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Social cross-functional vendor selection in technologically uncertain sourcing situations

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ABSTRACT

Based on an in-depth case study of an automotive manufacturer sourcing parts for high technology projects, this study investigates the intentions and structure of socialization within and between firms during the supplier selection process in technologically uncertain sourcing situations. Here, we aim to answer the question of how socialization can hedge against the high levels of uncertainty for manufacturers selecting suppliers of high technology resources. The case represents a major automotive manufacturer in Northern Europe, and is based on 38 semi-structured interviews with representatives of the different functions involved in the sourcing for the new development projects. Our data suggest that internal and external socialization during the supplier selection process can improve internal alignment and problem solving, and external familiarity towards the sourcing task. In this context, socialization took place on functional, cross-functional, and (inter)corporate levels, with higher functional autonomy during the assessment, and higher cross-functional integration during negotiations and decision making, adding to the debate on whether functions should be integrated or separated.

1. Introduction

Various traditional industries, including the automotive industry, are pushed to explore beyond their normal supply network, to search for new sources of supply such as from startups, innovation hubs, and companies from other industries and markets, in order to identify and access suitable new technologies (Homfeldt et al., 2017; Kurpjuweit et al., 2021; Phelps, 2010; Schiele, 2006). Consequently, firms are exposed to technological, commercial, organizational, and societal uncertainties including, e.g., the technological capabilities and capacities of future partners, uncertainties related to transactional and relational dimension of a future partnership, and uncertainties relating to the technology itself view technology (Hall et al., 2014), i.e. 'a technologically uncertain sourcing situation'. The supplier selection process includes scanning the market for potential suppliers, creation of long and short lists of suppliers, collection of information from potential suppliers (e.g. through RFIs and RFQs), evaluation of the potential suppliers, and selecting a few to start the negotiation process with (Van Weele, 2018). Selecting the right partner for a sensitive relationship characterized by uncertainty, requires input from multiple different functions within a company (i.e. cross-fucntional sourcing) as the required knowledge is often dispersed in the firm (Brewer et al., 2019; Eisenhardt and Tabrizi, 1995; Melander and Tell, 2014), including the involvement of purchasing and the R&D function (Oh and Rhee, 2010). Uncertainties in this context fall within three groups, including those related to the sourcing task environment (e.g. supply market conditions), the sourcing task characteristics (e.g. the novelty of the

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purchase or product, demand volitality, or complexity and importance of the product), and those related to the interdependencies between the sourcing task units (e.g. in the cross-funcitonal teams). The higher the uncertainties the more the firm needs mechanisms to process information in order to attain its goals and complete its tasks (Trautmann et al., 2009; Tushman and Nadler, 1978). In this study, we investigate the structure and communication within the firm (related to the sourcing task characteristics and interdependencies between sourcing task units) and between firms (related to the sourcing task environment) during the supplier selection process to handle such technologically uncertain sourcing situations.

The literature on cross-functional teamwork suggests that during cross-functional supplier selection more information is shared internally among the functions and externally with the suppliers (Moses and Åhlström, 2008), different functions have differing goals and ways of working (Öhman et al., 2021; Hesping and Schiele, 2016; Oliva and Watson, 2011), cross-functional diversity raises the level of task disagreements (Lovelace et al., 2001), and individuals from different functions often develop different relationships with different individuals from the supplier firm (Emsley and Kidon, 2007) which can create parallel relationships and information channels between the firms (Melander and Lakemond, 2015; Mikkelsen and Johnsen, 2019). Consequently, the different functions can form different opinions about the potential partners during the selection process (Moses and Åhlström, 2008). Lack of an appropriate alignment and matching of information internally at the firm and externally with the supplier, can result in a suboptimal buyer-supplier relationship (Agndal and Nilsson, 2010).

Scholars have widely suggested that socialization, through more intense interactions and communication, can increase familiarity between partners/individuals and thus help reduce the uncertainties and improve understanding and alignment (Cousins et al., 2006; Le Dain et al., 2020; Patrucco et al., 2020; Xu et al., 2017). In an interorganizational context, socialization can be understood as the "*level of interaction between, and communication of, various actors within and between firms which leads to the building of personal familiarity, improved communication, and problem solving*" (Cousins et al., 2006, p 853), which can be gained through both formal and informal channels. In the countext of our study, socialization involves learning about and adapting to the needs of the partner in a relationship with the aim of meeting the relationship requirements and thus signals benevolent intentions towards the relationship (Anderson and Weitz, 1992). Socialization fosters trust and commitment, which increases inter-firm dependence, contributes to higher degrees of integration, and can offset high degrees of uncertainty (Cousins and Menguc, 2006; Morgan and Hunt, 1994). Socialization with potential partners would thus seem particularly important in situations characterized by high technological uncertainty, as it will improve understanding, insight, and trust before entering a contractual relationship (see e.g. Le Dain et al., 2020 for a distinctin made between the socialization before and after development projects). In the context of supplier selection of technology, socialization takes place externally by the different functions with the supplier counterpart, but also, and arguably importantly, internally across the cross-functional sourcing team.

Socialization is mainly discussed in the context of existing relationships such as those related to new product development (NPD) projects (Lawson et al., 2009; Goodman and Griffith, 1991) and even connected to innovation in the market (Dai et al., 2018). The question arising is therefore how firms can use socialization as a strategy (internally and externally) to improve the familiarity of the potential partner before relationship formation, tackle the different uncertainties, and thus contribute to more successful supplier selection for high technology resources. We aim to answer this research question and investigate how socialization can manifest prior to a contractual relationship.

In this study, this question was investigated in a single case of an automotive manufacturer. The automotive industry is a suitable context for this study, as supplier selection is often cross-functional with established processes and functional roles. Due to the high dependencies that exist between components, modules and systems in automotive manufacturing (Behncke et al., 2011), knowledge from different functions has become an inherent part of supplier selection. Additionally, to remain competitive, automotive makers are finding themselves highly reliant on new technology from the supply market (Güttner and Sommer-Dittrich, 2008; Henry, 2015; Holweg, 2008), for instance, in the pursuit of autonomation and electrification of vehicles, which has resulted in a new set of suppliers such as start-ups emerging in the market with little to no knowledge of the industry. The interaction and collaboration of three functions which provide input to the supplier selection process and their interactions with potential suppliers at a large automotive manufacturer in Northern Europe were studied.

Our findings, firstly, contribute to the discussions related to firms sourcing high technology in the management literature. We add to the socialization literature by extending the discussions to the pre-contractual relationship phase, and add to the debate in the literature on whether firms should integrate the involved functions, or isolate them in order to benefit from the parallel relationship channels of "good cop- bad cop" (e.g. Brattström and Richtnér, 2014). By suggesting how firms can reduce uncertainties related to sourcing of high technology innovation while managing the input from multiple functions internally our study also contributes to practice.

The paper is structured as follows. First, theory on socialization and cross-functional supplier selection is presented. Then, our methodology is described, followed by a case description. Thereafter, discussion and conclusions of our case findings are presented.

1.1. Socialization in supplier selections

As a theoretical lens, socialization is well established to study interpersonal relationships, including in the fields of social sciences, strategy and marketing, but less commonly used to study complexities of inter-firm relationships (see the work by Cousins and colleagues for the supply chain management studies built on socialization, e.g. Cousins et al., 2006). Within the firm, socialization translates to an individual's interactions and communication within the group and with the broader social structure of the firm, which in our study would mean with individuals in the same team and other functional teams as well as with those higher in the hierarchy (Cousins et al., 2006; Oh et al., 2004). Externally (i.e. inter-firm), it would translate to similar interactions and communication of

relevant individuals at the two firms which results in higher familiarity of the supplier.

