

The Potential Role of E-Sourcing Information in New Product Development: An Information Seeking Perspective

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Abstract

The central theme of this paper is the contribution that e-sourcing information can make to new product development (NPD). Inspired by the article of Morten T. Hansen (1999), and drawing on the strength-of-weak-ties in social network theory, the paper argues that e-sourcing information bears all the hallmarks of a weak tie: low search costs, non-reciprocal transfer relationship, and codification of information. Further literature research has discovered the concept of a “trusted weak tie” (Levin and Cross 2004). Both approaches have been incorporated in a conceptual framework depicting the firm’s search for and transfer of e-sourcing information involving the firm’s procurement, upstream suppliers and the NPD team vis-a-vis the e-marketspace. The paper concludes by suggesting that the Sense-Making Methodology (Dervin 1983, 2003) could prove useful when testing the conceptual model’s validity.

Keywords: e-sourcing information, new product development, information search, sense-making

Introduction

At a recent IPSERA conference (April 6-8, 2006, San Diego, CA), there was one common theme prevalent throughout the presentations of the supply chain and purchasing practitioners. In their view, a successful supply chain management (SCM) should no longer exclusively focus on the cost reduction of purchasing. In order to be able to sustain the competitive advantage that savings in standard operating procedures may accrue, and to become of strategic importance to the firm, the SCM needs to take on board also the “soft” management concepts, such as relationships, information and behaviour. Coming from organizations as diverse as Cisco Systems, Northrop Grumman, Qualcomm, Intuit, the US Marine Corps, and the Sourcing Interest Group (a consortium of some 140 companies that share insights in the outsourcing market), the practitioners, all invited speakers, argued that successful SCM would generate value for both customer and supplier only if issues such as the inter-firm relationships, collaboration, and information within the SCM were taken into account.

Research Issues

Our paper addresses one of these “soft” concepts, namely information, and in particular, the e-sourcing information. The research question concerns the role of e-sourcing information in new product development (NPD). Specifically, we are interested in what ways the existence of e-sourcing technology affects the information search/transfer in the process of NPD involving the firm’s NPD team, suppliers, and purchasing. The research objective is to establish, if and how the real-time availability of e-sourcing information helps reducing the information asymmetry, and contributes to the knowledge creation within the firm. We are in agreement with the afore mentioned view that the cost reduction of purchasing is no longer enough. Our understanding of cost reduction of purchasing is that it can be regarded as another “best practice” which, however, can be emulated by the competitors. On the other hand, the creation of new knowledge, as expressed through new product development, is of strategic importance to the firm, and unique to the firm’s context. Given the fact that up to 80% of the cost of a product can be attributed to purchased components and material (Baines and Kay 2002), we believe that the networked availability of sourcing information in the early phases of NPD can have a positive impact on the product’s competitiveness. The research question is explored against the theoretical backdrop of the knowledge-based view of the firm (Grant 1996), the concept of virtual value chain of Rayport and Sviokla (1995), and the strength-of-weak-ties social network theory (Granovetter 1973; Hansen 1999).

The paper is structured as follows: an introduction to the information seeking perspective of purchasing’s involvement in NPD, is followed by an outline of the search-transfer problem in NPD as described by Hansen (1999). Next, supported by a literature review, we “translate” the Hansen’s framework of tie strength and knowledge complexity into an e-business context (Fig 2). This serves as basis for our conceptual model of the firm’s search and transfer of e-sourcing information (Fig. 3). Finally, we make suggestions as to the choice of the models of information seeking behaviour, known from the literature, that could best be used when operationalizing the model and testing its validity.

The Information Seeking Perspective

Fig. 1 shows the firm’s e-sourcing triangle. The involvement of procurement, or purchasing, in NPD is not a new topic. As early as in 1985, Burt and Soukup, in their Harvard Business Review article have made a pointed case for an enhanced role for purchasing in the management of NPD. Later, the terminology of purchasing literature has been adapted to reflect the purchasing’s

presumed role in NPD. Two examples: Dowlatshahi (1997) uses the term “design-based sourcing”, while Joglekar and Rosenthal (2003) talk about “design supply chains”. A typology describing the evolving role of the purchasing manager in new product development has been developed by Wynstra et al. (1998). These are just a few examples of the procurement/NPD literature. By and large, the focus has been on the potential or real effect of procurement on the NPD project time completion, reduction in material costs, and on the success of new products.

