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Trust, partner selection and innovation outcome in collaborative New Product Development

Raluca Bunduchi

University of Aberdeen Business School, University of Aberdeen, Aberdeen, Scotland, UK

University of Aberdeen Business School, Edward Wright Building, Dunbar Street, Aberdeen, Ab24 3QY, Tel: 0044 (0)122427 3318; fax: 0044 (0)122427 2128 e-mail: r.bunduchi@abdn.ac.uk

Raluca Bunduchi is Lecturer in Management at the University of Aberdeen Business School in Scotland, UK. Her research focuses on exploring the competencies and activities involved in new product development, in particular the management of inter-organisational relationships involved in collaborative development, and the adoption and diffusion of new technologies in inter-organisational settings. Her recent work is published in *International Journal of Operations and Production Management*, *International Journal of Management Reviews*, *Technovation* and *Industrial Marketing Management*.

Trust, partner selection and innovation outcome in collaborative New Product Development

A key feature of collaboration in general and collaboration for innovation in particular is the existence of trust. Trust is important because it reduces the costs and risks involved in collaboration, while also increasing the overall performance. This paper explores the role that trust plays during the selection of suppliers in new product development (NPD), and the outcome that reliance on trust has on the innovation effort. The research involves a case study of two organisations following contrasting approaches to NPD sourcing, but both relying on collaborative, long-term relationships. In both cases we find goodwill trust as the key variable explaining the reliance on collaboration. We also find that over-reliance on goodwill trust and geographical proximity in selecting NPD suppliers leads to an emphasis on incremental innovation which hampers the ability of both organisations to engage in radical NPD.

Keywords: new product development; innovation; trust; collaboration

Introduction

Across industries, NPD activities increasingly involve a range of collaborative arrangements with external partners (Tapon, 1989; Schiele, 2006). Collaborative NPD brings significant benefits to NPD (Schiele, 2006) including lower costs and risks (Perks, 2000), faster development (Deck and Strom, 2002), better product quality (Hoegl and Wagner, 2005), and better access to new resources and knowledge located outside firm's boundaries (Mohr and Speakman, 1994).

A key feature of collaboration is the existence of trust. Trust is critical to understand the formation of collaborative inter-organisational relationships in general (Smith Ring and van de Ven, 1994), and inter-firm R&D collaborations in particular (Hausler et al., 1994). Trust is important because it reduces the costs and risks involved

in the exchange, increasing the overall performance of the firm (Das and Teng, 2001; Dyer and Chu, 2003; Zaheer et al., 1998).

Within NPD literature, trust is generally identified as one of the key criteria for supplier selection (see Croom, 2001; Wagner and Hoegl, 2006). Most of this research however refers to trust only implicitly. For example, partner's intentions and competencies are identified as criteria for supplier selection, where partner's intentions relate to the intentions to refrain from opportunism, i.e. goodwill trust, while partner's competencies relate to competence trust (Bosch-Sijtsema and Postma 2009). Howells et al. (2008) speculate that trust is critical during R&D supplier selection due to the riskier nature of the R&D sourcing process which involves high uncertainty and tacit knowledge.

Despite the importance that trust plays during NPD supplier selection, there is limited research in the NPD area that focuses specifically on the concept of trust, or which has defined the type of trust that it considers, as part of the selection criteria. Research investigating the influence of trust on innovation outcome is also scarce. This paper sets out to explore the role of trust during the selection of suppliers for NPD, and the influence that reliance on trust has on the outcome of the innovation effort.

The paper is organised as follows. First, we briefly discuss the notion of inter-organisational trust and explain its role in the context of NPD sourcing, followed by a description of the research design. Subsequently, we present two organisations, and their approach to organizing NPD, followed by a discussion of the role of trust in shaping their approach to the selection of their NPD partners. Finally, we outline the implications for research and practice, and the limitations of the study.

Inter-organisational trust, key antecedents and outcomes in NPD

Trust is a multilevel construct that exists at personal, organisational, institutional and international levels (Das and Teng, 2001). Generally, trust is defined as the willingness to accept vulnerability based on positive expectations about another's intentions or behaviours (Mayer et al., 1995). At inter-organisational level, research differentiates between competence trust, which concerns a partner's ability to perform according to expectations, and goodwill trust, which concerns his intentions to do so (Nooteboom, 1996; Sako, 1992) (see Table 1).

Inter-organisational trust is based on experience, interaction and common history with an exchange partner (Smith Ring and Van de Ven, 1992). Consequently, an important condition for trust development is the existence of a history of interactions between partners (Smith Ring and Van de Ven, 1994). In situations where such a history does not exist, the ascertainment that an organisation can be trusted, either to have the ability to perform according to expectations or to have the intention to do so in an open and supporting manner, can be based on its reputation (Gulati, 1995). For example, manufacturers with a reputation for fairness were found to engender greater trust in relationships (Anderson and Weitz, 1989). Information about a partner's reputation (either concerning its fairness, or its abilities) can be gathered from third parties through proactive information gathering (Das and Teng, 2001).

Apart from reputation, another factor that helps trust building is communication behaviour. Two-way information sharing was found to build goodwill trust between buyers and suppliers (Sako, 1997), and timely, accurate, open and adequate communication was found to be a key predictor of trust in NPD (Bstieler, 2006). Linked to communication, geographical proximity was also found to support trust development (Bonte, 2008). Geographical proximity facilitates the use of frequent face-to-face

communication, rather than relying on less rich forms of communication (such as e-mails and phones) to keep in touch (Schiele, 2006). The quality of buyer – supplier relationship was found to deteriorate over distance (Homburg et al., 2002), with trust being stronger between geographically close partners (Bonte, 2008).