Socialization is considered essential in the development of any business relationship and can facilitate and enhance the supply integration process (Cousins and Menguc, 2006; Le Dain et al., 2020). Through socialization, individuals in a joint project acquire knowledge of the other firm's social values, such as the rules of thumb, specific language, ideology, prejudices, and social etiquette. In this manner, through socialization, partners can best utilize the relationship resources for their mutual benefit and improve the attractiveness of the relationship for the decision makers (Hallén et al., 1991).

Scholars have argued that these investments are particularly important during the early phases of interaction between two partners, in which the communication and negotiation causes them to "*rearrange their mutual distributions of obligations, benefits and burdens*" (Dwyer et al., 1987, p.16). The 'joint incremental' nature of socialization ensures that investments are mutual and proportional for both parties, adding to the norms of reciprocity for the relationship (Heide and Miner, 1992). While socialization is often discussed within the boundries of contractual relationships, parties also need to engage in socialization prior to entering into a relationship. Investing in building a relationship with a partner prior to a contractual realtionships can contribute to stabilizing that relationship. Thus, the initial exchanges with a partner are considered critical (Lambe et al., 2001). For example, through socialization activities such as team building, social events and joint workshops, individuals across firms acquire knowledge of the other firm's social norms and values (Cousins et al., 2006) which helps evaluate trustworthiness (Carey et al., 2011). Our study investigates the different levels of socialization initiated by a buyer firm, happening during the initiation of a relationship, or the supplier selection phase, both within a company (i.e. intra-firm) and externally with a supplier (i.e. inter-firm), a theme not explored in the previous literature.

It has been suggested that the are both formal and informal channels of socialization, where formal channels are based on the structures which exist within the firm for sharing information and expectations such as meetings, co-location, and reporting structures (Cousins et al., 2006; Xu et al., 2017). Informal socialization channels, on the other hand, are very much focused on developing inter-personal relationships and can move outside of the physical setting of the workplace. Socialization can improve interactions, increase understanding of differing cultural norms, improve communication, build trust, and increase the awareness of each other's needs (Cousins, 2002; Handfield and Bechtel, 2002). Both formal and informal socialization can enhance interpersonal ties, which in turn is expected to enhance inter-firm ties (Arvidsson and Melander, 2020; Cousins et al., 2006; Doney and Cannon, 1997). Formal and information socialization has also been found to facilitate knowledge sharing within an firm (Lynskey, 1999). In NPD projects involving suppliers formal socialization provides structures to enable informal socialization, for example formal project meetings are linked to informal social events such as dinners (Le Dain et al., 2020). Lawson et al. (2009) find that informal socialization such as social events and communication more directly facilitate knowledge sharing than informal ones. Some studies have argued that informal socialization needs to be combined with some degree of structure for a better outcome (e.g. Lawson et al., 2009; Le Dain et al., 2020). For instance, cross-functional teams need effective leadership and clear goals (Trent and Monczka, 1994). Familiarity seems to improve how cross-functional sourcing teams collaborate, where interactions and previous experience help members to interpret each others reactions (Kaufmann and Wagner, 2017).

1.2. Cross-functional supplier selection

In cases of technological uncertainty, firms are more inclined to deviate from their usual processes for supplier selections (van Echtelt et al., 2008). Although the purchasing function often has the most interaction with potential suppliers in the supplier selection process, R&D has been suggested to, at times, be the primary function responsible for approaching and selecting suppliers in the cases in which suppliers bring new technology (Ragatz et al., 2002). However, a recent study, found that firms that involve purchasing early in NPD sourcing processes are likely to have higher and more efficient supplier involvement than those that rely purely on engineering personnel for the supplier integration (Schiele et al., 2021). From a supplier's perspective, this can be explained by sales personnel wishes to avoid interacting with purchasers for as long as possible to keep room for innovation (Kurpjuweit et al., 2018).

Cross-functional supplier selection has mostly been discussed in relation to NPD projects. Purchasing and R&D have been identified as the most important actors for interacting with suppliers (Öhman et al., 2021; Dowlatshahi, 1998; van Echtelt et al., 2007). It is argued that purchasing should manage the interfaces with suppliers, solves commercial issues such as costs, deliveries and payments (Oh and Rhee, 2010), should act as a negotiator, facilitator, supplier's advocate and educator (Wu et al., 2010), should take a cross-functional leadership role (McGinnis and Vallopra, 1999), should share information, and lead discussions. Hence, it is argued that purchasing needs to integrate with other functions within the firm and become more team-oriented (Öhman et al., 2021; Faes et al., 2001). Cross-functional collaboration where functions make complex decisions, such as in supplier selection for sourcing high technology, is influenced by political dynamics within the firm (Franke and Foerstl, 2020a; 2020b), and team members tend to promote their own functions' interests related to, e.g., supplier evaluations (Hald and Ellegaard, 2011).

Luzzini and Ronchi (2011) show that purchasing's role depends on the level of technological uncertainty. They find that the higher the technological uncertainty, the more influential purchasing is in supplier selection phase. In fact, in their case with high technological uncertainty, they find that purchasing is in charge of all activities related to suppliers, including supplier selection (Luzzini and Ronchi, 2011). However, several scholars suggest that purchasing should have a supporting and facilitating role in NPD involving suppliers (Knight and Harland, 2005; Picaud-Bello et al., 2019; Schiele, 2010; Wu et al., 2010). Schiele (2010) discusses purchasing's dual role of supporting NPD while also being responsible for cost and integration over the product life cycle. In this sense, purchasing can be organized into advanced sourcing (involved in NPD projects), life-cycle sourcing (supplier management from the start of production) and operative procurement, in order to handle these dual roles. A recent study by Ellram et al. (2020) highlights purchasing's dual role of managing NPD costs and on-going saving initiatives. Ateş et al. (2018) suggest that purchasing categories managed for cost should have a formalized purchasing approach while categories managed for innovation should have a more informal

cross-functional approach. These studies suggest that purchasing should have an active role both within the firm (across functions) and outside of the firm (with suppliers).

Purchasing has a key role in the automotive industry's innovation processes, being responsible for identifying ideas and presenting these internally at the firm, and having a cost focus as well as identifying new suppliers (Homfeldt et al., 2017). Purchasing's activities in NPD in this industry revolve around finding new technologies and suppliers, communicating guidelines for supplier involvement, and motivating and communicating with internal actors such as R&D (Servajean-Hilst and Calvi, 2018). (Goldberg and Schiele, 2020) point to the need for purchasing to change towards more relational aspects in this context, such as moving from focusing on price negotiations towards joint cost calculations with suppliers.

During cross-functional supplier selection the overall company strategy, the specific sourcing strategy and the functional strategies need to be aligned (Moses and Åhlström, 2008). Additionally, the involved functions need to align both their decisions (Gonzalez-Zapatero et al., 2017) and their goals (Moses and Åhlström, 2008). Sharing and understanding information can also be an important aspect in the success of cross-functional sourcing (Foerstl et al., 2013; Gonzalez-Zapatero et al., 2016, 2017; Song et al., 1997), as it directly impacts decision-making (Moses and Åhlström, 2008) and facilitates the understanding of the needs and implications that a firm's business has for all the functions (Calantone et al., 2002). Following on from these studies, we explore further how connections with the supplier can contribute, or not contribute, to a more successful supplier selection.