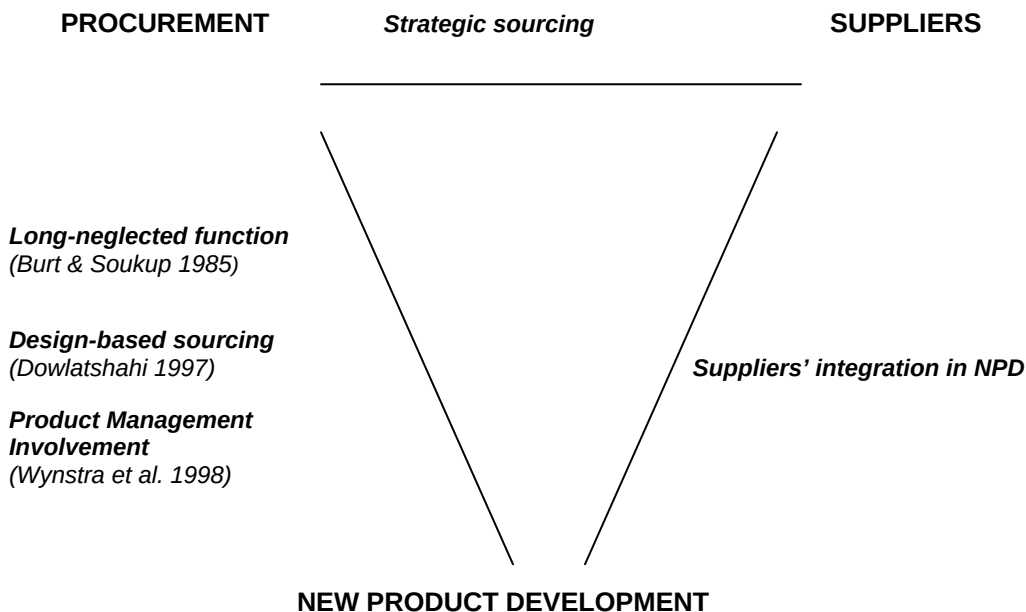


Figure 1: The Firm's E-Sourcing Triangle

The reason why this paper approaches the purchasing's role in NPD from an information seeking perspective, is given by two major developments: 1/ the arrival of e-procurement technology which provides the firm with an unique opportunity to treat and explore the e-markets as a collective level sourcing information depository. Several authors (Bakos 1977; Mahadevan 2000; Ordanini and Pol 2001, Ordanini 2005) have pointed out that it is in the aggregation of the product offerings information, and its transparency, that the future of e-markets must be sought; 2/ the shifting boundaries of the firm, borne from a realization that knowledge boundaries stretch beyond the production boundaries (Brusoni et al. 2001). This changing view of resources has given rise to the necessity to think of NPD as recombination of knowledge and relationships. Both situations require, indeed are dependent on, information search and transfer.

Information Search vs Information Transfer

Our interest in the topic of information search has been triggered by Hansen(1999) and his insightful article on the search-transfer problem in NPD and the role of weak ties in sharing knowledge across NPD project teams in a multinational electronics company. Hansen (1999) unites in his article two streams of research: 1/ the social network research which views the problem of finding relevant information as a search activity involving crossing the boundaries of one's network, and 2/ the product innovation research which tends to see the same problem as a transfer activity, i.e. moving the relevant NPD information within the firm. As shown in Fig. 2, Hansen chose knowledge complexity and tie strength as the two dimensions along which the search and transfer of information can be assessed. Using the strength-of-weak