Trust is important because it has beneficial outcomes for partners. Trust reduces the costs (Dyer and Chu, 2003; Zaheer et al., 1998) and risks (Das and Teng, 2001) involved in inter-organisational exchanges, and increases the performance of both the exchange (Gulati and Nickerson, 2008) and the overall business (Sako, 1997). Trust supports learning and continuous improvement in product development (Sako, 1997), and encourages greater information sharing and improved coordination between partners (Dyer and Chu, 2003). In its turn, learning supports collaborative technology transfer between partners (Dodgson, 1993), while greater information sharing leads to improved NPD outcomes including lower costs, faster development and improved product quality (Petersen et al., 2003). Trust also increases suppliers' commitment and involvement in NPD collaborations (Walter, 2003), which are both associated with more successful products (Ragatz et al., 1997).

There is very limited literature considering the implications that trust, in particular at inter-organisational level, has on the innovation outcome in NPD collaborations. Trust within the entrepreneurial team (intra-organisational trust) involved in technology development was found for example to encourage the team to rely on internal generated information and to isolate itself from external information, hence reducing the team's innovative capability (Chen and Wang; 2008). Krishnan et al (2006) suggests similar effects of isolation and reliance on internal information for inter-organisational trust in strategic alliances.

The role trust plays in NPD, as well as the types of trust and some of the key trust antecedents are summarised in Table 1.

Table 1. Inter-organisational trust and NPD

<i>Types of trust</i>	Competence trust = one's confidence in its exchange partner's competence, or professional standards, in carrying out specific task (Sako, 1992)
	Goodwill trust = one's confidence in its exchange partner's open commitment to supporting and continuing the relationship (Sako, 1992)
<i>Key trust antecedents</i>	Existing relationship (Gulati, 1995; Smith Ring and Van de Ven, 1994) and third party referrals (Das and Teng, 2001) provide information about a partner's reputation both concerning its abilities and its fairness
	Timely, accurate, open and adequate communication encourages trust building (Bstieler, 2006)
	Geographical proximity encourages frequent face-to-face communication which aids trust building (Bonte, 2008; Schiele, 2006)
<i>Trust outcomes in NPD</i>	Supports learning (Sako, 1992) which encourages technology transfer between partners (Dodgson, 1993)
	Encourages greater information sharing (Dyer and Chu, 2003) which leads to lower cost, higher quality and faster development time in NPD (Petersen et al., 2003)
	Increases partners' commitment and involvement in NPD (Walter, 2003) which is associated with more successful new products (Ragatz et al., 1997), but might also lead to overreliance on internal generated information (Krishnan et al., 2006) which hampers innovative capability (Chen and Wang, 2008).

Trust and supplier selection in NPD

Compared with the literature on trust in marketing and strategic management areas, there is much more limited research on trust in the NPD / R&D context. With few exceptions, NPD literature generally discusses trust simply as one of the criteria involved in supplier selection, rather than as a key aspect of NPD collaboration. For example, Croom (2001) finds that the relational capability of suppliers, including trust

with existing suppliers, and reputation and recommendations for new suppliers, which are key mechanisms for trust building, are the principal criteria during the selection of NPD suppliers. Bosch-Sijtsema and Postma (2009) find that partner's intentions and competencies are key criteria for selecting NPD partners. Partner's intentions relate to the intentions to refrain from opportunism, i.e. goodwill trust, while partner's competencies relate to competence trust. Wagner and Hoegl (2006) find that the top three criteria for selecting suppliers in NPD are (1) competencies and qualifications, which relate to competency trust, followed by (2) trust and reliability and (3) openness and mutual support, which both relate to goodwill trust. Similarly, Howells et al. (2008) find that the supplier's research and technical capabilities (i.e. competence trust) are the most important criteria for selecting suppliers in R&D sourcing. Trustworthiness and familiarity, which relates to goodwill trust, are also found to be important (Howells et al., 2008). The authors speculate that the reason why trust is so important has to do with the specific nature of the sourcing process in an innovation context. Sourcing for innovation is characterised by high uncertainty and tacit knowledge (Howells et al., 2008; Ulset, 1996) increasing the risks associated with prior disclosure of information and moral hazards between partners (Howells et al., 2008). According to the authors the riskier nature of innovation sourcing might explain why goodwill trust (that the partner will not disclose information and will not behave opportunistically) and competence trust (that the partner will deliver the solution) are so important in the context of NPD.

Consequently, although limited, current literature on inter-organisational trust in NPD seems to indicate that trust is an important factor during the supplier selection stage in NPD sourcing. Nevertheless, none of the research in this area has focused specifically on the concept of trust, or has properly defined the type of trust that it considers, as part of the selection criteria.

Research design

This research follows a qualitative, multi-case study research design. The choice of qualitative research design is driven by the exploratory nature of the research. The aim of this study is to explore the role that trust plays during NPD supplier selection, rather than to quantify the precise measure of these influences. As recommended by Yin (1994), explorative research questions are best explored through qualitative inquiry. Moreover, a number of researchers have called for case study research in operation management to complement the rationalistic approach that dominates empirical research in this field (Meredith, 1998; Stuart et al., 2002; Voss et al., 2002).

A common critique of qualitative case study design is that findings are not generalizable to populations of universes in the same way as findings from quantitative research (Yin, 1994). As discussed by Yin (1994) however, case studies are generalizable to theoretical propositions and not to populations in the sense that case studies do not aim to represent a “sample” of the total population. The aim of the investigator is to understand a particular issue (Stake, 1995), or to expand theory (analytical generalisation), not to enumerate instances in which a particular theory holds true (statistical generalisation) (Yin, 1994). For example, our study offers insights into the role that overreliance on trust during the selection of suppliers in NPD has for the innovation effort. This finding can be extended to other situations (e.g. when firms rely extensively on goodwill trust to select NPD suppliers) apart of the two case studies presented here. This process of using the insights from one or a limited number of case studies to create theory by extending the findings to other situations is what Meredith (1998) calls theoretical generalizability and Yin (1994) calls analytical generalisation and serves to ensure the external validity of the research. Similar approaches involving generalisation based on qualitative case studies have been employed to explore the

preconditions for successful inter-organisational collaboration in R&D (single case study) finding that trust builds in a cascade-like process (Hausler et al., 1994), to explore the partners selection process in collaborative NPD (four case studies) identifying three distinct phases within the process (Emden et al, 2006), and to investigate the strategies associated with involving suppliers in NPD (three case studies) identifying two types of generic strategies (Johnsen, 2011).