2. Method

This paper takes a qualitative approach, reporting a case study of 'the supplier selection process for new vehicle development projects (i.e. autonomous and electrified) of an automotive manufacturer'. The case relies on interview data from individuals in the sourcing team. An in-depth single case study is suitable and adds value to our purpose based on the following arguments: 1) Following Siggelkow's (2007) arguments, our case is representative of many traditional companies with an established supplier base and supplier relationships that need to deviate from their normal processes to access high technology from new suppliers. Thus, the in-depth case study gives us the insight required to understand how the buyers were actually socializing, on what aspects, with whom, to what extent, their intentions, and whether it was helpful or not. 2) We aim to answer "how" and "intent" questions which are best answered using in-depth case studies (Yin, 2009). 3) We aim to understand the phenomenon (i.e. socialization) in its context (i.e. during the technologically uncertain supplier selection) (Yin, 2009). 4) An in-depth understanding of the interactions, communications and socializations in this context was required in order to add to e.g. the debates related to integration versus isolation of functions during supplier selection (as suggested by e.g. Ellram, 1996). 5) Finally, as recommended by Ketokivi and Choi (2014) we delve into theory elaboration to build on the research on socialization in business relationships (e.g. Cousins et al., 2008; Cousins et al., 2006; Cousins and Lawson, 2007; Cousins and Menguc, 2006) in order to develop an understanding of socialization in the context of technologically uncertain supplier selection prior to relationship formation.

2.1. Case selection

The supplier selection process for new vehicle development projects (i.e. autonomous and electrified) of the established automotive maker in Northern Europe was selected as a representative case. The firm has a history of using cross-functional teams in supplier selection and it has an established supplier selection process. Also, the case represents the challenge of sourcing for new technologies. The firms also represent an established culture of socialization and trust building in their business. We did not focus on any specific development projects in the study, but the overall experience of the sourcing team in supplier selection for technology suppliers (similar to what Bogner et al., 2009 term interviewing experts, but within the borders of our case company).

Purchasing within the case company is a long-established function with more than 200 employees and, for the purpose of product development, is included in the top management of the business. The head of purchasing reports directly to top management, strategic decisions and contracting are taken centrally and most operational decisions (taken at the category level) are also coordinated through the central office. Around 70% of the vehicle production costs of the company come from external suppliers. The company has approximately 500 active suppliers for direct materials and has been working with several of its suppliers for decades. The top 10 suppliers have been working with the company for an average of 30 years. They often consider it easier to work with old and established suppliers, since the firms know each other, their respective capabilities and their people. Still, with the need to source for high technology, this view is challenged, and the management is extending resources to increase supply market knowledge and to collaborate with new suppliers.

2.2. Data collection

Semi-structured interviews were designed to gain a high level of communication with the respondents (as suggested by e.g. Easton, 2010). The questions were open–ended, and the interviewees were often asked to give concrete examples based on their experience, and to chart working processes (routines, structures) and tensions that arise as supplier selection is performed within these structures. The interview guide was designed according to the following sections and with the supplier selection process as a unit of analysis:

- Background of the individual and role in the company
- Histories and developments of the supplier relationships within the category

- Key activities related to supplier selection for the new development projects (what is exchanged, what's done by who in the company and at the suppliers, joint activities, etc.)
- Governance structures (e.g. the firm, communication, decision making, problem solving, regulations, strategies, systems, socialization efforts)
- Major positive and negative incidents in the past

Prior to the interviews, each subject received an explanation of the research and the questions. Additionally, the interviewees were informed about the confidentiality of their answers and asked for permission to be recorded. Each interview lasted 50–60 min. The interview sessions were recorded, transcribed, and if necessary, translated into English. Data was collected between 2015 and 2017 in 38 face-to-face semi-structured interviews. Of these 38 individuals, 24 were from purchasing, six belonged to supply quality management (SQM) and five were R&D managers. An R&D manager manages a group of R&D engineers and specialists for a particular part or technology, it could be for e.g. the body structure of a car or electronics. Data on the supplier selection process, the firm and the nature of the phenomenon was collected by one of the researchers by interviewing three top managers in the purchasing department. After these three initial interviews and identification of the functions involved, the data collection guide was designed. Then, 35 employees were identified from product categories that were involved with the new developments. Interview questions were asked with a focus on the particular new technologies required. The type of technology varied depending on the respondents' involvement in different supplier selections processes. Interviews were discussed during weekly meetings, with the aim of reaching saturation in information. Later, the raw data was analyzed (i.e. the transcripts). An overview of respondents is presented in Table 1.

2.3. Data analysis

We employed an iterative process (as suggested by Dubois and Gadde, 2002), moving between data and theory, and so the transcripts were analyzed guided by the reviewed theory on 1) socialization channels (i.e. formal and informal, internal and external channels), 2) identified levels of socialization (i.e. functional, cross-functional, and firm), and 3) the intent and potential outcomes of

Table 1
Number of interviews per department and task level.

Department	Role	Abbreviation
Purchasing top management	Vice President of Purchasing	P01
	Director of Car Purchasing	P02
	Senior Purchasing Manager	P03
Purchasing	Purchasing manager (powertrain)	P1
	Senior buyer (commodity)	P2
	Purchasing manager	P3
	Senior buyer (commodity)	P4
	Category buyer (interior)	P5
	Purchasing manager (exterior)	P6
	Category buyer	P7
	Purchasing manager (forward sourcing)	P8
	Category buyer (interior)	P9
	Purchasing manager (closers)	P10
	Senior buyer (commodity)	P11
	Purchasing manager (interior)	P12
	Purchasing manager (interior)	P13
	Senior buyer (commodity)	P14
	Purchasing manager (electronics)	P15
	Purchasing manager (senior, interior)	P16
	Purchaser (interior)	P17
	Purchasing manager (interior)	P18
	Category buyer (commodity)	P19
	Purchasing manager (electronics and safety)	P20
	Senior buyer (Engine)	P21
	Senior purchasing manager	P22
	Senior buyer (interior)	P23
	Category buyer (control)	P24
SQM	SQM manager (site)	S1
	SQM manager (senior site)	S2
	SQM manager (site)	S3
	SQM manager (senior site)	S4
	SQM manager (site)	S5
	SQM manager	S6
R&D	R&D Manager	R1
	R&D Manager	R2
	R&D Manager	R3
	R&D Manager	R4
	R&D Manager	R5

the socialization efforts. Since every individual interview followed a slightly different route, the transcripts were coded using an open coding technique (as defined by Yin, 2009). The codes were assessed and grouped if showing similar traits, without the ambition of assigning any particular label to the group itself. The coded data were then sorted according to the functions and the internal or external orientation of the interactions within mega matrices (Miles and Huberman, 1984). Afterwards, the data in the tables was sorted according to the formal/informal, functional/cross-functional/firm. Finally, the data was also sorted based on the intent of socialization using theoretical codes (e.g. familiarity, communication, problem solving, knowledge sharing from the socialization literature) and the type and level of uncertainty (from the information processing perspective literature). Discussions and propositions are then made based on the patterns observed.

3. The case of supplier selection at the automotive manufacturer

In the last couple of years, the company has tried to broaden their supply market knowledge as a response to market forces, in order to keep abreast of innovations including electrification, smartification, and automation: "*such market scanning takes a lot of resource and people would rather stick to the old ways*" (P1). In such vehicle development projects, needs arise in the engineering department, initiating the central supplier selection of the company. A sourcing team, which could be engineers only, first prepares a sourcing plan, mapping needs, required activities, timeframe, and suppliers to invite, which they then present to the top management. They then perform what they call a "supplier selection approach", in which the internal buyer or buyer team (i.e. the individual or team responsible for the purchase) present their strategy to top management. The buyers prepare and send RFQs while the engineering group assesses technical aspects of the offers to see if they can reach the set targets. However, it is a challenge for the purchasers to be broad in their market scanning when developing the RFQs due to internal reluctance by the engineers. Upon finalizing the negotiations, the buyers, located in different commodity groups, prepare and present their "supplier selection recommendation" to the supplier selection committee to get an approval for the purchase.

The company often awards supplier contracts with a length of several years. The supplier then typically takes part in both the development and production of a component. Three main functions take part in the review of suppliers during the selection process: purchasing, SQM, and R&D. While SQM serves as a support to the purchasing functions it belongs to the quality department of the firm. On the supplier side, executives and CEOs regularly meet with the company's top management; they present their research and advanced engineering, and together discuss what the suppliers can add to the company. Based on our observations, socialization takes place at three different levels including functional, cross-functional, and corporate levels, both internally within the firm, and externally with the supplier firms, during the supplier selection process. We explore this further in sections below.

