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A network view of entrepreneurial cognition in corporate entrepreneurship contexts

Network
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entrepreneurial
cognition

A socially situated approach

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Abstract

Purpose – Research in entrepreneurial cognition has called for a better understanding of interactions between contextual variables and cognitive processes. Based on previous work done on organizational learning and social networks, the purpose of this paper is to propose a formal model in which information acquisition, distribution and interpretation are tested as a function of cognition-based trust, perceived expertise and tie strength between organizational members in two different corporate entrepreneurship (CE) types.

Design/methodology/approach – The authors conduct a quantitative analysis based on network data in two companies located in India. Special procedures known as quadratic assignment procedure and multiple regression quadratic assignment procedure were used to run the correlations and multiple regressions, respectively. The authors complement this analysis with interviews and qualitative information to build a rich description in each of these cases.

Findings – The results indicate moderate support for the model. The evidence suggests that between both types of CE types, domain redefinition requires higher levels of tie strength, trust and perceived expertise. Sustained regeneration shows moderate significant results in tie strength, and cognition-based trust.

Originality/value – The authors combined insights on social network and organizational cognitive processes to analyze interactions between context and cognition. The authors were also able to compare two different companies. The authors found consistent results regarding tie strength, but the authors also found differences between both companies, which suggest that different CE types tend to require different dynamics between context and cognitive processes.

Keywords Corporate entrepreneurship, Organizational learning, Social network analysis, Entrepreneurial cognition

Paper type Research paper

1. Introduction

It has been widely acknowledged that already established organizations need to embrace values related to corporate entrepreneurship (CE) to cope with uncertainty and competitive pressures (Guth and Ginsberg, 1990). The concept of CE refers to “process [es] whereby an individual or a group of individuals, in association with an established organization, create a new organization, or instigate renewal or innovation within that organization” (Sharma and Chrisman, 1999, p. 18). However, not all CE efforts are the same. CE can take many forms that may encompass incremental changes associated with continual improvements to



products and services or internal processes to changes associated with disruptive innovation associated with the creation of new markets, products and product categories (Covin and Miles, 1999). Thus, scholars have called for the need to understand the heterogeneities among CE efforts, especially as these differences may provide insight into processes and knowledge-based resources in CE (Phan *et al.*, 2009).

Organizational learning is an important process in CE as organizations work through the process of organizational renewal (Phan *et al.*, 2009) and development of new business opportunities (Ahuja and Lampert, 2001). Organizational learning can be understood as a cognitive process in which organizations acquire, distribute and interpret information (Huber, 1991) through a combination of various mental processes (Kim, 1993). But at the same time, the process of organizational learning takes place across the individual, group, organizational and interorganizational networks levels and is situated in an organizational context (Crossan *et al.*, 1999). As organizational learning consists of both social and cognitive processes, it is necessary to consider organizational learning from both a cognitive and social perspective, especially in the CE context where companies have to process information in an ambiguous, and uncertain environment.

Thus, including social context variables that affect cognitive processes in entrepreneurial settings relates to the recent developed socially situated approach in entrepreneurship. This socially situated cognition (SSC) view of entrepreneurship argues that entrepreneurial cognition is adaptive action oriented, embodied, situated and distributed (Mitchell *et al.*, 2011, 2014). According to this view, cognition is dynamic and adaptive to the situation (Smith and Semin, 2004). Within an organization, the collective cognition and resulting behavior of the organization is the result of the embodied members of the organization, the organizational processes by which members of the organization acquire and distribute information, and the context of the environment in which the members are situated. Thus, we propose a network view of cognition that builds on frameworks that utilize a socially situated view of entrepreneurial cognition to provide some insight into organizational learning within CE.

While literature within the SSC view of entrepreneurship has advanced our understanding of different aspects of how cognitive processes are affected by the collective team (Zheng and Mai, 2013) as well their contextual factors like firm type (Hamilton, 2011), economic conditions (Wood *et al.*, 2015) and uncertainty (Baron, 1998), there is still room for a better understanding how cognition is distributed across different social contexts (Sasseti *et al.*, 2018). By social context we refer to patterns of social interactions that surround individual cognitive processes. These patterns of social interactions have been captured by sociologists in research streams that refer to social networks and their effects on different individual, organizational and societal phenomena (Borgatti and Foster, 2003; Burt *et al.*, 2013; Wasserman and Faust, 1994). In particular, scholars have shown the importance of social networks in organizational innovation and learning (Hargadon, 2002; Obstfeld, 2005; Tsai and Ghoshal, 1998). These are highly complex economic processes that require social interactions and are affected by non-economic dynamics such as organizational culture and more general institutional frameworks (Granovetter, 1985; Uzzi, 1997).

Scholars in entrepreneurial cognition have shown that entrepreneurs' cognitive processes mediate the relationship between an entrepreneur's social networks and the progress of the new venture (De Carolis *et al.*, 2009; De Carolis and Saporito, 2006). Herein, we hope to contribute toward the discussion on organizational learning cognitive processes in a larger social context in the form of social networks and specific CE forms which differ in terms of innovation and uncertainty. That is, in this paper we connect key organizational learning cognitive processes (information acquisition, distribution and interpretation) with key aspects of social networking (tie strength, perceived expertise and cognitive-based trust)

in two organizations characterized by different CE forms. In this way, we compare and contrast two different CE contexts and their respective social dynamics in the form of social networks' characteristics and their effects on cognitive processes. In doing so, we contribute to literature on SSC view of entrepreneurship and to gain a better understanding of the effects of relational and organizational contexts on cognitive processes key for entrepreneurial outcomes such as incremental innovation and domain redefinition.

2. Literature review

Corporate entrepreneurship

CE is of great interest as established companies are often the source of innovation. As firms seek to grow, they develop new products and services, create new ventures and undergo renewal activities in order to gain or maintain their competitive advantages (Guth and Ginsberg, 1990). CE consists of a firm's innovation, venturing and strategic renewal activities (Burgers and Covin, 2016) and can take the form of corporate venturing where firms form new ventures as their method of innovation or strategic entrepreneurship where firms work to enhance their ability to identify and exploit opportunities (Phan *et al.*, 2009). In order to focus on the context within a firm, this paper will focus on strategic entrepreneurship forms of CE. Strategic entrepreneurship can take the form of strategic renewal, sustained regeneration, domain redefinition, organizational rejuvenation or business model reconstruction (Covin and Miles, 1999; Ireland and Webb, 2007; Morris *et al.*, 2011; Phan *et al.*, 2009).