Two cases are included in the study: OilEquip, a medium sized oilfield equipment manufacturer, and Telco, a small business unit part of a large diversified telecom company. The cases were selected in two very different industries: telecom and oilfield equipment where the practices of both organising and sourcing NPD vary widely. The selection was based on theoretical sampling (Yin, 1994) as cases were chosen to differ as widely as possible from each other (Stuart et al., 2002) in terms of the context of NPD sourcing.

Two methods of collecting evidence identified by Yin (1994) were used: semi structured interviews and extensive documentation. Fourteen respondents were interviewed (see Table 2). In both companies, the respondents included the management team involved in NPD (four in OilEquip, and six in Telco) which provided the main source of data concerning NPD, sourcing decisions, and relationships with suppliers. Wider access in the case of Telco allowed the researcher to interview four of the NPD team members who corroborated the evidence obtained from the management team.

Table 2: List of respondents

Company	Level	Respondents	Code
<i>OilEquip</i>	<i>Management team</i>	Economic Director	OFE-DIR
		Director of Procurement	OFE-PRO
		Director of Marketing	OFE-MK

		Director of the Technical Direction	OFE-TECH
<i>Telco</i>	<i>Management team</i>	Acting Head of the Business Unit & Head of R&D	HofR&D
		Country Head of R&D Software	HofSoft
		Head of Technology	HofTech
		Head of Quality	HofSoftLoc
		Site Head of R&D Software	HofSite
		Program Manager	Prg_Mg
	<i>NPD team members</i>	Product Development Manager	Prd_Mg
		Software Engineer	Soft_Eng
		Representative of Business Development	Bus_Dev
		Representative of Sourcing	Sour

As recommended by Yin (1994), documentation was used primarily to corroborate the data from the interviews, especially for OilEquip where in order to compensate for the limited number of respondents extra effort was placed on triangulating the interview data with secondary sources to ensure data validation. For example, information concerning the difficulties encountered with the wide and specialised supply base obtained from OFE-PRO was corroborated with evidence from the internal documents containing suppliers' accounts. The researcher gained access to OilEquip's internal reports including the annual report of the company, the financial analysis of company, the analysis of major suppliers and customers, loan application reports, as well as publicly available reports. Relying on multiple sources of evidence together with seeking triangulation helped to ensure construct validity (Voss et al., 2002; Yin, 1994).

Following Stake's (1995) recommendation, data analysis was based on making detailed descriptions of the material and the case setting (see the next two sections).

This fits with Yin's (1994) third generic analytic strategy for case study analysis: developing a case description. The descriptive framework developed during the research process helped to organise the case study analysis and to identify the relationships to be analysed. The specific analytical techniques employed as part of the generic strategy included coding and arranging data into data displays to reduce and make sense of the data, followed by noting patterns, identifying relations between variables and building a chain of evidence (see Miles and Hubermann, 1994).

The first step in data analysis was to reduce the data through coding. Coding started with a provisional list of codes created prior to the field work based on the literature review. These codes are labels attached to chunks of data, which serve to assign units of meaning to the information compiled during the study (Miles and Huberman, 1994). As this research is part of a wider study exploring approaches to NPD, the initial list included a range of broad categories, such as concepts concerning the organizational context (e.g. business strategy, market conditions; firm competencies), the NPD approach (e.g. NPD organization and structure), sourcing NPD strategies (e.g. supply base, type of supplier relationships); and supplier selection criteria (e.g. cost, capacity). The list of codes was iteratively reviewed as the author checked the codes against the evidence from the interviews. Following Miles and Huberman's recommendation (1994), the codes were organized into a range of data displays to capture the relationships among different concepts, and to support conclusions drawing and verification.

Checklist matrices were generated to identify links between firm competencies, NPD approach, NPD sourcing, and supplier selection (see Table 3 in a following

section). These links were further explored through building casual networks. “Noting patterns”, and based on these patterns, “identifying relations between variables” were the first steps in building causal networks (see Mile and Huberman, 1994). Where the relations between two variables could not be precisely explained, for example between overall past experience and supplier selection, “finding the intervening variables”, in this case mutual understanding that leads to trust building with a particular supplier, was a useful tactic to develop the links in the network. As causal networks were constantly refined, tentative conclusions were developed for each case.

The analytical tactic used to bring together all the patterns and relations identified across the two cases, and to develop the conclusions was “building a chain of evidence” (see Miles and Huberman, 1994). For example, the choice of a particular supplier, existing dependencies and the level of goodwill trust between the parties appeared to be related in both cases. Figure 1 describes the causal network built to explain this relation.

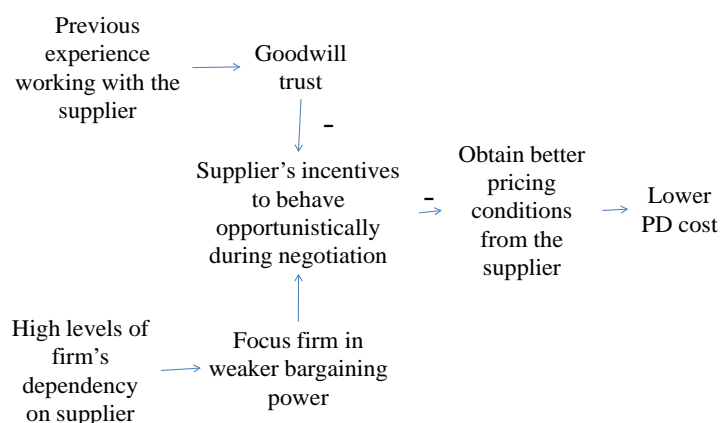


Figure 1. Goodwill trust, supplier selection and dependency in NPD outsourcing

The logical chain was constructed gradually as the analysis progressed and the causal networks were successively compared against the new evidence and refined as a

result. This process of explanation building served to ensure the internal validity of the research (Yin, 1994). Case narratives were developed to verify that the interpretations obtained from the casual network are plausible (Miles and Huberman, 1998). The narratives helped to identify and explain the context, to describe the casual relationships mapped onto the networks, and to explain why the variables are chained as they are. These narratives led to the development of the case descriptions that are described in the next section.

