

Research on innovation capacity antecedents: distinguishing between family and non-family businesses

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INTRODUCTION

Family businesses are an important source of economic development and growth. Worldwide, these firms are the predominant form of business (Gersick et al., 1997) realizing 40-60% of gross national products and 35 to 70% of job generation (Van Gils et al., 2008). The past decades, family firms have received a lot of attention in the literature. Yet there are still some gaps that need to be explored. One of these gaps is that there is limited research investigating innovation in family-owned businesses, despite the importance of innovation. That is, innovation is considered to be essential for growth and survival of all firms (Schumpeter, 1934; Wolfe, 1994; Cefis & Marsili, 2006). Family businesses are seen as one of the most complex forms of business (Neubauer & Lank, 1998) and thus innovation researchers have to deal with this specific group separately. Nevertheless, there is only limited research investigating innovation in a family firm context (e.g. Aldrich & Cliff, 2003; Zahra et al., 2004; Kellermanns et al., 2008). Like Craig & Moores (2006), Gudmundson et al. (2003) state that research investigating the relationship between innovation and ownership structure appears to be nonexistent.

Innovation is a broad topic. One can find in the innovation literature that innovation has been used as an umbrella term, to describe both the process to generate new products as well as the new or improved products themselves (Porter, 1990). The output of the innovation process can be defined as the adoption of a system, program, policy, product or service, that is new to the adopting organization (Damanpour & Evan, 1984). The innovation process starts with a firm's ability to innovate, referred to as innovation capacity by Hult et al. (2004). Innovation capacity **influences** the innovation output or performance. So far, the few papers investigating innovation in a family context, have put the emphasis on the innovation output, but findings fall short of expectations. So examined Wu (2008) the relationship between family ownership and innovation performance in a sample of service and industrial firms and found a positive but insignificant relationship. Additionally, a study conducted by Gudmundson et al. (2003) found no significant difference in the level of innovation output between family businesses and non-family businesses. Nevertheless, family businesses were found to implement more innovations than non-family businesses (**Gudmundson et al., 2003**). One can argue that the limitation of these papers is their focus on innovation output and performance. Innovation output is not always a true reflection of a firm's ability to innovate. Additionally, innovation output comprises many aspects what makes it difficult to measure it accurately. Therefore, to

understand innovation in family-owned businesses, an alternative route is to look at the facilitating factor, namely the capacity to innovate. The aim of this paper is to examine how innovation capacity is affected by specific antecedents that are influenced by the family characteristic of a firm. In doing this, we want to contribute to a better understanding of innovation in family businesses.

Family businesses possess a unique bundle of resources created by the interaction of the family and the business (Habbershon & Williams, 1999; Sirmon & Hitt, 2003). The interaction between the family and the business may affect how **resources** are managed and deployed in family firms (Sirmon & Hitt, 2003). Chua et al. (1999) state that the uniqueness of a family business is caused by their pattern of ownership, governance, management, and succession materially that influences the firm's goals, strategies, structure, and the manner in which each is formulated, designed, and implemented. This supports the assumption that innovation capacity is subject to unique influences in family firms (Gudmundson et al., 2003; Corbetta & Salvato, 2004). Van Gils et al. (2008) state that "examining the possible advantages and disadvantages of these unique resources to the innovation process is an important step in understanding how the family business population can create value" (p.3). To summarize, because of their uniqueness, their dominant appearance, their influence in the economy, and the importance of innovation, it is important and challenging to understand how the innovation capacity is affected by the unique characteristics related to family-owned businesses. For this paper the focus is put on human-related resources that are expected to affect a firm's innovation capacity, and this for two reasons. First, because we assume that people and organizational context are the main determinants of successful innovation. Secondly, we expect that human-related resources are mostly affected by the family characteristic of firms.