Each form of strategic entrepreneurship has a different innovation focus. The focus of innovation sustained regeneration is continual product or service innovation; the focus of organizational rejuvenation is the firm's internal processes, structures and capabilities; the focus of strategic renewal is the way the firm competes; and the focus of domain redefinition is to find new markets (Dess *et al.*, 2003). Although all four types of strategic entrepreneurship are distinct and important, this paper will explore network cognitions of two types of strategic entrepreneurship – sustained regeneration and domain redefinition as sustained regeneration and domain redefinition represent two very different strategies. Firms use sustained regeneration to maintain a competitive advantage by introducing incremental improvements to their products or services, while firms that pursue domain redefinition seek to gain a competitive advantage by moving to new markets and product categories (Kuratko and Audretsch, 2009).

Scholars in both entrepreneurship and organizational learning have argued that these two research traditions are highly intertwined. That is, organizations that leverage knowledge to their strategic advantage can also develop different business opportunities (Dess *et al.*, 2003; Kuratko and Audretsch, 2013; Lichtenstein and Lumpkin, 2002; Simsek *et al.*, 2009). Already established companies can develop a competitive edge in the different forms of CE by creating new knowledge relevant for the developing of new products, updating current business practices or correcting misalignments. As previous scholars have argued, organizational learning mediates the relationship between types of CE and outcome variables as result of organizational learning dynamics (Dess *et al.*, 2003). We then explore three cognitive processes as part of organizational learning and their relationship with the social contexts in which they are embedded.

Organizational learning as a socially situated cognitive process

Organizational learning is the process by which organizations generate, disseminate and exploit knowledge, translating it into innovation (Cyert and March, 1963; March, 1991; March and Simon, 1958). Research has shown that learning raises the effectiveness of organizational actions and leads to affirmative outcomes like enhanced performance and innovation (Baker and Sinkula, 1999). The relationship between learning and innovation was demonstrated by Lopez *et al.* (2005) who found a positive relationship between learning

and both competitiveness and innovation and by Alegre and Chiva (2008) who found empirical evidence that learning enhances product performance in their study of ceramic tile producers. Organizational learning has also been shown to impact an organization's ability to recognize and pursue entrepreneurial opportunities, and therefore, it is key in CE (Lumpkin and Lichtenstein, 2005).

A socially situated cognitive approach highlights the importance of a better understanding of the relationship between behavioral outcomes (i.e. venture creation, growth and product development) and social contexts like social networks, mediated by cognitive processes. In this way, scholars in the SSC view of entrepreneurship argue that entrepreneurial behaviors are the result of the interplay of individuals' social networks characteristics and cognitive processes (De Carolis *et al.*, 2009; De Carolis and Saporito, 2006). As a cognitive process, organizational learning begins with the acquisition of information. Task advice ties are one of the channels that managers use to obtain information, seek assistance and receive guidance in a work setting (Cross and Sproull, 2004; Sparrowe *et al.*, 2001). The acquired information then gets disseminated inside the organization and is followed by an information interpretation process, where people within the organizational get involved in sensemaking. During information flow in the organizational learning process, there are mainly three factors that are important – information acquirer, information source and relationship between information acquirer and source (Cross and Borgatti, 2004). Three characteristics can capture these three important factors: strength of the relationship between both parties in the exchange of information, the perceived expertise of the information source and the trust that the acquirer has on the source. We use these three variables as our independent variables and the supportive literature on them to build the main hypotheses on our model. Building on this previous work, and on organizational learning and social networks, we develop next the main arguments of our theoretical model (see Figure 1) and the relationships between social networks characteristics such as tie strength, perceived expertise and cognition-based trust and organizational learning cognitive processes. We finish with a hypothesis about different dynamics of our key variables according to different types of CE efforts and uncertainty levels.

3. Hypotheses development

Organizational learning and tie strength

As mentioned earlier, many studies have found information acquisition to be the initial step of organizational learning, and more specifically, entrepreneurial cognition (Walsh and Ungson, 1991). Information acquisition refers to the process through which an individual,

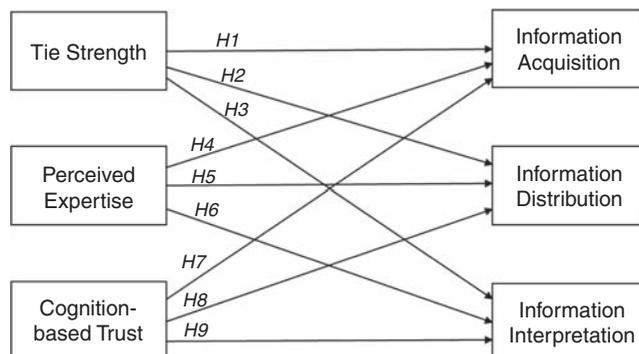


Figure 1.
Theoretical model

group or organization obtains information from internal and external sources (Huber, 1991). Information acquisition, as defined by Huber (1991), involves gathering information from different sources through grafting, searching and noticing, vicarious learning, congenial learning and experiential learning. In this research, we focus mainly on information acquisition from internal sources within the organization.

Ties have been used to help explain how information, ideas and capital flows between individuals in a network (Granovetter, 1973, 1983). In this research, we use tie strength as our first social network variable. The “strength of tie” has been defined by Granovetter (1973) as “combination of the amount of time, the emotional intensity, the intimacy (mutual confiding) and the reciprocal services which characterize that tie” (p. 61). Tie strength provides a quantifiable property of information flow, and as such, it has the potential to capture knowledge transfer among individuals involved in such relationships. Within entrepreneurship literature, studies have shown that as interactions and flow of information between social contacts increase, the odds of entrepreneurial behavior increases (Kreiser *et al.*, 2013; Newbert *et al.*, 2013; Patel and Terjesen, 2011).

We argue that tie strength and information acquisition are highly related and studies on social networks support this affirmation. For instance, Uzzi (1997) and Hansen (1999) in their studies found that the greater the strength of the tie, the better it facilitates the transfer of tacit knowledge. The behavioral theory of the firm may also offer some explanation to the relationship between tie strength and transfer of tacit knowledge. Cyert and March (1963) argued that firms put a cap on their search capabilities in the long run. This suggests that firms tend to become inward focused as they gain experience and their information acquisition attributes gets limited to internal search, i.e., within the firm. Studies have also shown that the firms tend to lose their entrepreneurial zeal and start emphasizing “continuity” and “stability” when they become established (Zahra, 2012). It is possible to infer from such behaviors that the formation of strong ties within the organizational network would, in turn, influence the acquisition of information from within such organization. This is particularly important in organizational contexts such as CE organizations that are already established and therefore there has a tendency for members to acquire information inwardly. We therefore hypothesize that:

H1. Tie strength will positively influence information acquisition within the firm.