3.1. The functional level of supplier selection

While all three functions of purchasing, SQM, and R&D aim to find the best option for the company, their driving forces are different, which can create unwanted tensions in sourcing for technological projects. Purchasing allocates great weight to price as a selection criterion: "*The price is most important. …. Sometimes we choose a supplier with fewer capabilities because they are cheaper*" (P5); "*We evaluate suppliers on a large number of parameters. But what is most important is that they have a competitive price*" (P15); and "*I can't select a supplier based on a feeling or my personal opinion about a supplier, the decision always has to be based on the best business case*" (P13). The other functions do not always consider this decision to represent the best supplier for new development projects: "*There are examples of when we have not had control over the technical steps and the technical prices but have pushed for lower costs from suppliers. Sometimes it has gone too far. And it's all about reducing costs. I know that we need to reduce cost to stay competitive, but it needs to be controlled*' (S1).

There seems to be a misalignment and a power imbalance between the three functions in relation to the final supplier selection in new development projects. Purchasing thinks that the opinion of the others has too great of an influence for new development projects "*if we come to the same commercial level, we try to push probably for the ones that engineering has preferred in the end. But sometimes we don't agree, and we have to fight*" (P20), while SQM, at times, sees its preferences overlooked "*Sometimes we have to look the other way … It's not an approach that I appreciate, but it's a pragmatic way to get products. But for how long?*" (S3). The size and involvement of R&D is much larger than purchasing in sourcing for high technology, but purchasing is still responsible for the commercial issues; "*For my particular commodity, in the daily work it's one amount of people, but of course with what we are developing now we have our whole R&D department working in close relationship with the suppliers and the same thing with the SQM with quality; they do not work all the time but from time to time*" (P19).

In these projects, socialization with a supplier of new developments happens during three distinct phases of supplier selection, during product development and during production. *"We often have dialogues with suppliers on three levels at the same time. First, the production; then there are a number of projects where we are developing a car together. Third: we are conducting a supplier selection"* (P6). During supplier selection, purchasing evaluates potential suppliers, and often meets new firms who are interested in becoming a supplier. In early meetings with a new supplier, purchasing meets a wide range of supplier representatives in order to get to know them. *"How interested a supplier is in us is shown by who we meet. I have visited a new supplier where the owner, R&D manager and factory manager spent the whole day with us and showed us the factory"* (P2).

Purchasing's main responsibility is to understand the cost of the suppliers' components and to evaluate the supplier's firm. Purchasing often needs in-depth information in order to understand how cost is structured at the supplier. They conduct an overall review of the company, involving aspects such as financial data, ownership structure and sustainability profile. A visit to the supplier is often made to interview management, and a set of questions is guided by the use of an evaluation sheet. Purchasing also ensures that the

Table 2
The intra- and inter-firm socializations at the function level including the type of uncertainty addressed.

Function	Intra-firm socialization	Inter-firm socialization
R&D	**Formal**	**Formal**
	- (TC) Assessment, discussions, and possible selection of the preferred supplier [R3, R4] - (TC and TE) Technical assessment of suppliers for sourcing and creating preferred lists [P20, R3, R4, R5] - (INTU) Escalation of potential issues to higher management if not resolved [P19, P20, P22, P23, P24, R2, R3]	- (TC) Revision of competence and capacity [S3, R1, R3, R4] - (TC) Assessment of how supplier develops their knowledge in-house and previous developments [P20, P21, P23, R1, R3] - (TC and TE) Collaboration with supplier on the NPD (e.g. communication of needs) [P19, P20, P22, P23, R2, R3, R4, R5] - (TC) Specifications sent to suppliers [P20, R4] - (TC and TE) Benchmark studies [R2, R3, R4] - (TC and TE) Up-front studies [R2, R3, R4, R5]
	Informal	**Informal**
	- (INTU) Leadership of communication depending on who has the biggest business or issue [P20] - (INTU) Informal corridor conversation [P20, P23, R2, R3, R4]	- (TC and TE) Communication of new developments not included in the agreement [P2, P19, R3] - (TC and TE) Direct communication with supplier production and engineers [P1, P19, P20, P22, P23, R3] - (TC and TE) New supplier communication with R&D by e-mail or call when they have a direct question [R2, R3]
SQM	**Formal**	**Formal**
	- (TC) Assessment of production and technical capacity of suppliers [P20, P21, P24, S3, S4, R1, R3] - (TC and TE) Assessment of tier-2 supplier if supplier wants to change [P20] - (INTU) Complement and opposition to purchasing [S2]	- (TC) Audits and assessment [P8, P12, P19, P20, P23, P24, R3, R4, S1, S2, S3, S4] - (TC) Site visits [P8, P20, P23, R3, S1, S3, S4, S5]
	Informal	**Informal**
	- (INTU) Corridor conversation [P20, P23, R3]	- (TC and TE) Direct communication with quality [P19, S1, S5]
Purchasing	**Formal**	**Formal**
	- (TC) Supplier assessments for sourcing [P20, P23] - (TC) Creation of preferred lists [P20, P23] - (TC) Reassurance best price is selection [P3, P4, P5, P6, P7, P13, P15, P18, P23, S1, S2, S3, S4, R1]	- (TC and TE) Requisition of information with RFQs [P19, P14, P20, P24] - (TC) Negotiation of price [P19, P20, P21, P22, R4] - (TC) Additional agreements [P19, P21] - (TC) Negotiation of technical changes [P3, P21] - (TC) Resolution of claims [P21, P22] - (TC) Discussion of capacity issues [P21]
	Informal	
	- (INTU) Informal corridor conversation [P20, P23, R3]	- (TC and TE) Approval of tier 2 supplier change [P20] - (TC and TE) Regular (bi-weekly-monthly) face-to-face meeting [P1, P19, P21] - (TC) Weekly meetings during annual renegotiations [P19, P23] - (TC) Visit to supplier facilities and reviews [P2, P6, P8, P17, P23] - (TC) Communication of agreements (e.g. on goals) [P19, P24]
		Informal
		- (TC and TE) Communication of different contacts at different levels on different topics depending on the mandates (e.g. category buyer or group manager with sales manager or KAM) [P1, P2, P16, P19, P20, P23, P24] - (TC and TE) Telephone, e-mail, or face-to-face conversations if something specific comes up (e.g. an issue or changes from agreement or development) [P19, P20, P22, P23, P24] - (TC and TE) Personal relationships [P21, P23]

[…]: the code of the interviewees mentioning the activity or channel
(…): the type of uncertainty addressed; TC=Task Characteristics; TE=Sourcing task environment; INTU=Interdependencies between sourcing task units

supplier follows production purchasing terms and conditions and follows up cost estimates and cost breakdowns of products.

The company's SQM reviews production and quality issues at the supplier. SQM carries out both desk reviews of suppliers and visits suppliers' factories to review their production and processes on-site. In interaction with suppliers, SQM tours the factory, studies manufacturing processes and reviews how the supplier handles documentation, how complaints are handled and other production-related issues. They interview both managers and operators. Often, SQM is involved in developing the suppliers' processes and improving the quality of their operations. Hence, they need to have several interaction points with suppliers and to have good working relationships and communication. *"Management thinks that we should be working at higher levels with our suppliers, focusing on time schedules and so on. But it doesn't matter what time schedule we have if we haven't solved the technical issues, such as chemical details. You can say whatever time schedule you like, but I don't know when the chemical issue will be solved"* (S1). They see their role as a complement to purchasing and question purchasing's decisions from a technical point of view, so that a low-quality supplier is not selected merely on the basis of price.