Case studies overview

OilEquip

The oilfield equipment market is very competitive, dominated by a few large, resource intensive competitors. The market is polarised between high-end manufacturers that drive new technology development and low-cost producers that sell cheap versions of older technologies. OilEquip's strategy is to serve the mid price–quality range in the oilfield equipment market offering reliable and highly customized products at a premium vis-à-vis low-cost producers. A strategic focus on product customisation translates into a prototyping approach to NPD, where each product is adapted to the client's technical requirements. Consequently, NPD is characterised by a focus on incremental product adaptations to the specific requirements of individual clients. The key targets in NPD are thus product features and fit to customer requirements, rather than speed to market or development cost. The products are very expensive and with long development cycles (up to a couple of years). Therefore, there are only a few new products under development at any one time.

Customisation also means that OilEquip tries to manufacture as much in-house as possible. Sourcing during NPD involves a wide range of highly specialised materials and components (e.g. engines) where OilEquip lacks the technological capabilities to develop them in-house.

Telco

The telecom market niche served by Telco is characterised by very short product life cycles (from few months up to one year) and fast changing customer demands. The market is dominated by a few small, specialised companies. Telco's strategy is to position itself in all segments of the market through a fast follower approach to NPD. Consequently, speed to market is the primary driver behind product development. The focus on speed to market, coupled with a broad market target translates into an agglomerated approach to NPD with a large number of short-lived products simultaneously under development. NPD time is short, varying between one month and one year, with approximately 50-70 products under development at one time.

A very wide range of products that have to be developed fast means that Telco relies extensively on sourcing in NPD. In software for example most product development is sourced from third party contractors, with the unit overseeing the overall integration and, occasionally, the development of key components in core technological areas.

Trust and the selection of NPD collaborative suppliers

This section discusses the supplier selection process in NPD, focusing on the role of trust during the selection decision.

OilEquip

A focus on customisation during NPD means that most new products include different specialised components to fit the needs of individual customers. Many of these specialised components are supplied by unique suppliers which tend to be small and highly specialised. This leads to a very large supply base including over 1600 suppliers and over 40,000 different supply items. Organising sourcing across such a large and diverse supplier base increases both the costs and the risks involved in NPD.

First, prototype development (as opposed to mass production) involves sourcing components and materials in very small quantities. In order to fulfil orders, OilEquip has to procure the items by ordering the minimum order quantity accepted by suppliers. This leads to higher inventory costs as all the items are not necessarily used immediately. A large supply base is also more difficult to coordinate, creating additional administration costs for the procurement department.

Second, the specialised nature of the supplier base means that for certain components there can be only one or two suppliers available, limiting OilEquip's choice in switching suppliers. The lack of sourcing options leads to a high dependency on individual suppliers increasing the risk of suppliers' opportunistic behaviour. For example, one respondent explained that many of the unique suppliers do not respect the delivery terms agreed, which is the main reason for delays in NPD.

OilEquip's approach to deal with higher costs and increased risk of opportunistic behaviour is to encourage collaboration with suppliers in NPD. The first step in ensuring collaboration is to select suppliers where such collaborative relationships already exist. Consequently, the firm relies extensively on long-term, co-national suppliers, which they refer to as "traditional suppliers" in conducting their NPD activities. Although price, quality and quantity were mentioned as the generic criteria

for the selection of suppliers, the initial screening is always limited to the existing long-term supplier base. Only when established suppliers lack the necessary competencies to develop the required component does OilEquip consider a new supplier. As the representative of the procurement department explained:

“Sometimes we cannot use traditional suppliers. For example, one product that we made for a drilling installation necessitated [the use of] round pipe. Subsequently, the designer and the technical representative came up with improvements to use a top drive installation which requires hydraulic heads and Rotary subs. As a result, it was necessary to change the documentation for round pipe to square pipes. In [our country] there is no supplier for square pipe as [a former supplier] has been shut. Therefore we needed to use [a German supplier] which delivered square pipes in 45 days.” (OFE-PROC).

Two characteristics of the “traditional supplier” were emphasised during the interviews: (1) a long term relationship which often span decades, and (2) location within a few hours’ drive of OilEquip’s headquarters. Common history of prior exchanges and geographical proximity encourages goodwill trust development between partners. Trust enables OilEquip to reduce NPD costs, and to counteract the supplier’s incentives for opportunistic behaviour.

A history of prior “uninterrupted commercial relationship” means the partners know each other well. Geographical proximity also means the partners meet frequently face-to-face. While the respondents mentioned that there is no typical number of face-to-face meetings with a supplier, they emphasised that problems generally tend to be dealt face-to-face rather than on the phone or through e-mails with suppliers located in close proximity. Both mutual knowledge and face-to-face meetings facilitate mutual understanding and support goodwill trust building. In its turn, goodwill trust smoothes the negotiation process, reducing not only the effort and time involved, but also

allowing OilEquip to obtain better commercial conditions during the negotiation, such as lower price:

“The quantity and price are interdependent – for example with traditional suppliers, for bearings the supplier maintains the same price for a lower quantity, and when we order 100 pieces it gives us a discount.” (OFE-PROC).

In contrast, similarly advantageous conditions are not generally obtained from non-traditional suppliers. Consequently, because of the firm’s dependency on many of its specialised suppliers, goodwill trust is important to counteract the supplier’s incentives for opportunistic behaviour and to reduce the cost involved in NPD.

A key problem with this approach of relying on existing, trusted suppliers is that OilEquip can access only the competence pool of its existing supplier base. By and large, traditional suppliers are failing to keep up with the pace of technology developments in the industry and are thus lacking the competencies required by customers. In contrast, foreign suppliers have a strong reputation for developing and using new technologies, and their components are increasingly being required by customers as a condition of the deal with OilEquip.