The second step, information distribution, refers to the processes through which information is communicated and disseminated among individuals, groups or units (Huber, 1991). Information distribution becomes critically important for the learning process because information that is acquired and not communicated remains useful to the individual alone.

Social and organizational interactions influence the extent to which information gets distributed inside the organization. Theories on network structure that refers to proximity support the idea that strong connections facilitate the likelihood of communication between actors (Festinger, 1950). Previous studies show that social cohesion in relationships affects the willingness and motivation of individuals to invest time, energy and effort in sharing information with others (Reagans and McEvily, 2003). In this way, we posit that strong connections will facilitate information distribution, hence the following hypothesis is proposed:

H2. Tie strength will positively influence information distribution within the firm.

Information interpretation has been defined multiple ways. Daft and Weick (1984, p. 294) defined it as “the process through which information is given meaning.” Crossan *et al.* (1999, p. 595) defined it as “the explaining, through words and/or actions, of an insight or idea to one’s self and to others,” while for Levinthal and March (1993) and Weick (1979), it refers to how individuals make sense of the new information that they have acquired and distributed. A shared thread in all of these definitions is that sensemaking occurs during the information

interpretation process. Sensemaking refers to those processes of translating actions and developing shared understandings and conceptual frameworks of reference (Daft and Weick, 1984). Thus, in this research we defined information interpretation as the sensemaking process by which individuals in an organization work to reach shared similar goals and perspectives with others in the organization.

Within organizations, the enactment-selection-retention model of sensemaking proposed by Weick (1979) has been used by scholars to explain how organizational members, through a mutual negotiation of cognitive maps, interpret information. Ambiguity creeps in when multiple or contradictory explanations of the information are strewn in the organization during the information interpretation process. To avoid such uncertainties, information is integrated in groups to reduce equivocality and reach a shared understanding. The establishment of shared observations and understandings among members of the organization (Daft and Weick, 1984) develops a common language and coordinated action (Brown and Duguid, 1991). Reaching shared understandings is critical in entrepreneurial organizations as uncertainty and ambiguity are higher in entrepreneurial organizations as they enter new markets, innovate new products or renew their organizations. Individuals within an organization may have insight but in order for the organization to use the information, the insight must be shared and become integrated into the organization (Crossan *et al.*, 1999; Dutta and Crossan, 2005).

In general terms, according to Salancik and Pfeffer (1978), information possessed by other people may be used by an individual to frame his/her interpretations of events. In this case, the social information helps the individual to structure his/her perceptions and to construct interpretations. We also find underpinnings of the information interpretation process in social comparison theory that postulates that an individual compares his/her views with those of others while developing his/her own beliefs and understanding (Festinger, 1954). For example, Ho and Levesque (2005) found that workers turned to their friends while interpreting information they received from others. Also, Rentsch (1990) noted that interaction with co-workers mostly helped an individual to gather information on co-workers' interpretations of an event and it had a direct effect on his/her interpretation and evaluation.

The homophily theories can also explain the similarity in social information processing during information interpretation process. The rationale behind homophily theories is that similarity attracts relationships (McPherson *et al.*, 2001). Studies have shown that as the strength of the ties increases, the need to have similar views, beliefs and mental maps also goes up (Burt, 2005). Other studies have shown that members develop stability in their mental schema over a period of time owing to their similarity in sensemaking (Shah, 1998). So, we argue that the stronger the ties between members, the stronger the tendencies to share information interpretations, hence:

H3. Tie strength will positively influence information interpretation within the firm.

Organizational learning and perceived expertise

Following a SSC approach to organizational learning, it is necessary to complement internal cognitive processes with an inclusion of contextual cues that affect those intra-individual processes (Smith and Collins, 2009). Given the importance of personal perception, researchers in this tradition have conducted studies on how people perceive, select, interpret and integrate information about other people (Smith and Collins, 2009). For instance, studies have shown that it is important for an individual to have a positive evaluation of the skills and knowledge set of the person from who he/she intends to obtain or share information (Borgatti and Cross, 2003). In a study conducted by O'Reilly (1982), it was observed that people looked into the quality of the information source when they sought information from their co-workers. We use the construct called perceived expertise to capture these individuals' positive impressions about others' expertise levels.

According to SSC, whether valid or not, people's impressions of others' levels of expertise will shape their choices regarding how to incorporate their advice and expertise (Baron and Markman, 2000). These insights take us beyond individual cognitive processes to include ways perceptions about others are actively elicited and co-constructed by others. In this sense, the higher the perceived expertise of the person providing information, the more respected and actively sought is the information that this person can provide. In addition, higher perceived expertise levels of the people involved in the information exchange have been shown to affect the intensity of knowledge transfer between these individuals (Pacharapha and Ractham, 2012). We, therefore, hypothesize that when individuals believe that others are experts in specific topics, it is more likely that these individuals will look for these perceived experts' advice (i.e. acquisition). It is also expected that perceived expertise will positively affect the frequency of interaction and include the information in decision making (interpretation). That is, when people believe that others are experts, they will look for more opportunities to interact with them and share those levels of expertise (i.e. distribution). In this way, we expect that:

- H4. Perceived expertise will positively influence information acquisition within the firm.
- H5. Perceived expertise will positively influence information distribution within the firm.
- H6. Perceived expertise will positively influence information interpretation within the firm.

Organizational learning and cognitive-based trust

Expert knowledge has the potential to reduce complexity about a particular subject and it can enhance trust in what believed experts suggest or advice. Thus, a concept highly related to perceived expertise is the level of trust a person can generate with this expert knowledge. We, therefore, include trust as a key variable that affects how social relations and knowledge transfer unfold (Levin and Cross, 2004). Although with different drivers and implications, both economists and sociologists acknowledge the role of trust in economic and social exchanges. Economists tend to see trust as an efficient tool to achieve economic exchanges, which facilitates transactions (e.g. Arrow, 1974; Williamson, 1993). Sociologists, on the other hand, examine the sources and mechanisms throughout which trust influences economic exchanges and recognize that these exchanges are embedded in powerful webs of social relationships (e.g. Granovetter, 1985, 2005).

Thus, trust has been a widely researched concept in organizational studies as well as in entrepreneurship (e.g. Fulmer and Gelfand, 2012; Mayer *et al.*, 1995; McAllister, 1995; Welter, 2012). This literature concludes that trust has both cognitive and affective foundations. On the one hand, the affective foundations refer to emotional bonds between individuals and to the care and linking feelings people develop for one another. On the other hand, cognitive foundations of trust refer to reasons that tend to be perceived as evidence of trustworthiness (McAllister, 1995). Both types of trust-based foundations have been used in social networks research (Chua *et al.*, 2008, 2010). Here we emphasize on cognitive-based trust because of its potential relationship with perceived expertise.