ties perspective in social network theory (Granovetter 1973) to describe the framework's first dimension, Hansen shows that the search activity is more fruitful when performed by weak ties. Defined as distant infrequent relationships (e.g. contacts outside the NPD team, such as digital markets), weak ties lead to novel and diverse information. On the other hand, strong ties, defined as relationships with a small group of actors (e.g. the NPD team members), are less suited for this task as they tend to rely on information already available and well tried. Strong ties prefer to engage in the transfer of information which is firm-specific (often tacit) and where trust among the exchanging parties is expected, and the relationship is reciprocal. Another feature of strong ties is knowledge redundancy (i.e. overlapping knowledge) arising from frequent interaction, such as information sharing and learning. Weak ties, by contrast, because of their temporal nature and loose connectivity, are not restrained by reciprocity, have low knowledge redundancy, and high information diffusion. The framework's other dimension is knowledge complexity, consisting of codified independent knowledge (e.g. well documented information about product components), and of non-codified independent knowledge (e.g. tacit knowledge of the designer, or a firm's specific working practice). The objective of the Hansen's framework was to help identify and evaluate the factors affecting the speed of NPD in one (albeit multinational) firm.

Search-Transfer Problem in an E-Business Context

The translation of Hansen's framework into an e-business context can be seen in Fig. 2 and is shown in red. For a detailed discussion of the four quadrants we refer to our IPSERA paper (Santema and Kopecka 2006). In this paper we concentrate solely on Quadrant IV, and the ensuing conceptual model.

		TIE STRENGTH	
		Strong	Weak
KNOWLEDGE COMPLEXITY	Noncodified, dependent	I Low search benefits, moderate transfer problems Integrated NPD knowledge within the NPD team and firm	II Search benefits, severe transfer problems Tacit knowledge, Personal know-how of NPD team members
	Codified, independent	III Low search benefits, few transfer problems Embedded knowledge of upstream suppliers	IV Search benefits, few transfer problems. E-informing Sourcing information

Figure 2: Search and Transfer Effects Associated with the Four Combinations of Knowledge Complexity and Tie Strength (Hansen 1999, p. 8).

Quadrant IV represents a combination of weak ties and codified, independent knowledge, and is characterized by search benefits and few transfer problems. The quadrant illustrates the potential impact of sourcing information in NPD. For, as Sherer (2005) points out, the origin of the sequential information processing in the supply chain ought to be put down to the limitations of information systems. With the arrival of web-based technologies, the network character of supply chain had quickly emerged, and information has become the key driver of competitive advantage. For example, the experience at Dell Computer Corporation shows that linking buyers and suppliers not by inventory, but by information, can become source of such advantage (Presutti 2003). The NPD process, too, is no longer a sequential process, but network-oriented and information driven. It needs to be flexible and to respond quickly to changes in product complexity, product life cycles, and the consumer demand.

Although the participation of suppliers in NPD is advocated strongly in the literature, its timing is a matter of contention (Petersen et al. 2005). Moreover, it is generally recognized that suppliers' integration in NPD is a trust-building process (Monczka et al. 2000) and, as a recent case study at Bang and Olufsen in Denmark has shown, it is far less organized and well planned than prescribed in the literature (Møller 2006). Perhaps the solution could lie in making a distinction between the suppliers' involvement per se, and the use of suppliers' information, as mediated by purchasing. Wynstra et al. (2003) have empirically established that informing is a key process in the purchasing/NPD relationship. It is our contention, that similarly as in the case of the supply chain, the sourcing information in NPD processes could act as a surrogate, a kind of forerunner of real suppliers' involvement in NPD.

The first steps towards highlighting the value of e-procurement information can be found in publications of Essig and Arnold (2001) and De Boer et al. (2001) which address the role of e-procurement information in reducing uncertainty in sourcing decisions, such as the choice of suppliers. De Boer et al. (2001) coined the term e-informing which they defined as one of the five forms of e-procurement. E-informing is not directly associated with the process of purchasing, but rather with seeking and distributing additional information about suppliers and their offerings. Ordanini and Pol (2001) have highlighted the importance of the continuous interaction between the codified information of digital markets and the firm-specific knowledge, and stressed the potential of such interaction for new knowledge creation and innovation. Similar conclusions have been reached by authors studying the benefits of and the need for interaction between tacit and explicit knowledge (Skyrme 2001, Johannessen et al. 2001, Jasimuddin et al. 2005). For our part, we would argue that the firm's procurement department should claim a crucial role in this infomediation process by positioning itself as a boundary spanner between the virtual and physical value chain. By monitoring, evaluating, and making sense of emerging technologies in suppliers' market, and by funneling this information to the NPD team, the procurement professionals can be instrumental in laying groundwork for new product and supplier relationship combinations.