R&D on the other hand, decides which technologies are suitable for a specific project. R&D is responsible for the product and SQM ensures that the supplier's processes work. In other words, R&D uses SQM to check if the supplier has the right quality. R&D reviews how well the supplier will manage technically to develop and produce a specific item. *"We perform a validation of suppliers during the*

Table 3
The intra- and inter-firm socializations at a cross-functional level including the type of uncertainty addressed.

	Intra-firm socialization	Inter-firm socialization
Formal	- (INTU and TC) Purchasing communicates specifications to R&D [P19, P20, P23, R1, R2] - (INTU and TC) R&D communicates preferred suppliers to purchasing [P7, P20, R1, R2, R3] - (INTU and TC) R&D communicates selected supplier to purchasing [R3, R5] - (INTU and TC) R&D discusses the quality of a supplier with SQM [P8, R1, R2] - (INTU and TC) SQM sends weekly reports to purchasing [P24] - (INTU and TC) Formal documents (e.g. supplier quality, specifications, agreement) [P20, P24] - (INTU and TC) SQM communicates the technical capabilities of a supplier to purchasing [P3, P20, P23] - (INTU and TC) SQM communicates supplier limitations and factory quality systems to purchasing [P3, P20, P21, P24] - (INTU and TC) SQM and R&D perform pre-study of supplier [P8, S3, R3] - (INTU and TC) Joint preparation meetings [P2] - (INTU and TC) All three functions have more meetings if problems arise or during development to coordinate (e.g. weekly) [P19, P20, P22, P24] - (INTU, TC, and TE) Strategic individuals from the groups have separate meetings to discuss e.g. dev. Or quality and to obtain the whole picture (e.g. category/group managers) [P19, P20] - (INTU and TC) Negotiate supplier selection (e.g. having different preferences) [P4, P7, P9, P20] - - (INTU, TC, and TE) Purchasing develops business plan for commodities with R&D [P21, R2]	- (INTU and TC) R&D communicates specifications with purchasing and then with the supplier [P19, P20, P23, R1, R2] - (INTU and TC) Purchasing chooses the supplier based on a list from R&D (removing technologically non-suitable) and SQM (removing the process related non-suitable) [P7, P20, R1, R2, R3] - (INTU and TC) The functional managers jointly hold meetings with the supplier representatives in situations of necessity [P20, P23]
Informal	- (INTU and TC) R&D contacts purchasing if an issue, e.g. changing specs, couldn't be solved by a given function, e.g. (Ops buyer) [P19, P20] - (INTU and TC) Regular weekly work by operational buyer at R&D to follow developments and tests [P9, P21, P23, R2] - (INTU and TC) Ops buyer is at the offices of R&D daily or more [P19, P23] - (INTU) Not always clear and sometimes difficult to know who to contact. Might end up with someone contacting a person they know to be directed to the right person [P19, P20, P21, P22] - (INTU) Coffee, lunch, after-work, or dinners [P2, P3, P9, P23] - (INTU) Trust that the other functions are doing their job [P9, P16, P20, P23, R2]	- (INTU and TE) Depending on the individuals involved, informal gettogether might happen with the supplier representatives and individuals from involved functions [P19, P23]

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concept phase, where we provide a list of available suppliers to purchasing" (R2). They meet with the supplier to gather information about the suppliers' technologies, technical capabilities, knowledge in-house and their systems. *"If the supplier's technology isn't the right one, then that is basically the only time we can say no to a supplier. That we don't accept this supplier because they have the wrong technology. That is the mandate that we have"* (R1). R&D directly communicates the specification requirements with the suppliers, for example, in terms of new developments. R&D also needs to have a global perspective. *"Aspects that are raised in Europe need to be considered for Asia and the US from the beginning as well. We need to think about the global footprint*" (R2). The discussed socialization efforts of each function during the supplier selection process are summarized in Table 2, including the type of uncertainty that they mainly address.

3.2. The cross-functional level of supplier selection

In new development projects, during supplier selection there are meetings among all three, and at times discussions take place only between two, functions, e.g. purchasing with SQM, or R&D discussing quality with SQM; or R&D with purchasing. Depending on the individuals heading the operations or groups, they maintain differing levels of contact with the other functions. This can range from having routinely scheduled meetings, having more contacts during problems or new specification requirements, management meetings, informal conversations (in the corridor, over coffee, lunch or after work), or even regular visits to the other functions e.g. to jointly develop business plans for a new development. Informal discussion of final supplier selection was specifically considered important for the process: "*we sometimes discuss gut feelings about a supplier during preparation meetings, we call it coffee chat. It happens when you happen to meet for example someone from SQM and you briefly discuss a supplier. It's not necessarily meetings, you just happen to meet the SQM person*" (P2); "*We often work closely with someone from R&D and SQM. We often take a moment to consider a number of questions before making a recommendation. Sometimes this is done next to the coffee machine, it's not very structured and we don't need to document it*" (P2). The supplier selection activities and socialization channels at the cross-functional level are summarized in Table 3, including the type of uncertainty that they mainly address.

R&D communicates specifications to purchasing to be communicated to the suppliers, discusses quality requirements and the standard of the supplier with SQM, informs purchasing of its preferred suppliers, and negotiates its preferences with them when disagreements arise: "*After we have handed our drawings over to purchasing and they go looking for the best price supplier, we have very little influence. We can demand that SQM ensures the suppliers' quality and we have to trust that they can check that the supplier can deliver correctly … we may wish to collaborate with a certain supplier, one that is great to work with but is very expensive. Then we need to have that dialogue with purchasing, and we have to compromise*" (R1). SQM communicates the technical capabilities, limitations and factory quality systems of a supplier to purchasing, and at times conducts a preliminary study of a supplier with R&D; *"Our way of working is changing. We are involved earlier in the process and collaborate with R&D in the early phase to ensure that the requirements sent to suppliers are of sufficient quality"* (S3).

The three involved functions all addressed the need to be aligned. All interviewees from all three functions stressed the importance of having clear sharing of information across functions and to be aligned and informed on progress and issues: *"It's very important to have internal collaboration. We need cross-functional collaboration between R&D, purchasing and SQM and we all need to collaborate. We need to share information with each other so that when we enter into the final negotiations with a supplier, we have a shared view of that supplier and what we want"* (P18); *"We try to work together and align with others inside [our company] to see which the best suppliers are that we want to have in sourcing"* (P20); *"it's almost team work. And if it's in the sourcing it's usually good if the category buyer aligns with the right person in engineering."* (R2).

Purchasing considers this alignment to be part of its role: "*It is us, the purchasers, who are responsible for supplier selection. But it is our responsibility to seek consensus with other functions and to persuade them to agree with our recommendation*" (P8). Purchasing also commonly negotiates with other functions over supplier preferences: *"we often have discussions with R&D with regard to how advanced technologies we need in a particular case. Are we satisfied with a good enough supplier or do we need the best supplier?*" (P4). Additionally, purchasing discusses approval of suppliers with SQM, or jointly develops business plans for new developments. R&D sees many advantages from having a close collaboration with purchasing and meeting purchasing regularly, especially to get closer in vision related to technological issues. There is almost daily contact between R&D and purchasing regarding the suppliers: *"It is fruitful to involve purchasing in order to improve their technological knowledge so that they have an understanding of why we would argue for a specific supplier in a supplier selection"* (R2).

The interviewees mentioned the importance of cross-functional ties for better performance: "*Internally […] particularly between purchasing and R&D, we need to be open about our thoughts and ideas. The goal with our sourcing is to have both SQM and R&D on board, that they think our choice is okay… it is very important to know their opinions […] and keep their views in mind when I make a decision*" (P9). One of the respondents stressed the importance of open conversation by addressing how the physical separation of the functions has reduced their effectiveness (i.e. a year ago purchasing was moved to another part of town): "*it was a poor decision to separate where we sit (R&D from purchasing), since we worked best when we sat in the same building where we had the discussions on articles and forthcoming changes every day and they understood my thoughts. We think very differently and also alike. We have different areas of focus; they have different deliverables. Once we sit down and talk it becomes much more effective and clearer*" (P23).