Cognition-based trust refers to trusting "from the head," which can be interpreted as judgment formed based on evidence of another person's competence and reliability. Chua *et al.* (2008) found that task advice ties were positively associated with only cognition-based trust, and not affect-based trust that is grounded in reciprocated interpersonal care and concern (McAllister, 1995). Cognitive-based trust is an instrumental inference that one makes from circumstantial evidence about the other person's behavior. We, therefore, expect to find that cognitive-based trust positively affects the three focal cognitive processes here discussed. In organizational networks, once a connection has provided the person who is seeking information with useful task-related advice, the acquirer is likely to identify the

connection as someone who has relevant expertise, competence and experience in the given task domain and continue to seek information from him/her in future, thus demonstrating cognition-based trust. Conversely, a focal individual is also more likely to seek task advice from a connection who is perceived to be reliable and competent because such a connection is more likely to provide useful assistance (Borgatti and Cross, 2003; Hinds *et al.*, 2000).

Zand's (1972) "spiral reinforcement model of the dynamics of trust" can be used to explain how people reach a shared understanding as the strength of the relationship improves over a period of time. According to this model, when two individuals decide to share information, both of them expect each other to be trustworthy. The initial trust expectation is reinforced when actual sharing of information takes place and the resultant trust so developed leads to further sharing of information. Thus, a spiral of trust gets built up between the members and sharing increases with higher levels of trust. However, if the initial expectation itself is of mistrust, the spiral deteriorates into one of reduced information flow and declining trust. We, therefore, argue that cognition-based trust is an enabler of the three focal cognitive processes here discussed in the following way (please refer to Figure 1 to visualize the hypotheses):

- H7. Cognition-based trust will positively influence information acquisition within the firm.
- H8. Cognition-based trust will positively influence information distribution within the firm.
- H9. Cognition-based trust will positively influence information interpretation within the firm.

Differences according to CE dynamics

Our final hypothesis refers to potential differences between different types of CE and our key variables. Based on previous research on CE (Dess *et al.*, 2003), we view CE as a system of roles and exchanges in which key challenges in CE are to manage social dynamics among managers at different levels in the organization. As such, the quality of entrepreneurial outcomes (i.e. innovation) is highly influenced by the levels of shared understandings and trust among members of the organization (Dess *et al.*, 2003). Among contingencies that can affect these relationships, higher levels of uncertainty have been described as one important variable that can intensify these relationships (Garcia-Sanchez *et al.*, 2018; Heavey *et al.*, 2009). These authors have found that when facing high levels of perceived uncertainty, managers tend to be more thorough and critical in the analysis of wide-range information when making decisions in the pursuit of CE outcomes such as innovation.

We argue that CE types can vary in terms of the levels of uncertainty members experienced. On one hand, sustained regeneration has a focus on innovating new products and services. Organizations that are successful at sustained regeneration have structures, systems and cultures that enable product innovation (Covin and Miles, 1999). These structures, systems and cultures provide a context that promotes incremental innovation. One of the ways it supports innovation is by reducing the uncertainty around new product development. Firms with sustained regeneration strategies exploit the knowledge they have about market trends and product life cycles to maintain a competitive advantage (Dess *et al.*, 2003). By the time an organization has reached sustained regeneration, it has progressed along the organizational learning process to where the entrepreneurial process of developing new products has been institutionalized in the firm. In other words, the processes, systems, structures and strategies to introduce new products or services to the market are embedded in the organization (Crossan *et al.*, 1999). In other words, sustained regeneration is in a steady state form of innovating.

On the other hand, domain redefinition requires defining and employing new competencies (Dess *et al.*, 2003). In order to define and use new competencies, organizations have to learn

about new industries, new customers and possibly new technologies. Firms utilizing a domain redefinition strategy are earlier in the organizational learning process and its members are still in the process of interpreting and integrating information, meaning the organization is gaining new insights and moving toward a shared understanding of new information (Crossan *et al.*, 1999). As a consequence, serious attempts at domain redefinition tend to require changes at the core of the organization (McGrath and MacMillan, 2009). These changes can create uncertainty in different managerial situations, routines and organizational structures. Thus, under these conditions, organizational members might turn to one another and to their social exchanges to look for a sense of certainty.

Literature on organizational learning and entrepreneurship supports the idea that under conditions of sustained regeneration, the organization has integrated and institutionalized new product development routines that help organizational members cope with potential levels of uncertainty (Argote and Guo, 2016). On the contrary, when the organization is venturing into new areas, such as the ones entailed in domain redefinition, managers have not yet developed common understandings and routines are still in the making (Weick, 1995). We therefore hypothesize that variables such as tie strength, perceived expertise and cognition-based trust are more likely to be significant characteristics in conditions of high levels of uncertainty such as in domain redefinition, in which there is a lack of institutionalized routines to cope with high levels of market uncertainty:

H10. Tie strength, perceived expertise and cognition-based trust are less likely to influence the organizational learning dynamics of information acquisition, distribution and interpretation under CE contexts characterized by lower levels of uncertainty such as sustained regeneration.

4. Research design and data collection

Research context and sample

To test the hypotheses, we conducted a quantitative analysis based on social network data in two different entrepreneurial firms in South India. We also collected rich qualitative data about each of the companies' entrepreneurial contexts. One of the authors conducted interviews and collected archival information about key organizational processes such as company brochures, organizational charts and books written by one of the founders, newspaper articles, TV interviews and company newsletters. Interviews were conducted during 2013 and 2014, and continued to track the both the companies from 2013 to 2015. With this information, the rich descriptions of the two companies that participated in our study enhanced our understanding of the companies' social networks. The first company was an electronics and electrical equipment manufacturing company, and the second company was a manufacturer and exporter of herbal and spice extracts. For anonymity, the two companies are represented by the names "iProtect" and "Vismaya," respectively, in this research. A brief summary of both companies can be found in Table I.

The preliminary qualitative information indicated that managers at both iProtect and Vismaya relied on internal resources of information to develop key competences and solve various strategic problems. In addition, the different dynamics in both of these companies suggest that each one can be classified as distinctive CE types. Vismaya is characterized by continuous new product development and therefore fits the CE profile of sustained regeneration. On the other hand, iProtect displays CE strategies of domain redefinition (Dess *et al.*, 2003) as iProtect had proactively sought to reach untapped markets while updating organizational practices and processes to be more competitive. We believe these characterizations are important to gain a better understanding of what context represents in a SSC approach of entrepreneurial behavior in these two companies (Figures 2 and 3).