In conclusion, this study contributes to the literature in two ways. First, it enhances the family business literature by focusing on innovation capacity as a facilitator in the innovation process. Within the family business literature, this study investigates whether innovation capacity is influenced by the unique family business characteristics in order to get a better understanding of innovation in family businesses. Secondly, by doing this, we provide academics and policy makers insight in the innovation capacity of family firms and hence ways for improvement.

This paper is organized as follows. We begin with a discussion of innovation capacity and its antecedents. We explain the proposed innovation capacity framework and the specific focus of this paper. Next, the four innovation antecedents are described and attention is paid to how these antecedents are influenced by the family characteristic of a firm. Furthermore, the empirical part of this paper is introduced and the results are discussed.

Implications/limitations

INNOVATION CAPACITY AND ITS ANTECEDENTS

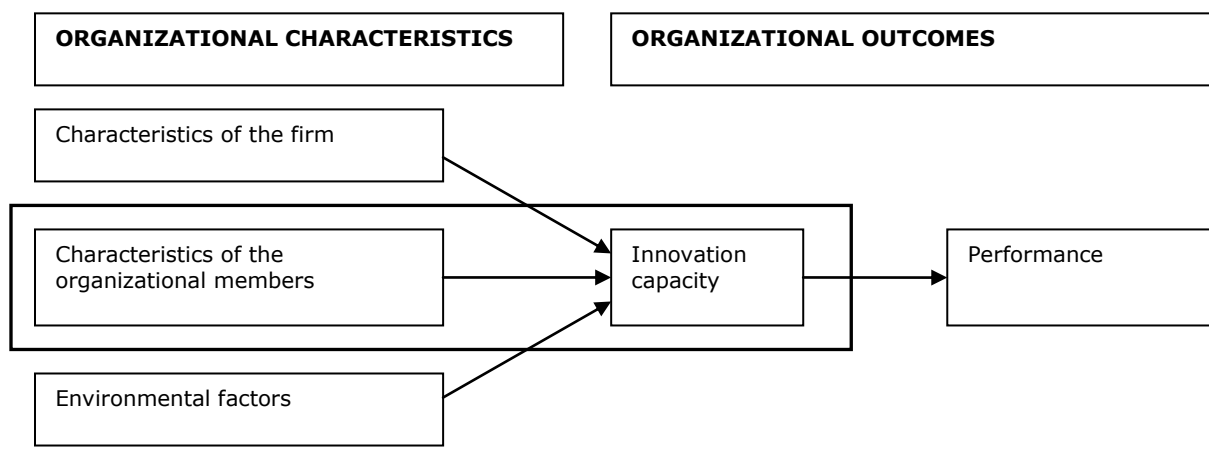
Successful innovation in new product and processes is increasingly being regarded as the central issue in economic development (Porter, 1990). Innovation is found to stimulate firm growth and, importantly, this growth occurs almost regardless of the condition of larger economy (Craig & Moores, 2006). **The organization's ability to innovate is one of the key capabilities to be competitive in the 21st century.**

Consequently, innovation is a popular topic in the business and academic world. In the literature one can find that innovation has been used to describe the process to generate new products as well as the new or improved products themselves (Porter, 1990). The classic Schumpeterian definition of innovation distinguishes five different types of innovation: new products, new production methods, new markets, new sources of supply and new forms of organization (Schumpeter, 1934). Additionally, innovation can be defined as the adoption of an idea or behavior – being a system, a program, a policy, a device, a product or a service, that is new to the adopting organization (Daft, 1982; Damanpour & Evan, 1984). Innovation capacity or innovativeness relates to the firm's capacity to engage in innovation and can be defined as the capacity, the ability and the willpower of the organization to introduce new processes, products or ideas in the organization successfully (Damanpour, 1991; Hult et al., 2004).

Being innovative starts with having a well-oiled organization. The conditions for successful innovation and strategic change have been an important subject in the research literature since the pioneering days of Burns and Stalker (1961). There is an encouraging similarity regarding the importance of a number of basic success factors. These factors, related to cross-functional cooperation, commitment at the top and work floor, down-the-line leadership, effective

processes, customer-involvement, expertise and skills, adaptive capacity, networking, and culture, are seen as antecedents of innovation. The relevant antecedents of innovation capacity and strategy are all connected and create an ongoing process.