In the event that issues such as those relating to quality arise, or if a new development takes place which necessitates changes from the original talks with the supplier, then more intense interactions are needed by purchasing with the other functions so that it is fully informed before communicating with the supplier*: "R&D has a lot of technical demands that they need to review. During the supplier reviews and negotiations these demands can change. Then we need to have a discussion about consequences and if the supplier is up to the new demands. This is seldom a decision for a single person, often it's a team that makes this judgement"* (P15). Aside from supplier qualification, lack of internal cross-functional communication on these issues has in the past given the supplier the upper hand and opened the door for

opportunistic behavior.

R&D and SQM have the option of preventing some suppliers from being part of the final supplier selection, but they do not have the mandate to select the suppliers: *"We say stop with regard to technology and SQM says stop with regard to quality"* (R1). The functions have distinct roles in the supplier selection process; however, it is clear that purchasing has the final say in the supplier selection where price is a determining factor. SQM reviews the production and quality and may wish to avoid some suppliers that have quality issues. *"Price is the determining factor, but we also consider quality issues and other potential problems with a certain supplier. We try to avoid these suppliers and we have some influence on the supplier selection, but no way near the heaviest influence. Price is the determining factor"* (S4). Similarly, R&D reviews technology and has the mandate to delete some suppliers from the selection process when they do not possess the right technology. *"Within R&D we look at price very little. It is purchasing that review suppliers and handles the price. […] In principle, it is price that is the most important"* (R1).

The three functions jointly decide on which supplier to select: "*After our (within function) investigations, all three of us (purchasing, SQM and R&D) have to say 'yes' to a supplier. We follow certain steps and go though it structurally. Then we select the best business case*" (P17). The three functions do not always agree on the suppliers and need to negotiate their side: "*we are three parties who are involved, SQM, purchasing and R&D. We all have different opinions on suppliers, but two functions can often overrule the third one. Purchasing is strong, but it needs to meet the demands of R&D*" (S2). For instance, purchasing and R&D may have different views on a supplier, where R&D might want to select a supplier from previous collaborations while purchasing would prefer to select a new supplier. *"Sometimes … R&D might prefer to keep on collaborating with the supplier. But we (purchasing) do not want to deal with that supplier"* (P2).

3.3. The corporate level of supplier selection

The supplier selection decision is not, however, just a functional issue, and the requirement often comes from top management and is directed to purchasing. Thus, at times, if the functions cannot agree on a suitable new partner, the issue needs to be escalated in the firm hierarchy: "*We might judge that a supplier is not ready for construction or production of a product, then we can't choose them. Then we can fight with R&D and SQM and realize that we can't recommend them. Then we go up together and say 'here is the cheapest quote, but we don't think the supplier will be able to manage it'. Then there are a lot of arguments. Somewhere along the line we agree on what to do. It may be that we agree to put in more resources. We might decide upon the cheap supplier but then we will need to dedicate resources to make the supplier better and to ensure that they can make it*" (P8). On this level, top management of the case company has management meetings with the same level at potential suppliers either specifically on development issues or at regular intervals where suggested developments can also be discussed. Additionally, development ideas are also discussed during the annual gathering the company has with all its suppliers. The supplier selection socializations and the type of uncertainty they mainly address at the corporate level are summarized in Table 4.

All these channels can trigger the top management to directly suggest a supplier for a new development project. Historically, this has created some degree of tension among the three functions: *"There have been decisions made by top management on which suppliers to choose. It was not purchasing's decision, but the result was that R&D did not trust us (purchasing) although it was not our decision. When a decision is made you have to follow it. But it has led to us not trusting each other. It's a shame, because we are aligned on the management level but then I hear from my colleagues that there is no alignment on the operational level"* (P16).

Internally the case company also issues a document that states strategies for each commodity, which the functions have relied on to be better aligned. This document provides a baseline of how functions should work towards reaching that strategy. *"This document has a high impact on our alignment across functions. It is the starting point for our on-going discussions on how we should work towards suppliers"* (R2).

3.4. Intentions of socialization

The interviewees stress the importance of having clear communication with potential suppliers, becoming familiar with said suppliers and building relationships to overcome the uncertainties related to the characteristics of the task and the purchase environment. Cross-functional collaboration within the company is an important element in building these relationships dealing with the interdependencies between the sourcing task units arising from having to work across functional borders: *"We have the responsibility to*

Table 4
The intra- and inter-firm socializations at a corporate level including the type of uncertainty addressed.

	Intra-firm socialization	Inter-firm socialization
Formal	- (INTU and TE) New suppliers can be suggested directly from top management [R2, R3] - (INTU) Strategy document for products that helps the functions align better [R2]	- (TC and TE) Top management meetings [S1, S3] - (TC and TE) Annual joint gathering with suppliers [P19] - (TC and TE) Monthly / quarterly management meeting [P1, P20]
Informal	–	- (TE) New suppliers can be suggested through top management dialogue between the company and the supplier [R2, R3]

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understand the supplier's problems. We want to have a relationship where we give and take" (P16). Being familiar with, and having personal contacts within the supplier firm helps with problem solving: *"We had a sales representative that we had a good dialogue with. He was smart and we solved problems together. We got the feeling that he was helping us and then we wanted to help him"* (P6); *"They were open and transparent and told us that this is going to be difficult. We felt that they know what they are talking about"* (P12). Having these relationships require efforts from both sides: *"We know that he usually solves the problem. That's why we will walk the extra mile for him if needed"* (P16). It is important to be an attractive customer in order to get the right resources for a development project. Hence, as pointed out by a purchaser, it is important to build a strong relationship with the supplier representative: *"Our sales representative at the supplier fights internally for us, to get us the best R&D people on the project. Other sales representatives work for other automotive brands and they also fight internally to get the best resources. So, we want our sales representative to want to do a good job"* (P6). Personal relationships are considered important to build a business relationship, but becoming familiar with a specific supplier does not have to result in their becoming a supplier for the specific development in question: *"We are not looking for a personal relationship, but at the same time you need to have a personal relationship with the person that you are expected to make a deal with. You need the personal relationship in order to solve the business relationships"* (P8).

The relationship is also used to get higher performance from the suppliers which is directly related to the uncertainties related with the task characteristics: *"When a supplier is going to do a development job for us, then we make sure to let them know that we choose them because they are world leading in this area, that we consider them to be the best and that we believe in them. … We use emotions to push them"* (P1). Similarly, the suppliers may put in more resources to build a more attractive relationship: *"There are times when they put in extra efforts, without it actually being their responsibility"* (R1); *"Some suppliers enjoy working with us. You get the feeling that they are willing to do everything to make things work"* (R1). Hence, both sides need to make mutual adjustments in finding a solution that benefits both parties: *"…it is seldom that they don't prioritize us. I think it's because they actually care about us a little more than they do about their other customers"* (P4).

In the development of new products, the company is often looking for new technological solutions, as well as solutions for more efficient production of new components: *"They (the supplier firm) communicate a lot and work proactively. They have many ideas and suggestions about what we could do"* (P12); *"Sometimes suppliers show us how a change in specific products can change our processes to be more cost efficient. It's important to take the time to have those discussions with suppliers"* (P2). In order to become familiar with potential suppliers, there are many meetings with top management at the suppliers, but also internally: *"We have a lot of meetings with top management at the supplier, to learn what will work and what will not. And then we have meetings with our top management, sometimes the supplier participates. We have a lot of dialogue"* (P7). Another way to get to know the supplier, their technology and firm, besides visits and meetings, is to participate in educations at the supplier: *"I've been to internal educations at the suppliers. I have asked for it and these educations are often very good to learn about the product and the firm"* (P9).