MD

	iProtect	Vismaya
Year founding	1977	1989
Industry	Major electrical and electronics appliances	Leading exporter of botanical extracts for pharmaceutical industries
Size (number of people)	1,800 employees	300 employees
Public vs private	Public limited company	Private limited company
Company structure	See Figure 2	See Figure 3
Type of corporate entrepreneurship	Domain redefinition	Sustained regeneration
Age of managing director	38	60
Managing director tenure	6	25

Table I.
Company overviews

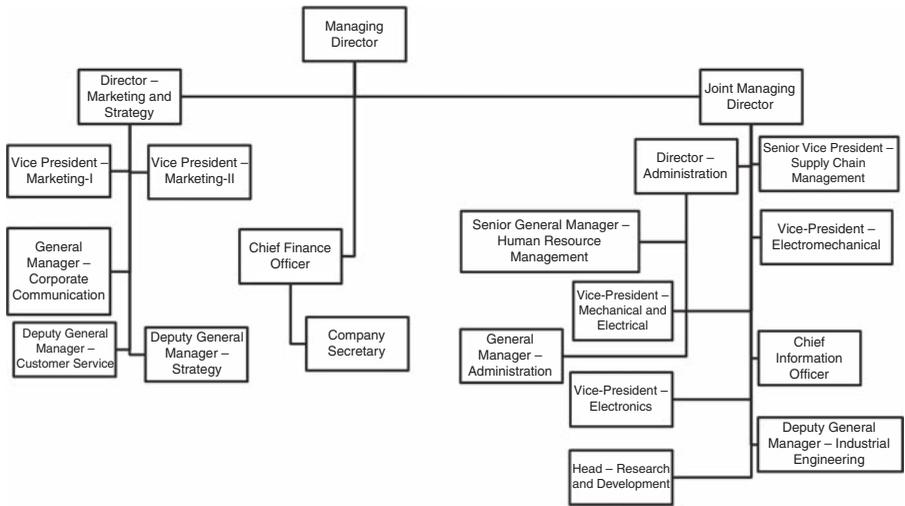


Figure 2.
Organizational chart for iProtect

Source: Company documents

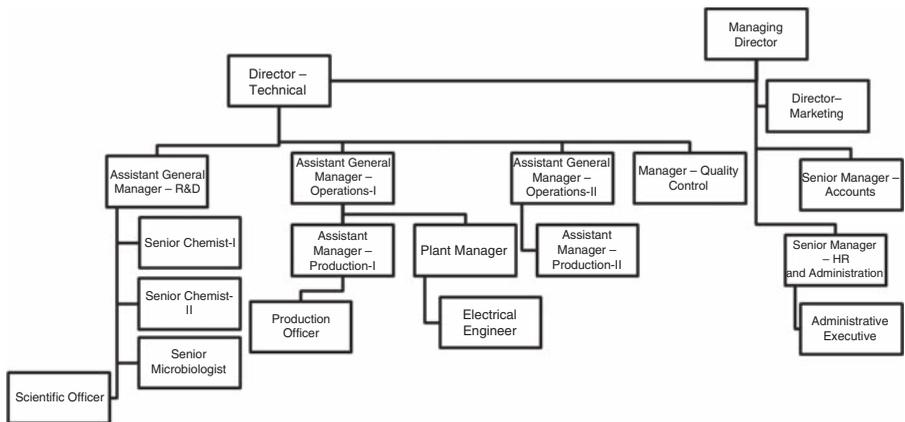


Figure 3.
Organizational chart for vismaya

Source: Company documents

Vismaya is one of the India's leading exporters of botanical extracts for pharmaceutical companies and has gained its competitive advantage utilizing the sustained regeneration form of CE. Started from 1989, Vismaya has customers in around 40 countries and research collaboration with universities across the world. The company is known for the innovative spirit of their top management and employees in developing new products on a continuous basis. Vismaya was founded by two individuals who currently hold the position of chairman and managing director, and director (technical). Both of them had complementing skills – business and financial acumen of the chairman and specialist knowledge of director (technical) – that helped in integrating their two different worlds and share their strategies.

Vismaya's first product – essential oil of mustard (natural) – aimed at a niche market, captured global attention. They grew by focusing on the nutraceutical sector that was emerging. Vismaya was successful in developing a series of innovative herbal extracts, thereby making an impression on the nutraceutical segment in its state of infancy. Vismaya's manufacturing process of Omega 3 fatty acids with indigenous technology earned them national recognition for successful commercialization of an indigenous technology. Vismaya's discovery of bioavailable curcumin and ability to commercialize a high-quality, low-cost product surprised their competitors. Vismaya has continued to pioneer an inventive approach, enhance their existing products and create a distinctive operational system. Technological innovation has been the key to their growth. While an average Indian company spends less than 1 percent of its revenue on R&D, Vismaya invests at least 12 percent on R&D. Their investments include human and physical assets for conducting research. Vismaya has a total of 26 patents, of which 25 are international patents. Commercializing these patents globally has been a source of success for the company. The international acceptance of its products and the number of patents granted in the USA and other countries are evidence of their successes in innovation.

iProtect is one of the India's leading electronics and electrical equipment manufacturers based in South India. iProtect was started as an entrepreneurial venture that manufactured voltage stabilizers in 1977. Due to the founder's stringent norms for quality and customer service, his product became synonymous with voltage stabilizers across South India. In the new millennium, however, with abundant power supply in South India, stabilizers were becoming less of a necessity. When the founder's son took over as the managing director in 2010, he was more ambitious than his father. He set aggressive growth goals which included doubling revenues by 2018. For the son, stabilizers were a product category that did not hold much promise as it itself was a very small market with high competition.

The son adopted a domain redefinition strategy by diversifying into new product categories and new markets. The wires and cable segment was one sector where he saw growth. Across India, market for wires had doubled from 2009 to 2014 and iProtect witnessed a ninefold growth. He started putting money into the wires and pumps business, specially focused on product development, branding and advertising. As a result, stabilizers that earlier contributed 60 percent of iProtect's sales moved down to 18 percent. The company also placed huge bets in solar water heaters based on the founder's son's strong belief that solar heaters will overtake electric water heaters in the next five years and iProtect will become a major player in the solar market.

During his father's tenure, the company did not extend beyond its market. The father was satisfied with iProtect being a regional player that grew by introducing new product for his quality conscious customers in the southernmost states of Kerala, Karnataka and to a limited extent, Andhra Pradesh. The son's new management team was quick to realize that the southern market was getting saturated and future growth would only come by venturing into new geographies. iProtect started setting up plants outside Kerala and later introduced four products in the non-south market. It took time for iProtect to make a

significant mark in these markets through capacity addition and brand building. The target of 30 percent contribution from non-South markets was finally achieved.