Conceptual Model

The conceptual model (Figure 3) represents a two-part network consisting of strong ties and weak ties, and is positioned in the upstream part of the firm's virtual value chain. The network actors are procurement professionals, preferred suppliers, and the NPD team (the e-sourcing information triangle shown earlier in Fig. 1). The search for and transfer of sourcing information is presented at the meta level as a combination of two search modes: an analytic mode which is planned, formal and task-driven, and a browse mode which is opportunistic, informal and data-driven (Marchionini, 1995). At the micro level, three types of information seeking behaviour can be studied: organizational, team and individual. The transfer activity and the type of information transferred is affected by the characteristics of the firm's tie relationships which can be structural (weak/strong) and relational (information diverse/learning rich).

The model underscores the focal role of the firm's procurement as that of an e-sourcing information broker engaged in task-driven, systemic search. The search efficiency in getting e-sourcing information will depend on the seeker's knowing what e-markets have to offer, the

seeker's valuing that information, the e-market's ease of access, and the costs incurred when accessing the information (after Borgatti and Cross 2003). The nodal function of the procurement department lies therein that it shares common knowledge with the NPD team and the preferred suppliers. According to Grant (1996, p. 115), "common knowledge comprises those elements of knowledge common to members of a network, and intersecting their individual knowledge sets. The importance of common knowledge is that it permits individuals to share and integrate aspects of knowledge which are not common between them". This relationship is characterized by a high density of strong ties and is based on trust and confidence of the NPD team in the competence of procurement professionals. The procurement professionals have acquired common knowledge, and gained the trust, through aggregating and transferring sourcing information. Being aware of the information needs of the NPD team, the procurement professionals are well placed to provide timely signals about new products in e-markets. Due to the strong-tie relationship between procurement and NPD team, this information exchange is reciprocal. The reciprocity can take the form of joint NPD sourcing decisions. The selection of the preferred suppliers would be one example of such joint decision. The active

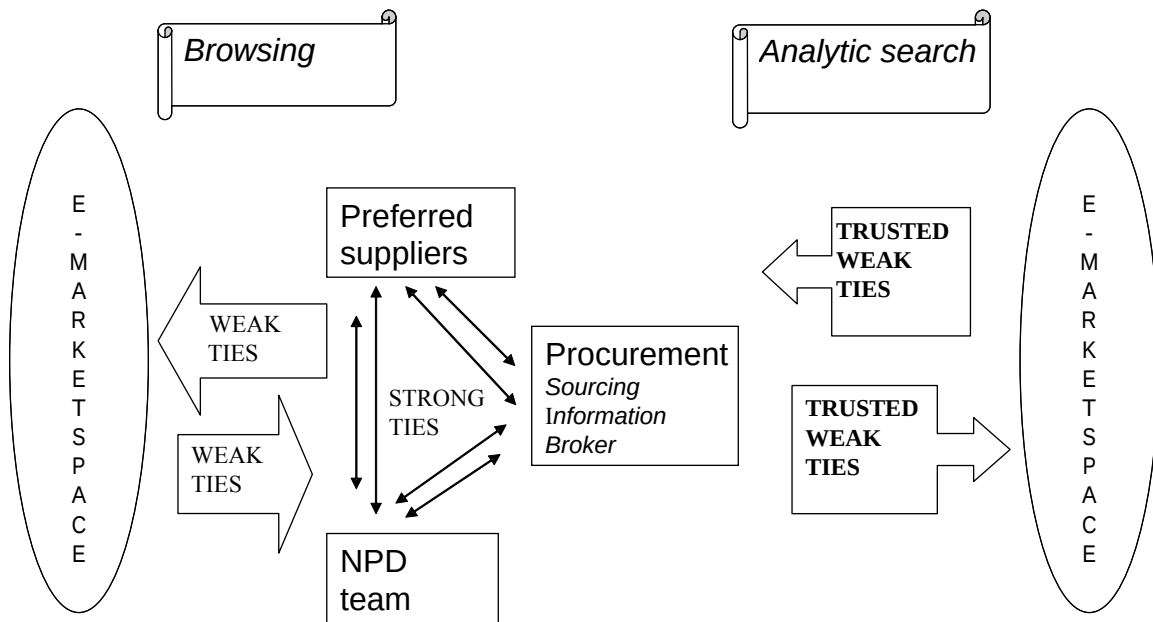


Figure 3: The Firm's Search and Transfer of E-Sourcing Information.