In our contribution, innovation is defined as a continuous process that is influenced by organizational characteristics that are depicted in Figure 1 as antecedents to the capacity to innovate and hence the innovation output and success. These organizational antecedents come from the enormous literature on the characteristics of innovative organizations (e.g. Damanpour, 1991; Wolfe, 1994; Hurley & Hult, 1998). The organizational antecedents can be distinguished in three broad categories (Damanpour, 1991; Wolfe, 1994; Hurley & Hult, 1998). The first category, firm characteristics, are characteristics like size, age, structure as well as R&D expenditure, and can be seen as objective aspects of an organization that cannot be deduced from or reduced to properties of organizational members (Hurley & Hult, 1998). The second category, characteristics of the organizational members, defined as cultural characteristics by Hurley & Hult (1998), refer to the behaviors of people in an organization. Examples of this category are teamwork, involvement of the employees and communication. The third category, environmental factors, are for instance, the intensity of competition, the intensity of networking, and the extent of change in the environment as perceived by the people in the company. This model can be criticized, especially for its sequentially. The single direction of arrows is only used for a simplified presentation. It is expected that influence acts in both directions and there are feedback loops among the organizational characteristics.



Note: the empirical focus of this paper is put on the variables in the frame.

Figure 1: The antecedents of innovation. Source: Adapted from Hadjimanolis (2000), Hurley & Hult (1998)

There is an abundant literature that proves the influence of the organizational characteristics on innovation capacity (e.g. Hurley & Hult, 1998; Damanpour, 1991; Deshpandé et al., 1993; Siguaw et al., 2006). According to Prajogo & Ahmed (2006), two major streams of research emerge in the numerous studies on innovation. Each stream focuses on a different set of antecedents of innovation. The first stream focuses upon technological aspects that influence innovation, such as R&D (e.g. Napolitano, 1991; Leblanc et al., 1997). The second stream examines innovation in terms of human aspects. This latter research stream presupposes that people and organizational context are the main determinants of successful innovation (e.g. Cooper & Kleinschmidt, 1995; Zien & Buckler, 1997). In this paper the focus is put on human-related factors that are recognized as antecedents of innovation, referred to as the characteristics of organizational members in Figure 1. As such the key question in this paper is whether the family characteristic of a firm influences the innovation capacity through its effect on the organizational characteristics. To put it differently, does family ownership influence the innovation capacity antecedents and as such the innovation capacity?

INNOVATION CAPACITY IN FAMILY FIRMS

Family firms are often unique compared to non-family firms with regard to their resources and capabilities. These unique bundle of characteristics are created by the interaction of the family and the firm, referred to by Habbershon & Williams (1999) as the ‘familiness’ of the firm. These unique characteristics can create both advantages and disadvantages (Sirmon & Hitt, 2003). As such, it is reasonable to expect that the human-related antecedents of innovation are influenced by the family factor of a firm.

As Prajogo & Ahmed (2006) stress that people and social practices, instead of technology, constitute the basic ingredient in organizational success, the principles and practices of managing the human factors of innovation **are zoomed in on**. Human capital can be seen as an enabling factor in profitable innovation (Leiponen, 2005). Given that the purpose of the paper is to assess whether the family characteristic of a firm influences innovation capacity via its effect on the internal human determinants, these determinants are briefly reviewed. Respectively skills present in the company, involvement of the employees in the innovation process, top-down relationship, teamwork and innovation capacity are discussed.