The social network data of these two companies were by surveying key decision makers in each of the organizations. Surveys were conducted via pen and paper. The survey questionnaire was initially sent out along with a cover letter. Surveys were returned directly to the researchers, who also sent follow-up e-mails to increase response rate. The response rate was more than 80 percent for both the companies. The survey data were collected during 2014.

Dependent variables

In this study, the organizational learning process was captured with three variables, information acquisition and information distribution and information interpretation. The respondents were asked to answer one to two questions about each of their co-workers for each of the three variables. When capturing relationship data about co-workers, asking too many in-depth questions about each coworker can lead to respondent fatigue which could render the data unreliable (Wasserman and Faust, 1994). Thus, we limited the number of questions for each dependent variable to one to two questions. A review by Marsden (1990) suggests that the practice of asking a single sociometric question is largely reliable when appropriate procedures are followed to help individuals accurately report their network links. The respondents were presented with a complete list of names of other actors (also called roster) in the network (Ferligoj and Hlebec, 1999). Rosters were provided to aid recall, to reduce measurement error and to improve data reliability (Marsden, 1990).

For information acquisition, we used an estimate pooling technique suggested by Borgatti and Cross (2003). Instead of asking only: "Who are the people that you typically turn to for information or knowledge on work-related topics?" we also asked: "Who are the people who typically turn to you for information or knowledge on work-related topics?" For information distribution, we asked "how often did you communicate with this person during the last three months? (on a scale on 1–7)." For information interpretation, we asked "indicate whether the person below shares the same perspective, in that, he/she think in a similar way, have similar goals and objectives, and understand each other's mindset when you communicate."

Predictors

To measure tie strength, we asked the respondent to rate his relationship with others in terms of emotional closeness on a scale of 1–4 (Marsden and Campbell, 1984). Perceived expertise was measured by using the question mentioned in Borgatti and Cross's (2003) study: "I understand this person's knowledge and skills. This does not necessarily mean that I have these skills or am knowledgeable in these domains, but that I understand what skills this person has and domains they are knowledgeable in." We adapted measures of cognition-based trust from McAllister's (1995) study to suit the current research context: "Given this person's track record, I see no reason to doubt this person's competence and preparation." We used a scale of 1–5 for both perceived expertise and cognition-based trust.

Controls

We also collected demographic data, including each person's hierarchical position in the organization, tenure within the group (in years), gender and age. All of these were used to construct control variables. The matrix for demographic data was constructed by conducting a logical operation on actor-based data. In the case of age and tenure, for each ordered pair of persons, we subtracted the second person's value (such as number of years

in the organization) from the first person's. In the case of gender and hierarchical position, we constructed dyadic variables X in which $X_{ij} = 1$ if persons i and j had the same value on gender (or position), and $X_{ij} = 0$ otherwise.

Data analysis

We used network correlation and regression to test the model statistically. Network data do not satisfy the assumptions of classical regression because the observations (relations) are interdependent. The autocorrelation compromises the estimated standard errors and makes the network data troublesome (Krackhardt, 1988). Hence, it is not possible to test the hypotheses we developed with traditional ordinary least squares procedures. Therefore, statistical procedures that do not assume independence of observations were employed to test the hypotheses. Consequently, special procedures known as quadratic assignment procedure (QAP) and multiple regression quadratic assignment procedure (MRQAP) (Baker and Hubert, 1981; Krackhardt, 1988) were used to run the correlations and multiple regressions, respectively. MRQAP is principally used when a social relation (i.e. a dependent matrix) has to be modeled using the value of other social relations (i.e. independent matrices) (Borgatti *et al.*, 2002).

In this way, this analysis is similar to a traditional multiple regression analysis, but it uses data matrices instead of vectors, and it conducts permutation-based instead of traditional standard-error-based significance tests. As Borgatti and Cross (2003, p. 438) explained, "QAP and MRQAP are identical to their non-network counterparts with respect to parameter estimates, but use a randomization/permutation technique to construct significance tests." The MRQAP algorithm proceeds in two steps. In the first step, it performs a standard multiple regression across corresponding cells of the dependent and independent matrices. In the second step, it randomly permutes both rows and columns of the dependent matrix and re-computes the regression, storing resultant values of all coefficients. This step is repeated 10,000 times to estimate standard errors for the statistics of interest. For each coefficient, the program counts the proportion of random permutations that yielded a coefficient as extreme as the one computed in Step 1. Using UCINET 6 (Borgatti *et al.*, 2002), we ran MRQAP algorithm. The dependent matrices were information acquisition matrix, information distribution matrix and information interpretation matrix, and the independent matrixes were tie strength, cognition-based trust and perceived expertise.

5. Results

The data for each company were analyzed separately. The results for iProtect are presented first, followed by the results for Vismaya. The QAP correlation table for the variables in iProtect is presented in Table II. The QAP shows correlations without controlling for any variable, which reveals if any variables covary with each other. The only demographic variables that are correlated are tenure difference and age difference ($\beta = 0.38, p < 0.05$). All of the independent variables are positively and strongly correlated with the dependent variables.

The results for the first dependent variable, information acquisition, for iProtect are reported in Table III. Tie strength had a significant effect on information acquisition ($\beta = 0.119, p < 0.001$) at iProtect as was the case with cognition-based trust ($\beta = 0.072, p < 0.05$), which supports *H1* and *H7*. We did not find support for *H4* as the relationship between perceived expertise and information acquisition was not significant at iProtect.

The results for the second dependent variable, information distribution, for iProtect are reported in Table IV. Tie strength was found to have significant relationship to information distribution ($\beta = 0.442, p < 0.001$) in iProtect, which supports *H2*. The relationship between perceived expertise and information distribution was also significant ($\beta = 0.281, p < 0.001$),

MD

Variables	1	2	3	4	5	6	7	8	9	10
1. Age dissimilarity	1.00									
2. Tenure dissimilarity	0.27	1.00								
3. Gender identity	0.00	0.00	1.00							
4. Level dissimilarity	0.00	0.00*	0.05	1.00						
5. Cognition-based trust	0.05	0.01	-0.04	-0.06	1.00					
6. Perceived expertise	0.07	0.03	-0.08	-0.01	0.55**	1.00				
7. Tie strength	-0.07	-0.11	0.08	-0.11	0.27**	0.19**	1.00			
8. Information acquisition	-0.06	0.00	0.03	-0.21	0.25**	0.25**	0.34**	1.00		
9. Information distribution	-0.05	-0.05	0.01	-0.09	0.26**	0.24**	0.46**	0.43**	1.00	
10. Information interpretation	-0.13	-0.13	-0.11	0.07	0.02	0.07	0.11	0.07	0.19**	1.00