“Before we were using engines from [traditional internal supplier], but now nobody wants them anymore, everybody asks for Caterpillar engines.”(OFE-DIR).

The lack of similar strong technical reputation for existing traditional suppliers is one of the reasons why competence trust was not mentioned as a criterion for selecting traditional (rather than new) suppliers. As customers increasingly demand particular type of components from foreign suppliers, OilEquip is under increased pressure to move outside its current supplier base. The need to find, develop and manage relationships with new suppliers poses significant problems for OilEquip, as it

creates additional coordination costs during product development and hampers the firm's ability to rely on goodwill trust to compensate for its increasing dependency on specialised suppliers.

Telco

Telco relies extensively on sourcing in NPD. In an effort to reduce supplier coordination costs, Telco actively encourages the development of collaborative, long term relationships with a small number of preselected suppliers. As one respondent explained,

“each supplier comes with an overhead ... There are very practical commercial aspects which need to be negotiated, terms and conditions [...] You need to build a relationship with these people and if you have 300 suppliers you are not going to be talking to them very often ... so it's a balance between having a few suppliers which you would really want to develop versus having a lot of suppliers to spread the risk and actually have the capacity [required]” (HofSoft).

Consequently, in selecting suppliers in NPD, Telco relies on an organisation wide database of preferred supplier where existing suppliers are mapped against their technical competencies. This database of “preferred suppliers” is always used as the first step in identifying a supplier for a new product. Consequently, while technical competencies, production capacity, and price are important criteria to choose a supplier for a new product, the initial screening is always limited to suppliers with whom the company has an existing, long term relationship. Relying on established suppliers allows Telco to speed up its development process, to reduce development costs, and to offset the incentives for opportunistic behaviour on the part of some suppliers. As in the case of OilEquip, the key mechanism through which these positive outcomes are realised is trust, in this case both competence and goodwill trust.

The existence of previous relationships between a supplier and the organisation assures Telco that the supplier has been formally assessed to possess the required competencies. Moreover, the contractual framework surrounding negotiations has already been agreed with the supplier during previous interactions:

“there is a list of preferred suppliers ... Those are reliable companies, qualified. ... They have been assessed to work according to [our organisation’s] standards, and liabilities have been agreed with them ... if you take a strange [new] partner, then you have to start this kind of basic negotiation from scratch.” (Prog_Dev).

The existence of competency trust reduces the time and effort that Telco needs to put into collecting information to assess the supplier’s technical competencies, thereby reducing the time and costs associated with the search, identification and negotiation process.

Prior good working relationships also mean that goodwill exists between Telco and the supplier. Goodwill trust is particularly important when Telco is dependent on a supplier and finds itself in a weak bargaining position during the negotiations. In such circumstances, goodwill ensures that Telco obtains better conditions from the supplier than it would have been possible otherwise. One of the respondents gave the example of a supplier that dominates the target market for a particular component:

“we are very much dependent for example on [supplier], because [supplier] has maybe 80% market share of this [component]. ... We still work on that area by talking to other [suppliers] ... but due to the [collaborative] relationship we have with them we get probably better pricing from them as well” (HofTech).

The existence of a collaborative relationship between Telco and the supplier means that the supplier is willing to offer better conditions than its competitors, lowering product development costs.

Such a strong reliance on a small base of preferred suppliers with whom the company actively encourages the development of long-term relationships means that it can be very difficult for a new supplier to engage with Telco:

“so long as we don’t find a gap in the portfolio of the strongest supplier, it is difficult for others to get in really” (HofTEch).

As in the case of OilEquip, the company relies almost exclusively on trusted suppliers in their NPD. While relying on trust does have beneficial short-term effects on NPD in terms of speeding up and reducing the costs of NPD, it also restricts the access to competencies and capabilities located outside the existing supplier base. As such, the company forgoes the potential to develop innovative new products relying on new competencies outside their existing base of suppliers, focusing instead on incremental innovation based on known competencies within the existing supply base.

Table 3 summarises the approach to supplier selection in the two cases and its implications on NPD.

Table 3. Approach to supplier selection

Variable	OilEquip	Telco
<i>Characteristics of the supply base</i>	Prototype development means little reuse of components, leading to a very large supply base that includes a large number of small, specialized suppliers => focus on “traditional suppliers” to reduce costs and risks in NPD	Active effort to focus on few, large suppliers rather than a large number of smaller suppliers => rely on a company base of “preferred suppliers” to reduce the costs and risks involved in NPD
<i>Criteria for selecting suppliers</i>	Rely on “traditional suppliers” (i.e. common history of prior exchange + geographical proximity), unless they lack the required competencies demanded by the customers	Rely on “preferred suppliers” (i.e. common history of prior exchanges + prior knowledge of their competencies) unless there is a commercial obstacle (lack of competencies or / and higher cost)

<i>Nature of relationship with supplier – types of trust</i>	<p>Common history of prior exchanges => mutual knowledge => goodwill trust</p> <p>Geographical proximity => frequent face to face meeting => mutual understanding => goodwill trust</p>	<p>Common history of prior exchanges => goodwill trust</p> <p>Knowledge of suppliers' competencies => competence trust</p>
<i>Implications on NPD</i>	<p>Reduces opportunistic behaviour => pricing conditions are better => lower cost of development;</p> <p>Restricted sourcing to existing suppliers which lag behind => lacks competencies for radical innovation</p>	<p>Reduces opportunistic behaviour => pricing conditions might be better => lower cost of development</p> <p>Competencies are already evaluated => speeds up NPD + reduces NPD cost</p> <p>Difficult for new suppliers to get in => lacks access to competencies outside existing supply base => hampers radical innovation</p>

Discussions

This paper explores the role trust plays in shaping the choice of collaborative sourcing partners during NPD.