Both parties need to dedicate resources and make investments in order to reach a fruitful development project. The buying firm need to invest in suppliers: *"I think it's important to sit down with the supplier, understand the problem and help them, coach them to get back*

Table 5
Framework of social cross-functional sourcing for technologically uncertain projects.

Levels of socialization	Inter-firm socialization	Intra-firm socialization
Functional (within a function)	**Socialization channels:** Formal channels are used more often **Socialization intent:** Familiarity of the sourcing task including supplier capabilities, the technology, and the business culture **Main uncertainty addressed:** Mainly address the sourcing task characteristics with some input to address sourcing task environment (P3)	**Socialization channels:** Both formal and informal channels are used **Socialization intent:** Alignment across categories and in each function Familiarity of the sourcing task **Main uncertainty addressed:** Formal channels mainly address the sourcing task characteristics (P1a*[1]) Informal channels mainly address interdependencies between sourcing task units (P1b)
Cross-functional (across functions)	**Socialization channels:** Formal channels are used more often **Socialization intent:** Alignment across functions to have a unified front **Main uncertainty addressed:** Mainly address the sourcing task characteristics but also interdependencies between sourcing task units (P4)	**Socialization channels:** Both formal and informal channels are used **Socialization intent:** Alignment across functions Familiarity of the sourcing task across the functions Problem solving by reducing potential tensions based on different preferences **Main uncertainty addressed:** Both channels mainly address interdependencies between sourcing task units and also input to the sourcing task characteristics (P2)
Corporate (involving the top management)	**Socialization channels:** Both formal and informal channels are used **Socialization intent:** Familiarity of the top management of the sourcing task **Main uncertainty addressed:** Mainly addresses sourcing task environment (P6)	**Socialization channels:** Formal channels are used more often **Socialization intent:** Alignment with top management both up-down and bottom-up **Main uncertainty addressed:** Mainly addresses interdependencies between sourcing task units (P5)

* P: Proposition

on track" (P9); and *"We guide the supplier and coach them to fulfill our demands"* (P15). These investments can cover several areas where improvements may need to be done. Mutual understanding of the problem and ways to solve them are important: *"We go through the problems and agree on what needs to be changed. It's about technology, cost, communication and project management. It's about putting in more resources"* (P18).

Communication, familiarization and mutual benefits are also important within the company, where for example a network of purchasers collaborate within their function: *"We network with purchasers on our other global locations, we share knowledge and exchange experiences"* (P3). Similarly, a lot of effort is put into building cross-functional relationships: *"The supplier selection is always a team effort between us (purchasing), SQM and R&D"* (P4). Sometimes, internal communication is not always transparent. For example, R&D may have made technical changes with the supplier that have not been communicated internally. Then, it can be through the relationship with the supplier that purchasing learns of such changes in the technical specifications.

4. Discussions

This study focused on how socialization can improve the familiarity of the potential supplier partner before relationship formation, and thus contribute to more successful supplier selection for high technology resources with high degrees of uncertainties related to the task charactersitcs, the sourcing task environment, and interdependencies between sourcing task units. The supplier selection process of a large automotive manufacturer for development projects was studied in-depth, where three functions were involved in the supplier selection process: purchasing, R&D (engineering) and SQM (quality). Each function shared their information through different channels with the others, pointing to the importance of understanding information across functions (Gonzalez-Zapatero et al., 2016) and creating a shared belief in how decisions on sourcing are made (Kiratli et al., 2016). The company has a business culture in which trust and interpersonal relationships are valued, and is facing the uncertainties related to sourcing high technology from new sources of supply.

As summarized in the framework in Table 5, based on the findings from our case study, and building on the theoretical discussions on socialization (e.g. Cousins et al., 2006; Kulangara et al., 2016), we contend that "social cross-functional supplier selection" can be defined as a supplier selection approach with higher degrees of both internal (functional, cross-functional, and firm) and external (with the supplier firm) socialization (See Table 5). More specifically, our case study suggests that such an approach can contribute to a more successful selection of a partner for technologically uncertain purchases by both 1) a more aligned internal supplier selection through increased communication, increased familiarity with the sourcing task, and improved problem sovling through decrease of tensions related to differing preferences, and 2) a reduced perception of the external uncertainty through increased familiarity with the supplier's technical and business capabilities and culture, the supplier's interest and commitment, and thus, trust in the future of the business. Based on the observations a number of propositions are developed as marked by PX in Table 5 and further discussed below.

Our study shows that internally at the firm, there are many tensions that arise during the supplier selection process of highly uncertain and technological purchases, such as price versus technical capacity, or degree of risk aversion, all adding to the uncertainties and complexities of interdependencies between sourcing task units. Additionally, although the firm aims to have an agreement between functions on the preferred supplier, the R&D function can at times have a higher degree of leverage than previously assumed. This challenges purchasing's influence on the supplier selection decision and thus creates tension and conflict between the two (see e.g. Moses and Åhlström, 2008). Both purchasing and R&D considered themselves as the driving function at times. SQM also pointed towards such power dynamics. Further, all three functions experienced frustrations towards the others, due to such loss of control in the final decision.

In response to such tensions, socialization takes place in both formal and informal channels that impact the supplier selection opinion of the decision makers; documents are shared, discussions take place at joint meetings and information and opinions are shared during breaks, in the corridors, or after working hours during informal gathering. Within the function, formal channels of socialization, however, were mostly related to the uncertainties stemming from the e.g. product, design, supplier, or market characteristics, while the informal channels were mostly surrounding the uncertainties related to e.g. what the other decision makers thought or what their expectations were. While, the latter was also true at the cross-functional level, it seemed that the formal channels were also used to increase familiarity and alignment between the functions, and to reduce the tensions arising due to the uncertainties. Consequently, we make the following propositions related to the functional (1a & 1b) and cross-functional (2) levels of interaction:

Proposition 1a). Formal intra-firm socialization at functional level increases internal familiarity and alignment of decision making, thereby reducing uncertainties related to high technology sourcing task characteristics.

Proposition 1b). Informal intra-firm socialization at functional level increases internal familiarity and alignment of decision making, thereby reducing uncertainties related to interdependencies between high technology sourcing task units.

Proposition 2). Formal and informal intra-firm socialization at cross-functional level increase familiarity, alignment of decision making and improve internal problem solving, thereby reducing uncertainties related to interdependencies between high technology sourcing task units.

Our findings also suggest that inter-firm socialization during supplier selection for technologically uncertain purchase situations is mainly carried out through formal channels at the functional and cross-functional level (i.e. across functions and through cross-functional teams), with the intention of becoming more familiar with the supplier (i.e. from a technological, commercial, quality, and business culture perspective) and to develop an ex-ante opinion prior to entering a relationship. Our case company considered the investments made for the supplier assessment necessary to develop such an opinion in the uncertainties related to the characteristics

and environment of the high technology sourcing task, which suggests that the debate (e.g. Mikkelsen and Johnsen, 2019; Song and Di Benedetto, 2008) needs to question the argument that supplier selection is either an extensive process or trust based.

Informal socialization channels are used more extensively in an intra-firm setting to increase familiarity, both horizontally within functions and vertically across the company levels. As many respondents pointed out, since at times it becomes difficult to know who has the mandate or responsibility for a task at hand, the familiarity of personal relationships gained through informal channels makes it possible to find the right information efficiently. At an inter-firm level, informal socialization is used mostly between top management. While previous research has discussed formal socialization channels as an antecedent of informal socialization mechanisms (e.g. Lawson et al., 2009; Le Dain et al., 2020), our findings suggest that they could also serve the supplier selection independent of each other. The culture of our case firm, which fosters socialization, might explain the difference in our findings and the previous literature. At our case company the informal socializations happening with the supplier, contributed to lowering sourcing task environment uncertainties as the firm became more familiar with the purchase environment. Based on these findings, we suggest the following:

Proposition 3). Formal inter-firm socialization at a functional level increases familiarity with the potential supplier, thereby reducing uncertainties related high technology sourcing task characteristics.

