretical insights in B-2-B marketing theory have been driven by the private sector research perspective. Additionally, as previous research has focused on the firm, the mutual benefits that relationships with other parties in collaborative partnerships deliver have been ignored. Similarly, individual benefits for other participants, such as benefits for a university, have also been ignored. By researching collaborations that incorporate the public sector in the form of universities (i.e. S-2-B collaborations), this study therefore addresses a literature gap that is relevant to industrial-marketing researchers.

The majority of the B-2-B literature has focused on existing collaborations and networks. There is little research on the establishment of collaborations or management of emerging collaborative networks (Möller & Svahn, 2003, 2009). Thus, studying how and by whom such S-2-B collaborations are established offers interesting insights that current research has not yet addressed. As the motives to partner with universities have mainly been researched from an industry perspective, this study looks at these issues from the perspective of all collaborating partners on a project including: (a) university researchers (Principal Investigators (PIs)); (b) industry partners; (c) Technology Transfer Office (TTO) managers; (d) government agents; and (e) commercialization or center managers. It addresses the gaps identified in B-2-B marketing literature and to respond to the calls for research on: (1) the process of establishing collaborations in a S-2-B environment; and (2) mutual benefits of such collaborations. In achieving this aim, the study also responds to the call to study multi-party relationships (Plewa & Quester, 2008, Rampersad et al., 2010).

B-2-B marketing is concerned with relationship building and management and has previously radicalized success within several industry sectors. B-2-B marketing theory also offers a useful theoretical framework for the analysis of S-2-B relationships in the public sector context. Due to its applied nature it has the potential to offer practical advice for universities and industry. Accordingly, this study puts forward a theoretical framework to examine the establishment of S-2-B collaborations. In particular, this study examines:

- (a) Who is involved in the process of establishing collaborations in a S-2-B environment?
- (b) How can B-2-B marketing help to explain the establishment of collaborations in a S-2-B context?
- (c) What are the benefits of collaborations for S-2-B scientific knowledge commercialization?

The paper is structured as follows. In the next section industrial marketing is reviewed, focusing on aspects relevant in a S-2-B environment. Section 3, outlines the research methodology which is followed by an overview of the contextual background. Section 5 presents the findings under the following headings: (1) the actors involved in the establishment of collaborations; (2) the application of B-2-B marketing in a S-2-B environment; and (3) the benefits of collaborations for S-2-B scientific knowledge commercialization. The final section discusses the key findings and presents contextual and managerial implications.

2. Theoretical framework

The study builds on several industrial marketing streams which stress the value of collaborations. Relational exchange theory builds upon relational interdependence. It states that, contrary to discrete transactions, relational exchanges develop over time, use formal and informal communication and give rise to personal, noneconomic satisfaction (Dwyer et al., 1987). B-2-B relational exchange “is motivated by the mutual recognition of the parties to the exchange that the outcomes of such exceed those that could be gained from...exchange with a different partner” (Lambe, Wittmann, & Spekman, 2001 p12). Mutual investments are made as a result of satisfactory relationships (Rao & Perry, 2002, Turnbull, Ford, & Cunningham, 1996, Wilson, 1995). These investments in relationships will create social bonds (trust, commitment, interdependence) or structural bonds (information and resource sharing, pooled knowledge, contractual arrangements and joint investments). These bonds, in turn, will strengthen the relationship further and are more complicated to terminate. The core domain for relational exchange success is, therefore, the relationship. These relationships are strategic and organizations form relationships in order to achieve goals (Wilson, 1995).

Commitment-trust theory (Hennig-Thurau, Gwinner, & Gremler, 2002, Moorman, Deshpandé, & Zaltman, 1993, Moorman, Zaltman, & Deshpande, 1992, Morgan & Hunt, 1994, Pritchard, Havitz, & Howard, 1999) builds on social-exchange theory and postulates that commitment and trust are the most important aspects for understanding relationship performance and success. In B-2-B markets, satisfaction is defined as a positive affective condition which does not emerge by virtue of single transactions but rather through business relationships (Werani, 2004). This condition is based on the evaluation of all aspects of a business relationship and embraces economic and psychosocial perspectives of satisfaction. Economic satisfaction shows the extent to which economic expectations in relation to business relationships are met. Psychosocial satisfaction concerns positively assessed relational aspects, such as reciprocal support, mutual appreciation or amicable relations. Similarly, the interaction approach accentuates the salience of previous purchases and mutual evaluation in order to establish satisfying exchange relations (Håkansson 1982). It builds on the idea that the nature of the relationship between two entities may not merely be built up during the course of a single major transaction, but rather through an interaction process within a certain environment. The reoccurring transactions modify the overall nature of the relationship Table (2–3).

Research by the Industrial Marketing and Purchasing (IMP) group argues that greater attention must be paid to the embedded context and environment in which relationships occur (Anderson, Håkansson, & Johanson, 1994) and that no relationship can be understood without looking at the wider environment (Håkansson & Ford, 2002). These relationships and recourses should be pooled and expanded in order to create chances for innovation and gains (ibid.). Knowledge based organizations need to openly engage with their environment in order to facilitate the knowledge creation process.

The rationale behind industrial marketing can be applied to scientific knowledge commercialization as participating partners form relationships in order to achieve the mutual goal of transferring and exploiting scientific knowledge. Inherent in this mutual goal is the fact that both parties will make investments in the relationship. These investments will create the above-mentioned social bonds of trust, commitment, interdependence or structural bonds in the form of information and resource sharing, pooled scientific knowledge, contractual arrangements, joint investments in equipment and machinery. These social and structural bonds in turn will strengthen the relationship further and produces satisfaction with the collaboration.

A study by Becerra, Lunnan, and Huemer (2008) shows that high trustworthiness assists the transfer of tacit knowledge. Thus, trust influencing factors in scientific knowledge commercialization could

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