The two organisations described here approach NPD sourcing very differently. OilEquip relies extensively on in-house product development, sourcing the development of specialised materials and key components where it lacks the competencies to develop in-house. In contrast, Telco sources most of its NPD activities from external partners, focusing on the integration of various components into the product architecture. Despite their different approaches to NPD sourcing, we find that both firms approach partner selection in a very similar fashion. Both companies rely extensively on collaboration in an effort to reduce the development costs and to lower the risk of suppliers' opportunistic behaviour (see Table 4). Economic literature (in particular transaction cost

economics) finds that firms choose to rely on collaborative arrangements to organise their NPD because of the high costs and risks associated with both vertical integration and with market arrangements to govern R&D activities (Tapon, 1989; Ulset, 1996). The argument is that a hierarchical organisation hampers the creativity required to conduct R&D, while the existence of transaction specific assets makes collaborative arrangements preferable to (i.e. cheaper than) market structures (Ulset, 1996). We find that a key variable that explains why firms rely on collaboration during NPD is the existence of goodwill trust, rather than simply the logic of transaction cost minimizing. This finding complements efforts in the literature to incorporate trust in the transactions costs economising framework (e.g. Chiles and McMackin, 1996), and/or to propose trust as an alternative governance mechanism (see Adler, 2001; Smith Ring & van de Ven, 1992, Zaheer and Venkatraman, 1995). Research on trust in the context of NPD / R&D is however relatively scarce and generally tends to highlight the importance of competence trust (in the form of confidence that the supplier will deliver a solution) in shaping the firm's supplier selection process (Howells et al., 2008). While we find that competence trust matters, our study identifies goodwill trust as the key variable influencing supplier selection during NPD. Goodwill trust enables the firms not only to reduce the costs, but also to lower the risks of NPD (see Table 4).

Table 4. Summary of results

	OilEquip	Telco
<i>Key driver in NPD</i>	Fit with customer demand	Speed to market
<i>Key criterion for supplier selection</i>	Existing, long term relationships & geographical proximity	Existing, established relationships were competencies have already been assessed

<i>Trust</i>	Goodwill trust	Goodwill trust Competence trust
<i>Implications on NPD outcome (e.g. cost, speed)</i>	Obtains better pricing / volume conditions, important especially when the company is in a weak negotiation position (e.g. small volume and few options for sourcing)	Obtains better pricing conditions, important especially when in a weak negotiation position (e.g. supplier dominant in its market) Reduces the cost and time involved in contract negotiation & competencies assessment => speeds up NPD
<i>Implication on innovation outcome</i>	Limited technological competencies within the existing suppliers base (lack of competence trust) => increased difficulty to keep up the pace with customer demands => need to forge new relationships with new suppliers whose reputation for innovation supports competence trust building	Difficulties for new suppliers to get in => might damage the prospects of the firm to access new competencies from new suppliers which are critical to support radical innovation

Goodwill trust reduces the incentives for suppliers to behave opportunistically, meaning that the firm might obtain better terms during the negotiation process than would be the case with a new supplier. This is especially important in situations where the company is in a weaker bargaining position due to the existence of strong dependencies on the supplier, for example because of the lack of real alternatives for sourcing that particular component (e.g. the supplier is the market leader in that market, or there are few specialised suppliers for a particular component). Existing research suggests that when the firm has only a small number of potential partners, for example where there are only a few specialised suppliers that it can choose from (as is the situation for OilEquip), because of the incentives of suppliers to behave opportunistically, the firm will tend to internalise the R&D activities (Pisano, 1990). Instead, we find that reliance on goodwill trust during supplier selection in small

number bargaining situations enables both Telco and OilEquip not only to reduce the risk involved in the relationship (lower risk for opportunistic behaviour), but also the costs of product development (due to better pricing conditions). The existence of goodwill trust can thus explain why firms engage in collaborative R&D sourcing even in situations where the transaction cost framework would suggest otherwise.

In OilEquip, we also find geographical proximity as an important selection criterion. Together with the existence of an established relationship with a supplier, geographical proximity indicates higher levels of goodwill trust between partners due to more frequent face-to-face meetings which promote goodwill trust building vis-à-vis less rich communication media. Our finding thus complements existing research that suggests that geographical proximity between R&D partners influences the organisation of R&D activities (Brockhoff, 1992). Geographical distance between potential partners increases R&D uncertainty leading to higher transaction costs which means that the firm will internalise R&D (Brockhoff, 1992). Complementing Brockhoff's (1992) findings, we find that geographical proximity supports goodwill trust building, incentivising firms to engage in collaborative NPD.

In the case of Telco, in addition to the existence of goodwill trust, the respondents emphasised the existence of competence trust as an important criterion for supplier selection. Experience of previous exchanges with a particular supplier allows the firm to assess the supplier's competencies. Prior relationships also mean that contractual arrangements specifying the suppliers' responsibilities and expected capabilities have already been developed. Relying on existing competency trust allows the firm to reduce both the costs and the time involved in conducting the contractual negotiations from scratch, and the effort involved in acquiring the necessary information to assess whether suppliers have the required competencies. Competence trust also

reduces the risk that suppliers will not be able to perform according to expectations during product development. This finding supports existing research, which found competence trust (or the lack of it) as a key factor shaping supplier selection in R&D (Howells et al., 2008) and clarifies the avenues through which competence trust leads to beneficial outcomes on NPD.