Notes: * $p < 0.05$; ** $p < 0.01$

Table II.
QAP correlation
for iProtect

Variables	Model 1		Model 2	
	Standardized	SE	Standardized	SE
Gender identity	0.029	0.083	0.037	0.120
Age dissimilarity	-0.504	0.019	-0.067	0.003
Level dissimilarity	-0.070	0.063	-0.172**	0.062
Tenure dissimilarity	0.487	0.095	0.032	0.002
Tie strength			0.259***	0.033
Perceived expertise			0.117	0.042
Cognition-based trust			0.126*	0.044
Adjusted R^2	0.015		0.170	

Notes: Based on 10,000 permutations. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table III.
Multiple regression
QAP for
iProtect – information
acquisition

Variables	Model 1		Model 2	
	Standardized	SE	Standardized	SE
Gender identity	0.011	0.164	0.039	0.131
Age dissimilarity	-0.035	0.003	0.012	0.003
Level dissimilarity	-0.094	0.072	0.061	0.060
Tenure dissimilarity	-0.039	0.003	0.066	0.002
Tie strength			0.445***	0.077
Perceived expertise			0.263***	0.094
Cognition-based trust			-0.053	0.083
Adjusted R^2	0.001		0.364	

Notes: Based on 10,000 permutations. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table IV.
Multiple regression
QAP for
iProtect – information
distribution

supporting *H5*. *H8* was not supported with the data from iProtect as the relationship between cognitive trust and information distribution was statistically significant.

The results for the third dependent variable, information interpretation, for iProtect are reported in Table V. Based on the data from iProtect, *H3*, *H6* and *H9* are supported. Cognitive trust, tie strength and perceived expertise have positive, significant relationships with information interpretation (cognitive trust: $\beta = 0.375$, $p < 0.001$; tie strength: $\beta = 0.291$, $p < 0.05$; perceived expertise: $\beta = 0.129$, $p < 0.01$).

Table VI reports the correlation results for Vismaya. With the exception of the correlation between tenure difference and age difference ($\beta = 0.96$, $p < 0.01$), there is no

correlation among the demographic variables at Vismaya. All of the independent variables are positively and strongly correlated with the information acquisition and information interpretation, except tie strength.

The results for the first dependent variable, information acquisition, for Vismaya are reported in Table VII. *H4* was not supported as perceived expertise was not significantly related to information acquisition. Cognition-based trust is significantly related to information acquisition ($\beta = 0.154, p < 0.05$) as was the case with tie strength ($\beta = 0.179, p < 0.05$) at Vismaya, which supports *H1* and *H7*.

The results for the second dependent variable, information distribution, for Vismaya are reported in Table VIII. Tie strength has a positive, significant relationship to information distribution ($\beta = 0.389, p < 0.001$), which supports *H2*. *H5* and *H8* were not supported within Vismaya.

The results for the third dependent variable, information interpretation, for Vismaya are reported in Table IX. Within this company, *H3* and *H6* were not supported. *H9* was supported as there was a positive, significant relationship between cognition-based trust and information interpretation ($\beta = 0.591, p < 0.001$).

To test *H10*, we inspected all different tested relationships in both iProtect and Vismaya. As expected, we see that in Vismaya, which according to our classification falls within the sustained regeneration CE type has fewer significant results, than iProtect, a company classified as going through domain redefinition. This result suggests that in situations with higher levels of uncertainty, such as domain redefinition, social exchanges around organizational learning are more affected by tie strength, perceived expertise and cognition-based trust. We present a summary of the results in Table X.

6. Discussion and conclusion

Previous researchers have called for the need of understanding important heterogeneities among CE efforts and have warned against simple dichotomies of CE into new and in established corporations (Phan *et al.*, 2009). Thus, in this paper we acknowledge this heterogeneity and study two companies characterized by different CE efforts. To do this, we use organizational learning and social network perspectives to first theorize in a general case how these two social exchanges are related and then discuss potential differences in two different CE contexts. The results of this study provide insight into our understanding of the cognitive processes of organizational learning within CE, in particular in what is related to distributed cognition (Sasseti *et al.*, 2018). In this study, we investigated situating entrepreneurial cognitive processes around knowledge transfer in two already established companies: one sustained regeneration and the other one domain redefinition. In this way,

Variables	Model 1		Model 2	
	Standardized	SE	Standardized	SE
Gender identity	-0.109*	0.067	-0.088	0.131
Age dissimilarity	-0.101	0.002	-0.112	0.004
Level dissimilarity	0.083	0.040	0.017	0.053
Tenure dissimilarity	-0.101	0.002	0.187*	0.003
Tie strength			0.133*	0.069
Perceived expertise			0.279**	0.103
Cognition-based trust			0.341***	0.096
Adjusted R^2	0.028		0.364	

Notes: Based on 10,000 permutations. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table V.
Multiple regression
QAP for iProtect –
information
interpretation

Table VI.
QAP correlation
for Vismaya

Variables	1	2	3	4	5	6	7	8	9	10
1. Age dissimilarity	1.00									
2. Tenure dissimilarity	0.96**	1.00								
3. Gender identity	0.00	0.00	1.00							
4. Level dissimilarity	0.00	0.00	0.00	1.00						
5. Cognition-based trust	0.02	0.05	0.17	-0.108*	1.00					
6. Perceived expertise	0.00	0.00	-0.06	-0.10*	0.28**	1.00				
7. Tie strength	-0.21**	-0.227**	0.11	0.07	0.06	-0.09	1.00			
8. Information acquisition	-0.04	0.00	0.03	-0.07	0.31**	0.42**	-0.01	1.00		
9. Information distribution	0.01	0.03	-0.11	0.01	0.21**	0.74**	-0.04	0.38**	1.00	
10. Information interpretation	0.01	0.08	0.24*	-0.16	0.75**	0.31**	-0.01	0.34**	0.25**	1.00

Notes: * $p < 0.05$; ** $p < 0.01$

we contribute to a better understanding of cognitive entrepreneurship embedded in social contexts such as social networks and CE types.