participation of procurement professionals in NPD sourcing was found to be beneficial to the NPD flexibility, as well as to the control over the supply chain knowledge (Barragan et al. 2003). The relationship between the (preferred) suppliers and the NPD team is a strong tie relationship characterized by frequent contacts, trust and joint knowledge exploitation. The browse mode describes the information seeking behaviour of NPD team members and preferred suppliers vis-a-vis the e-markets. It is a weak tie relationship. The searches have an ad hoc character, are data-driven, and are often marked by serendipity and satisficing (March and Simon 1958).

In principle, the relationship between the procurement professionals and the e-markets (in our model on the right) could also be seen as a weak-tie relationship. However, given the task-driven character of the search, the regularity of contact, and the expertise of the procurement professionals, we would expect this weak-tie relationship to be qualitatively different. Therefore, we have designated this relationship as a trusted weak tie relationship. In our view, the concept of “trusted weak tie”, first proposed by Levin and Cross (2004), fits well into the information search space of e-business.

The trusted weak-tie relationship is basically a weak-tie relationship operating in the environment of the benevolence-and-competence-based trust (hence “trusted weak tie”). However, unlike weak ties, trusted weak ties can result in learning effects, hitherto associated only with information transfer within the strong ties. In our view, both features of the trusted weak tie, the benevolence/trust and learning, are amply in evidence in the relationship of the procurement professionals vis-a-vis the e-markets. A further similar “upgrading” of the potential of weak ties can be found in the research of Rindfleisch and Moorman (2001) which shows that provided weak ties operate in an interorganizational setting (in our model represented by the firm’s relationship with e-markets), weak ties can be instrumental in information utilization (i.e. learning). Here again, we see that a capability which has traditionally belonged to the domain of strong ties can, under certain conditions, be attributed to weak ties, too.

Looking at the conceptual model through the lens of an enterprise information system, we see that the model offers the two kinds of flexibility recommended by Gosain et al. (2004), namely: 1/ the operational flexibility – the ability to support changes in product offerings provided for by strong tie relationships between procurement professionals, NPD and preferred suppliers; and 2/ the partnering flexibility – the ability to change supply chain partners in response to changes in the business environment enabled by the scanning and monitoring of e-markets through the trusted weak ties.

Search Outcomes

Fig. 4 shows how the search results relate to the strength-of-ties relationship: weak ties result in the supply of data, trusted weak ties provide information, and strong ties are instrumental in knowledge creation.

	DATA	INFORMATION	KNOWLEDGE
Weak Tie	X		
Strong Tie			X
Trusted Weak Tie		X	

Figure 4: Search Results Reflected through the Strength-of-Ties Relationship.

Traditionally, in the knowledge management literature, data have been regarded as building blocks, information as a means to reducing uncertainty, and knowledge as a result of new understanding (after Davenport and Prusak 1997a). However, the research findings of Levin and Cross (2004) and of Rindfleisch and Moorman (2001) indicate that there are situations in which weak ties, the bearer of novel and diverse information, have the potential to positively affect knowledge creation and learning. Viewing these findings in the light of our research question, we

posit that e-sourcing information, a weak tie, could - under certain conditions - contribute to the firm's knowledge creation and new product development.

Our research task, therefore, is to establish the differences in learning effects resulting from the strong tie, trusted weak tie and weak tie relationships, whereby the underlying assumption is that learning can be both an outcome and a process. Given the dynamic environment of NPD processes, and the volatile reality of e-business, we surmise that the Sense-Making Methodology, developed by Brenda Dervin in the 1970's could prove useful in validating our conceptual model.