This study also explores the implications that relying on trust to select sourcing partners has on the future opportunities for NPD (see Table 4). Research has shown that networks of relationships supporting innovation often depend on trust, and this reliance is particularly important in regional clusters characterised by firms located in close proximity where firms rely on reputation based on past interactions (Simard and West, 2006). We find that over-reliance on trusted (for both companies) and geographically close (in the case of OilEquip) suppliers in an effort to reduce the cost, time and risk involved in NPD means that both firms emphasise incremental rather than radical innovation. Relying on established trusted suppliers means that both companies exploit the competencies of their existing base of suppliers, rather than focusing on exploring relationships outside their current supplier base. However, it is the relationships with new partners that give firms access to new competencies and helps develop radical new products (see Phillips et al., 2006). Moreover, high levels of trust tend to characterise bonding networks characterised by high levels of cohesion. While cohesion stimulates the exchange of resources and learning capabilities, it also tends to emphasise inward looking, hampering the ability to adopt new information outside the existing knowledge domain (for a discussion of trust and cohesion in social capital literature see Lee, 2009). Overreliance on existing, trusted partners means that the firm (and the network in general) becomes closed to external information (Uzzi, 1997). Similarly, over-reliance on close proximity relations (as was the case with OilEquip) was found to lead to

“inward looking norms”, restricting experimentation (Lee, 2009). Experimentation and an ability to look beyond the knowledge within the existing supply network are critical to the development of radical new products (Phillips et al, 2006).

Conclusions

This study explored the approach to supplier selection during collaborative NPD using a qualitative case comparison approach. Our findings show that a key factor that influences the selection of collaborative partners to support innovation relates to the pressures to reduce the costs, time and risk involved in NPD. We identify goodwill trust as the key mechanism through which firms attempt to achieve these outcomes. This finding helps to clarify why trust appears in the literature as a key criterion during the selection of NPD suppliers (Croom, 2001; Wagner and Hoegl, 2006). It also adds to the body of literature (see Adler, 2001; Smith Ring & van de Ven, 1992) that emphasises the role that trust (rather than transaction costs economizing logic) plays in shaping the choice of inter-organisational arrangements. We also find that overreliance on trust in selecting suppliers for NPD hampers radical innovation as it encourages firms to explore information and competencies only within their existing supply base. This finding complements social capital research which suggests that bonding networks characterised by high levels of trust lack the flexibility required for radical innovation, stimulating inward looking and hampering experimentation (see Lee, 2009). Similarly, open innovation research indicates that there is a trade off between high levels of trust on one hand, and the novelty and diversity of information and the flexibility required for radical innovation on the other (Simard and West, 2006).

The study has a number of limitations. First, the exploratory nature means that future research is required to test the outcome that reliance on goodwill trust in NPD

supplier selection process has on innovation outcome to other settings, for example through a survey covering different industries. Second, we have included only two case studies in our study, from two very different industries. In both cases however we have found a focus on incremental innovation. Future research should include polar cases considering both incremental and radical innovation to clarify whether the predictions concerning the role of goodwill trust and innovation outcome identified in our research apply widely. Another avenue for further research is to cover a wider range of organisations in different industries pursuing both radical and incremental innovation, either through in-depth case studies or through a large scale survey.

Notwithstanding these limitations, the study brings several contributions to literature and practice. First, it helps towards a better understanding of the key drivers of the selection of collaborative partners during NPD. While trust has been widely explored in organisational literature, there is relatively little focus on trust issues in R&D / NPD literature. Trust is a critical mechanism which governs inter-organisational relationships, hence its understanding is critical to support NPD management and deserves more attention within the innovation management literature, especially as innovation in general, and NPD in particular become increasingly collaborative.

Second, the study also identifies some of the dangers associated with over-reliance on trusted relationships in NPD, in particular the difficulty of accessing new competencies outside the current and trusted supplier base. It is these new relationships that are required for the development of radical innovations. For practice, the study clarifies the need to consider trust as a key selection mechanism during NPD sourcing, especially in the context of incremental NPD. The findings also requires NPD managers to consider the trade off between relying on trust and collaboration to achieve short term benefits in NPD in the form of lower costs and risks, and faster development on one hand, and the

risk to move outside the current base of trusted partners in order to access new competencies and encourage radical innovation in the long term on the other.

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References

- Adler, S., 2001. Market, hierarchy, and trust: the knowledge economy and the future of capitalism. *Organization Science*, 12(2), 215-234.
- Anderson, E. and Weitz, B., 1989. Determinants of continuity in conventional industrial channel dyads. *Marketing Science*, 8(4), 310-323.
- Bonte, W., 2008. Inter-firm trust in buyer-supplier relations: Are knowledge spillovers and geographical proximity relevant? *Journal of Economic Behavior & Organization*, 67(3-4), 855-870.
- Bosch-Sijtsema, P.M. and Postma, T.J.B.M., 2009. Cooperative innovation projects: Capabilities and governance mechanisms. *Journal of Product Innovation Management*, 26(1), 58-70.
- Brockhoff, K., 1992. R&D cooperation between firms – A perceived transaction cost perspective. *Management Science*, 38(4), 514-524.
- Bstieler, L., 2006. Trust formation in collaborative new product development. *Journal of Product Innovation Management*, 1(1), 56-72.
- Chiles, T.H. and McMackin, J.F., 1996. Integrating variable risk preferences, trust, and transaction cost economics. *Academy of Management Review*, 21(1), 73-99.
- Chen, M-H. and Wang, M-C., 2008. Social networks and a new venture's innovative capability: the role of trust within entrepreneurial teams. *R&D Management*, 38(3), 253-264.
- Croom, S.R., 2001. The dynamic capabilities concept: examining the processes of key supplier involvement in collaborative product development. *European Journal of Purchasing & Supply Management*, 7(1), 29-37.