Proposition 4). Formal inter-firm socialization at a cross-functional level increases alignment of decision making regarding the potential supplier, thereby reducing uncertainties related to interdependencies between high technology sourcing task units.

Additionally, at the cross-functional level, the autonomy of the functions was maintained at a functional level both in intra-firm operations and in inter-firm socialization, with the supplier contributing to the collection of information needed via independent relationship channels. The final decision-making process regarding which supplier to contract was then developed in an integrated manner at a cross-functional level in order to maintain firm unity. In our case, the purchasing function took a coordinating and aligning role here, and the other functions communicated their requirements and decisions through purchasing both internally and externally to the supplier. At this level, the functions performed several collaborative efforts (e.g. joint assessment, joint business plan development, joint management meetings) to be better aligned. This observation adds to the debate regarding whether to integrate the functions or not (e.g. Brattström and Richtnér, 2014).

Finally, at a corporate level, top management contributes to the supplier selection process of technologically uncertain projects by providing strategy documents to align the functions, and by maintaining formal and informal socialization channels with suppliers both to identify technology (i.e. reducing the sourcing task environment uncertainties) and to develop ex-ante trust on an inter-firm level (i.e. reducing the uncertainties related to interdependencies between sourcing task units). These results suggest that top management support is essential in reducing the uncertainties derived from the complex levels of socialization. Our findings also show that a leading function (e.g. purchasing) and the corporate level structures are necessary for maintaining this alignment. These findings are in line with the literature on socialization that suggests structures and processes foster interactions and thus contribute to problem solving (Roscoe et al., 2019). For instance, issues that could not be solved at a functional level are escalated to top management. Some suppliers use top management contacts for communicating issues, which also creates a need for top management understanding, support and commitment towards the internal firm. Drawing on these findings, we propose the following:

Proposition 5). Formal intra-firm socialization channels at a corporate level increase internal alignment of decision making, thereby reducing uncertainties related to interdependencies between high technology sourcing task units.

Proposition 6). Both formal and informal inter-firm socialization at a corporate level increase familiarity with potential suppliers and the supply market, thereby reducing environmental uncertainties related to the high technology sourcing task.

4.1. Theoretical contributions

Firstly, our study adds to the literature on socialization by expanding "the link between socialization channels and uncertainties" to the pre-contract phase and during partner selection (i.e. a topic found important but less discussed in the previous literature c.f. Cousins et al., 2006; Kulangara et al., 2016; Lawson et al., 2009; Le Dain et al., 2020). While scholars have indicated the potential of socialization in reducing environmental uncertainties (e.g. Wei et al., 2012), there is little research on how this is achieved. By connecting socialization concepts (i.e. channels and intent), to different types of uncertainty borrowed from information processing perspectice (e.g. from Trautmann et al., 2009), and the different sourcing levels (i.e. functional, cross-functional, and corporate), we extended the theory to the supplier selection field for technologically uncertain purchases. Our findings suggest that a social cross-functional supplier selection, characterized by internal and external socialization during the supplier selection process of high technology, can improve internal alignment and address interdependencies between sourcing task units in the supplier choice, and reduce the perceived external uncertainty towards the the sourcing task characteristics and environment. We also contribute to this stream of the literature by showing that informal and formal socialization channels can contribute to higher familiarity of a potential partner in parallel; that is, building on the work of some scholars suggesting that formal channels are an antecedent of informal channels (e.g. Lawson et al., 2009; Le Dain et al., 2020). In this respect, we also add to the literature by showing that at lower corporate levels, informal channels are more commonly used within the company and formal channels are used with the supplier, while among top management a reversed pattern exists. The business culture of the firm in our study might explain this difference in observations.

Secondly, this study contributes to the literature on cross-functional supplier selection. The findings of this study add to the debate on integration or isolation of functions in supplier relationships (e.g. Brattström and Richtnér, 2014; Melander and Lakemond, 2015; Schiele et al., 2021), by showing that during supplier assessment, separation of the functions can contribute to better information

sharing by the supplier, but during negotiations, internal integration of functions is necessary for a unified front. These findings add to the previous understanding of how cross-functional teams maintain alignment, integration, but also autonomy and separation of goals and drives (a discussion raised by e.g. Moses and Åhlström, 2008; or Hesping and Schiele, 2016), by showing that they move from isolation to higher degrees of integration as the supplier selection moves from identification and assessment to negotiation and contracting.

Thirdly, we add to the literature on sourcing for technologically uncertain projects (e.g. Kurpjuweit et al., 2021; Phelps, 2010; Schiele, 2006) by showing how a higher degree of socialization can reduce the perception of the external uncertainty through increased communication, increased familiarity of the supplier's technical and business capabilities and culture, understanding of the supplier's interest and commitment, and trust in the future of the business. Our study shows that socialization also reduced internal uncertainties towards the final sourcing decision by addressing interdependencies between sourcing task units. Hence we add to the literature on using familiarity to reduce uncertainties within firm boundaries, similar to previous studies that show how familiarity reduces uncertainties outside firm boundaries between buyers and suppliers (Cousins et al., 2006; Le Dain et al., 2020; Xu et al., 2017).

Fourth, our study points to how socialization can contribute to firms becoming the preferred customer (Hüttinger et al., 2014, 2012; Kragh et al., 2021), and adds to the previous literature that suggest the importance of top management interaction in the process of becoming a preferred customer (Nollet et al., 2012). Our study points to top management meetings as a way to handle sourcing task uncertainties by using both formal and informal channels. Also, engineers and purchasers are important in building and maintaining the relationships with suppliers, ensuring that the suppliers want to collaborate with the firm and that it is being prioritized. Hence, our study also demonstrates a need for functional socialization, where engineers meet engineers, as pointed out in a recent study by Kragh et al. (2021).

5. Managerial implications

The findings from this study depict how higher degrees of socialization within the firm and with unfamiliar suppliers for high technology projects, can reduce the perceived uncertainties and contribute to a more secure supplier selection. The findings also show that a business culture that fosters socialization can result in knowledge sharing, internal alignment, and external understanding. In the absence of such alignments or coordination, parallel personal relationships can be created. Our findings also shed light on how structures and procedures, and also possibilities for informal socialization, can improve internal alignment across functions and reduce the internal tensions raised from the uncertain supplier selection of high technology. Our study adds to the growing number of best practice cases of sourcing of innovation in the automotive industry (e.g. Goldberg and Schiele, 2018; Homfeldt et al., 2017; Schiele, 2010; Servajean-Hilst and Calvi, 2018), demonstrating how socialization within functions, across functions (purchasing, R&D and SQM) and with suppliers facilitates supplier selections when sourcing for high technological resouces, which is particularly relevant in the tranditional industries that are facing a number of technological uncertainties related to electrification, automation and connectivity.

6. Limitations and future studies

Our study is, of course, limited by our methodology and our somewhat skewed sample of respondents, with a lower number of representatives from the quality department. However, it should be noted that many of the respondents from the Purchasing function have previously worked in R&D or SQM in the firm before starting in purchasing. Additionally, by focusing on specific projects or commodities (i.e. having embedded cases), we could have shed light on questions regarding, e.g., intensity of socialization related to the degrees of uncertainty. Nonetheless, focusing on the higher case level, we detected some aspects related to e.g. knowledge sharing across the categories and category managers, that would not have come up otherwise. We do not differentiate between grey and black box integration, something which could have provided a more nuanced picture of the selection processes.

Our suggested framework and proposed findings should be quantitatively tested in future studies. The study elaborates on a case company that fosters socialization within its business culture, and thus the impact of socialization to reduce the supplier selection uncertainty should be further studied in other business cultures. Future research could further investigate the suppliers' view on collaborating with many functions within the buying firm in the supplier selection process. Another fruitful venue of research could be to further explore what role socialization can play in being an attractive customer.

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