Sense-Making as a Method of Valuing E-Sourcing Information

It would be tempting to use, as the unit of analysis, the three levels at which the information search in our conceptual model takes place, namely: the levels of the organization, the team, and the individual. There is a vast amount of literature describing information seeking behaviour models pertaining to these three situations. We suffice here with a few examples. Organizations as information processing mechanisms have been studied by Choo (1998, 2006), Daft and Weick (1984), Davenport and Prusak (1997a, 1997b), and Galbraith (1973). The information seeking behaviour of teams have been addressed by Allen (1984), Fidel and Green (2003), Kurakawa (2004), Leonard and Sensiper (1998), and Poltrock et al. (2003). Finally, there are information seeking models describing the information search at the individual level, developed by Belkin (1982), Ellis and Haugan (1997), Kuhlthau (1991), Marchionini (1995), and Taylor (1968). The majority of the above models are sender-receiver models which regard information as things to be gotten and transmitted. Although these transmission models, by and large, treat information search as a gap bridging, iterative, and context dependent activity, they approach messages from the perspective of the sender, always assuming that the transmitted message answers the needs of the receiver. In transmission models, both senders and receivers are static entities. The Sense-Making Methodology (SMM) of Brenda Dervin (1983, 2003) goes much further.

The Sense-Making Model takes a communication perspective of information. The central idea is that information is made and unmade in communication – intrapersonal, interpersonal, social, organizational, national, and global. It starts with the receiver and looks at message only in terms of how it intersects with the receiver's present, past and expected future. Thus, the receiver is co-constructing meaning of communication against the background of his/her learning, shifting needs and interests. The SMM focuses on behaviour and views the information use not as state condition but as process condition. The three core elements of the Sense-Making Model are: Situations-Gaps-Uses.

Situations consist of time-space contexts through which individuals see themselves moving or stopped from moving. The Gaps are seen at a specific moment by an observer and will depend on where the observer is in time-space and how he or she sees the time-space. Thus, different observers facing the same Gap will "construct" different ways of bridging it. Finally, Uses are the ways in which the individual puts the newly created sense to work in guiding his/her behaviour. The Sense-Making Methodology provides tools with which to measure each of the three core elements. Data are collected through the Micro-Moment Time-Line Interview consisting of three phases. First, the respondents describe, in their own terms, step by step, one or more critical situations. Second, for each time-line-step, the respondent is asked to describe and reflect upon the situations, gaps, bridges, and outcomes. Third, an in-depth analysis of one or more gaps is performed (Dervin et al. 2003).

From the above very brief description, it is clear that the Sense-Making Methodology allows for e-sourcing information to be used as the unit of analysis. The learning and knowledge creation effects of e-sourcing information are likely to surface in the measurement of Situations and Uses. The SMM's constructivist perspective of information and information seeking is particularly attractive for research in an e-business context. Also, we expect that the SMM's emphasis on self-reflection in interviews will prove valuable in discovering the learning processes and outcomes in NPD situations. We associate the SMM's reflective thinking with the concept of reflective practitioner and the single-loop and double-loop learning introduced by Schön (1983). Finally, the situationally bound approach and the discontinuity premise of Sense-Making Methodology is, in our view, particularly well aligned to reality of e-business. For, as Malhotra

(2000, p. 12) remarks: “the new world of business puts less premium on playing by pre-defined rules and more on understanding and adapting as the rules of the game – as well as the game itself – keep changing.”

Conclusion

This paper has set out to discover under what conditions the e-sourcing information could contribute to new product development (NPD), thus enabling knowledge creation in the firm. A conceptual model depicting the firm's search for and transfer of e-sourcing information has been developed, deploying the strength-of-weak-ties theory. The model shows the e-sourcing information in three types of relationship: 1/ the strong-tie relationship of the NPD team, preferred suppliers and the firm's procurement; 2/ the trusted weak-tie relationship of the firm's procurement and the e-markets; and, 3/ the weak-tie relationship that the NPD team and preferred suppliers have vis-a-vis the e-markets. Based on literature review, the paper describes the conditions under which the e-sourcing information, having the characteristics of a weak tie, could become a trusted weak tie and, as such, could enhance the firm's knowledge creation. To validate the model, the paper proposes to adopt the Sense-Making Methodology, and gives reasons for this choice.

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