- Das, T.K. & Teng, B-S., 2001. Trust, control, and risk in strategic alliances: An integrated framework. *Organization Studies*, 22(2), 251-283.
- Deck, M. and Strom, M., 2002. Model of co-development emerges. *Research Technology Management*, 45(3), 47-54.
- Dodgson, M., 1993. Learning, trust, and technological collaboration. *Human Relations*, 46(1), 77-95.
- Dyer, J.H. and Chu, W., 2003. The role of trustworthiness in reducing transaction costs and improving performance: empirical evidence from the United States, Japan, and Korea. *Organization Science*, 14(1), 57-68
- Emden, Z., Calantone, R.J. and Droge, C. (2006) Collaborating for new product development: Selecting the partner with maximum potential to create value. *Journal of Product Innovation Management*, 23(4), 330-341.
- Gulati, R., 1995. Social structure and alliance formation patterns: A longitudinal analysis. *Administrative Science Quarterly*, 40(4), 619-652.
- Gulati, R. and Nickerson, J.A., 2008. Interorganizational trust, governance choice, and exchange performance. *Organization Science*, 19(5), 688-708.
- Hausler, J., Hohn, H-W. and Lutz, S., 1994. Contingencies of innovation networks: A case study of successful interfirm R&D collaboration. *Research Policy*, 23(1), 47-66.
- Hoegl, M. and Wagner, S.M., 2005. Buyer – supplier collaboration in product development projects. *Journal of Management*, 31(4), 530-548.
- Homburg, C., Krohmer, H., Cannon, J.P. and Keidaisch, I., 2002. Customer satisfaction in transactional buyer-supplier relationships, *Journal of International Marketing*, 10(4), 1-29.
- Howells, J., Gagliardi, D. and Malik, K., 2008. The growth and management of R&D outsourcing: evidence from UK pharmaceuticals. *R&D Management*, 38(2), 205-219.
- Johnsen, T., 2011. Supply network delegation and intervention strategies during supplier involvement in new product development. *Journal of Operations and Production Management*, 31(6), 686-708.
- Krishnan, R., Martina, X. and Noorderhaven, N.G., 2006. When does trust matter to alliance performance. *Academy of Management Journal*, 49(5), 894-917.

- Lee, R., 2009. Social capital and business and management: Setting a research agenda. *International Journal of Management Reviews*, 11(3), 247-273.
- Mayer, R.C., Davis, J.H. and Schoorman, F.D., 1995. An integrative model of organizational trust, *The Academy of Management Review*, 20(3), 709-734.
- Meredith, J. 1998. Building operations management theory through case and field research. *Journal of Operations Management*, 16(4), 441-454.
- Miles, M.B. and Huberman, A.M., 1994. *Qualitative Data Analysis: An Expanded Sourcebook*. Thousand Oaks: Sage Publications.
- Mohr, J. and Speakman, R., 1994. Characteristics of partnership success: Partnership attributes, communication behaviour, and conflict resolution techniques. *Strategic Management Journal*, 15(2), 135-152.
- Nooteboom, B., 1996. Trust, opportunism and governance: A process and control model. *Organization Studies*, 17(6), 985-1010.
- Perks, H., 2000. Marketing information exchange mechanisms in collaborative new product development. *Industrial Marketing Management*, 29(2), 179-189.
- Petersen, K.J., Handfield, R.B. and Ragatz, G.L., 2003. A model of supplier integration into New Product Development. *Journal of Product Innovation Management*, 20(4), 284-299.
- Pisano, G., 1990. The R&D boundaries of the firm: An empirical analysis. *Administrative Science Quarterly*, 35(1), 153-176
- Phillips, W., Lamming, R., Bessant, J. and Noke, H., 2006. Discontinuous innovation and supply relationships: strategic dalliances. *R&D Management*, 36(4), 451-461.
- Ragatz, G.L., Handfield, R.B. and Scannell, T.V., 1997. Success factors for integrating suppliers into new product development. *Journal of Product Innovation Management*, 14(3), 190-202
- Sako, M., 1992. *Prices. Quality and Trust. Inter-firm relations in Britain & Japan*. Cambridge: Cambridge University Press.
- Sako, M., 1997. Does trust improve business performance? In C. Lane & R. Backmann, eds. *Trust within and between organizations*. Oxford: Oxford University Press, 88-117.

- Schiele, H., 2006. How to distinguish innovative suppliers? Identifying innovative suppliers as a new task for purchasing. *Industrial Marketing Management*, 35(8), 925-935.
- Simard, C. and West, J. 2006. Knowledge networks and the geographic locus of innovation. In: Chesbrough, H., Vanhaverbeke, W. and West, J., eds. *Open innovation. Researching a new paradigm*. Oxford: Oxford University Press, 220-240.
- Smith Ring, P. and van de Ven, A. H., 1992. Structuring cooperative relationships between organizations. *Strategic Management Journal*, 13(7), 483-498.
- Smith Ring, P. and van de Ven, A.H., 1994. Developmental processes of cooperative interorganizational relationships. *Academy of Management Review*, 19(1), 90-118.
- Stake, R. E., 1995. *The Art of Case Study Research*. Thousand Oaks: Sage Publications.
- Stuart, I., McCutcheon, D., Handfield, R., McLachlin, R. And Samson, D. 2002. Effective case research in operations management: a process perspective. *Journal of Operations Management*, 20(5), 419-433.
- Tapon, F., 1989. A transaction costs analysis of innovations in the organization of pharmaceutical R&D. *Journal of Economic Behavior & Organisation*, 12(2), 197-213.
- Ulset, S., 1996. R&D outsourcing and contractual governance: An empirical study of commercial R&D projects. *Journal of Economic Behavior & Organisation*, 30(1), 63-82.
- Uzzi, B. 1997. Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*, 42(1), 35-67.
- Voss, C., Tsikriktsis, N. And Frohlich, M. 2002. Case research in operations management. *International Journal of Operations & Production Management*, 22(2), 195-219.
- Wagner, S.M. and Hoegl, M., 2006. Involving suppliers in product development: Insights from R&D directors and project managers, *Industrial Marketing Management*, 35(8), 936-943.
- Walter, A., 2003. Relationship-specific factors influencing supplier involvement in customer new product development, *Journal of Business Research*, 56(9), 721-733.

Yin, R. K., 1994. *Case Study Research. Design and Methods*. California: Sage Publication.

Zaheer, A., McEvily, B. and Perrone, V., 1998. Does Trust Matter? Exploring the Effects of Interorganizational and Interpersonal Trust on Performance. *Organization Science*, 9(2), 141-159.

Zaheer, A. and Venkatraman, N., 1995. Relational governance as an interorganizational strategy: an empirical test of the role of trust in economic exchange. *Strategic Management Journal*, 16(5), 373-392.