In the network literature, most studies have drawn generalizations based on a single organization. Here, we examined two organizations operating in two different industries in an emerging economy such as India. By analyzing the hypothesized relationships across the social networks of two types of CE firms, we demonstrated that context of the firm heavily impacts the way in which organizations learn. One of the firms we examined, iProtect, has been undergoing domain redefinition as the second generation of the founder's family takes over the firm. The other firm, Vismaya, has demonstrated a CE strategy of sustained regeneration as they continuously develop and introduce new products to the market. In this

Network
view of
entrepreneurial
cognition

Variables	Model 1		Model 2	
	Standardized	SE	Standardized	SE
Gender identity	0.029	0.084	0.053	0.084
Age dissimilarity	-0.504	0.019	-0.861**	0.018
Level dissimilarity	-0.070	0.063	-0.04491	0.081
Tenure dissimilarity	0.487	0.095	0.849**	0.084
Tie strength			0.116*	0.112
Perceived expertise			-0.012	0.262
Cognition-based trust			0.139*	0.096
Adjusted R^2	0.015		0.083	

Notes: Based on 10,000 permutations. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table VII.
Multi-regression QAP
for Vismaya –
information
acquisition

Variables	Model 1		Model 2	
	Standardized	SE	Standardized	SE
Gender identity	-0.108	0.091	-0.177**	0.076
Age dissimilarity	-0.266	0.012	0.061	0.013
Level dissimilarity	0.006	0.072	0.054	0.080
Tenure dissimilarity	0.288	0.059	0.054	0.065
Tie strength			0.258***	0.104
Perceived expertise			-0.014	0.252
Cognition-based trust			0.022	0.081
Adjusted R^2	0.008		0.08	

Notes: Based on 10,000 permutations. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table VIII.
Multi-regression QAP
for Vismaya –
information
distribution

Variables	Model 1 (controls only)		Model 2	
	Standardized	SE	Standardized	SE
Gender identity	0.241**	0.099	0.182***	0.057
Age dissimilarity	-0.781*	0.021	-0.262	0.012
Level dissimilarity	-0.157**	0.067	-0.070	0.055
Tenure dissimilarity	0.828*	0.103	0.396*	0.057
Tie strength			0.009	0.065
Perceived expertise			-0.030	0.170
Cognition-based trust			0.595***	0.090
Adjusted R^2	0.128		0.488	

Notes: Based on 10,000 permutations. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table IX.
Multi-regression QAP
for Vismaya –
information
interpretation

study, we found some evidence to suggest that the way organizations acquired, distributed and interpreted information is situated within the organization and the type of CE.

In the case of iProtect, seven of the nine hypotheses we proposed were supported. Tie strength was found to be positively related to the three processes of organizational learning – information acquisition, distribution and interpretation. Perceived expertise was related to information distribution and interpretation, and cognitive-based trust was related to information acquisition, and interpretation. This suggests that under higher levels of uncertainty, when people look for information, they take into consideration the strength of the relationship with that individual and trust, i.e., whether he/she would be helpful based on previous experiences and his/her trustworthiness with regard to information sharing. The extensive interviews we had conducted with the top and senior management of iProtect also supported these findings.

In the case of Vismaya, expertise did not have a stronger effect. However, we did find some support that cognitive trust may have an effect on information acquisition in Vismaya. Borgatti and Cross (2003) talked about the cost involved in information seeking in terms of risks involved in admitting ignorance, as far as the information acquirer was concerned. The cognitive trust one person has over another can reduce perceived risks and thus strongly influence the extent to which people will seek information from the other person. The results in Vismaya suggest that under conditions of less uncertainty, people sharing information may pay less attention to social cues and follow more routines already in place. In addition, Vismaya is a family-driven organization and highly dominated by the family members' presence in the network. We could not find any involvement of the non-family members. Experts were not consulted during the information acquisition process and it was assumed that the expertise lies with the family members. The flow of information was also controlled by the family members, bending the learning network toward them. Further research that incorporates this family dimension and entrepreneurial cognition is needed in order to better understand an influence of the family character.

These differences suggest that depending on the CE modes (or different organizational life cycles), context and cognitive processes interact in different ways (Dess *et al.*, 2003; Zahra *et al.*, 2009, 2014). In companies under a sustained regeneration strategy where new product development is highly important and institutionalized within company routines, individuals might pay less attention to social clues. Moreover, the strong family character of Vismaya might be influencing individual cognitive processes in such a way that perceived expertise is not as important as in the case of iProtect. For iProtect, on the other hand, these aspects tend to show a stronger relevance in the individual cognitive processes we studied. iProtect shows sign of going through a domain redefinition, and as such, its employees tend to face higher levels of uncertainty and ambiguity. Under these circumstances, cognitive trust and perceived expertise can be important signals that reduce uncertainty and facilitate knowledge transfer.

Hypotheses	iProtect (domain redefinition)	Vismaya (sustained regeneration)
<i>H1</i>	Supported	Supported
<i>H2</i>	Supported	Supported
<i>H3</i>	Supported	Not supported
<i>H4</i>	Not supported	Not supported
<i>H5</i>	Supported	Not supported
<i>H6</i>	Supported	Not supported
<i>H7</i>	Supported	Supported
<i>H8</i>	Not supported	Not supported
<i>H9</i>	Supported	Supported
<i>H10</i>	Supported	Supported

Table X.
Summary of results

Thus, our research shows that cognition-based trust relationships tend to have a significant impact on entrepreneurial cognition especially in companies encouraging domain redefinition. Hence, managers should take interest in developing trust relationships between its employees under these circumstances. Managers also need to be aware of each other's expertise in the network and that can cut down a lot of time and energy wasted in searching for information. Encouraging their subordinates to engage with members outside their limited boundaries can enhance their knowledge of expertise in the organizational network.

Our study is not free of limitations. One of such limitations is the cross-sectional and correlational research design, which does not permit strong inferences regarding the causal direction of observed relationships. We also did not include important constructs such as affect-based trust and external sources of information. Future research should include these and additional variables relevant in CE contexts such as corporate venturing, and strategic renewal (Dess *et al.*, 2003; Phan *et al.*, 2009). In our study, we focused on the CE aspects of the organizations and did not incorporate research or variables on family businesses. However, one of the firms in this study was undergoing domain redefinition as a result of generational transitions, highlighting the overlap between CE and family business. Because the dynamics of family businesses may also impact the ways in which CE and corporate strategies are implemented, future studies should consider the impact of family business on these relationships. Additionally, this research was limited to two firms. Future studies should be conducted to include more firms to gain a better understanding of relationship between firm context and the organizational learning processes.

Even though this study has limitations, and further research is needed, we believe that we uncovered relevant insights regarding interactions between contextual variables and individual cognitive processes in different CE modes. We use not only quantitative information, but also rich interviews that help complement a better understanding of the contexts in both of our companies included. We focus here on sustained regeneration and domain redefinition as two CE types. We found that for both CE types, tie strength is relevant to the cognitive processes, but we also found differences, suggesting that contextual variables affect how perceived expertise and cognitive trust affect individual cognitive processes relevant for the deployment of business opportunities in CE contexts.

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