Skills. Numerous authors recognize knowledge and skills of the employees and the owner/manager in respect to innovation as significant determinants of innovation (Mahemba & De Bruijn, 2003; Avermaete et al., 2004; Clancy, 2001; Romijn & Albaladejo, 2002; Mohnen & Röller, 2005). Romijn & Albaladejo (2002) argue that one of the most important factors that contribute to the enhancement of innovation capacity is the knowledge and skills of the workforce. Also Birdthistle & Fleming (2007) state that, within firms, the success of innovations depends significantly on the ability, skills and intellectual capacity of individuals to absorb change and interpret the rapidly changing environment. In a study of Mohnen & Röller (2005), lack of skills was the most important obstacle for innovation. The ability of SMEs, and particularly family SMEs, to remain competitive and grow is threatened without sufficient people having adequate skills (Birdthistle, 2006). Therefore, we propose the following hypothesis:

Hypothesis 1a: The skills present in a firm will have a positive effect on the firm's innovation capacity.

It can be expected that family businesses will have more problems and constraints concerning employee skills and competencies, and this for several reasons. First of all, it can be expected that it is more likely that family businesses employ relatives that are not always competent for the job. Additionally, Schulze et al. (2001) state that family firms are more likely to hire family members, even if there are more qualified outsiders. According to Dunn (1995) favoring family members over non-family candidates, can lead to a lower qualified workforce. The fact is that these family members are not necessarily the right persons for the job and this has automatically a negative effect on the business' innovation capacity. Kets De Vries (1993) concluded that **nepotism** allows inept family members to become and remain managers, and makes attracting professional managers difficult. Also particularistic criteria are often used by family businesses and this can have a negative influence on innovation capacity. Perrow (1972) summarizes particularism as follows: "Particularism means that irrelevant criteria like e.g. only relatives of the boss have a chance at top positions, in contrast to universalistic criteria like e.g. competences is all that counts, are employed in choosing employees ... The particularistic criteria are likely to be negatively related to performance ..." (Perrow, 1972, p.8-10).

The reason behind the employment or promotion of relatives in family-owned business is likely caused by a lack of trust in the capabilities of others and a desire to maintain family power and control (Stoy Hayward, 1992). This reluctance to use or employ outside expertise can cause family firms to become introverted, inflexible and uncompetitive (Leach, 1994), and this can automatically diminish their innovative capacity. Finally, it has been argued that it is more difficult for family businesses to attract and retain qualified managers due to the lack of promotion possibilities or payment in **a form of stock** (Schulze et al., 2003).

However, the family characteristic of a firm can also positively attribute to the skills and knowledge within the business. First of all, the protective characteristic of family businesses may as well create unique skills and knowledge because they are protected and kept in the family for generations (Uhlander et al., 2007). Moreover, family members active in the firm are often included in the firm at a very early age to understand the business, its competitors, its customers. Consequently, they have received hands-on training from family leaders who are knowledgeable and highly skilled (Dyer, 1986). Furthermore, the staff turnover rate in family firms is suggested to be lower compared to non-family firms (Miller & Le Breton-Miller, 2003), **which implies that skills and knowledge is preserves within the business for a longer period of time.**

To summarize, it appears that there are aspects that are positive and negative for the innovation capacity of family firms regarding the skills antecedent. However, we think that the fact that family businesses are more nepotistic in their recruitment process will be stronger than the positive influences. In this line of reasoning, we hypothesize that the family characteristic of a firm negatively influences the firm's innovation capacity via its negative effect on skills and knowledge present in the firm.

Hypothesis 1b: Skills present in a firm mediate between the family characteristic of a firm and a firm's innovation capacity.

Involvement. A second antecedent of innovation is employee involvement (Prather & Turrell, 2002). Prather & Turrell (2002) argue that firms need to challenge and involve employees in the innovation process when they want to improve the climate for innovation. Ultimately, this will also contribute to the firms capacity to innovate. Several authors report that when a firm has the intention to be innovative they need to encourage employee interaction and

demonstrate that the employees' ideas are valued (Siguaw et al., 2006; Prather & Turrell, 2002). In addition, Siguaw et al. (2006) argue that innovation is promoted in organizations that enhance employee autonomy and permit free expression. When firms want to be innovative they need to have a process that allows employees to communicate ideas (Blumentritt, 2006). Moreover, Prajogo & Ahmed (2006) suggest that there are several specific key practices aimed at building innovative behaviors, and among these are empowerment and involvement. Siguaw et al. (2006) state that "management must appreciate, encourage, direct, and enhance the willingness of employees to place their energy and diversity of ideas in the service of a set of collective understandings and beliefs to help orient or guide an overall innovation community" (p. 565). Furthermore, Tang (1999) suggests that leadership that works to create an open employee environment can significantly affect innovation. Therefore, the following hypothesis is proposed:

Hypothesis 2a: Involvement of the employees in the innovation process will have a positive effect on a firm's innovation capacity.

Closely related with the involvement antecedent, is the relationship between the top and the work floor. Siguaw et al. (2006) state the following about this relationship: "The way a firm views, interacts with, and enables its employees through knowledge dissemination, clarity of direction, and commonly shared understanding either facilitates or inhibits their capacity to invent" (p.565). Rothwell (1992) as well notes the importance of horizontal management style, with increased decision making at lower levels, as a critical success factor for innovation. Put differently, centralized and formalized organizations might be more efficient but less innovative (Pelhan & Wilson, 1995). Also Damanpour (1991) finds evidence for the negative association of centralization with innovation. Beer & Eisenstat (2004) argue that most failures of innovation initiatives in organizations start when top management implement change without finding out what other parts of the organization think about it. They state that strategic conversations have to be 'public'. By that they mean that managers need to keep everyone below them informed about what has been learned, as well as what changes are planned (Beer & Eisenstat, 2004). Additionally, Beer et al. (2007) argue that managers/owners have to facilitate an open and honest conversation to effectively manage their organization. One can argue that an effective top-down relationship is facilitated by an open top-down communication and by given the employees clear information about possible change and what is expected of them. As a result, we state the following hypothesis:

Hypothesis 2b: An effective top-down relationship will have a positive effect on a firm's innovation capacity.

In the family business literature, one can find contradictory evidence about the possible involvement and participation of the employees of the family firm. Some authors argue that family-oriented firms can be positively linked to innovation capacity. First, because these firms are typically found to rely less on the use of formal internal control systems (Uhlander et al, 2007: 12; Westhead, 1997). The use of informal management systems may increase the capacity to innovate. Not only because it is more easier for the employees to give ideas and to be involved in the innovation process, but also because it is easier to communicate between the different parts of the firm, a primary antecedent of innovation (Burns & Stalker, 1961). Additionally, the communication within family firms will be facilitated caused by the close bonds among family members (Gersick et al., 1997). Secondly, the employees' personal commitment and involvement to the company often present in family businesses (Daily and Dollinger, 1993) and mainly caused by the inside orientation of the family firm may be positive for the employees' involvement and participation in the innovation process.

On the contrary, there are also arguments that contribute to the expectation that family businesses might be less involving their employees in the innovation process and do not have an open top-down relationship. Namely, family businesses are closely held, with power and decision-making concentrated in the owner/manager (Dyer & Handler, 1994). The influence of the founder in family businesses on strategic decisions is generally greater in family firms in comparison with their non-family counterparts (Denison et al., 2004). Thus, innovativeness may translate into innovativeness of the owner/manager rather than the innovativeness of the whole firm (Verhees & Meulenber, 2004), especially in family businesses. Family business owners are found to commonly reject the advice and ideas of others and are reluctant to delegate decision-making, which leads to reduce innovativeness (Dyer & Handler, 1994). Put differently, employees of family firms are more likely to be left out of the decision-making, idea generation, and the innovation process.

Overall, family firm characteristics are assumed to have an effect on the involvement of the employees in the innovation process and the top-down relationship, but the empirical evidence does not lead to a consensus of the effect. The eagerness of the family manager to stay in control and the concentrated decision-making by the owner/CEO both lead to the

assumption that employees in family businesses are less involved in the innovation process and are not encouraged to give new ideas. Moreover, the centralization may become a burden for the entrepreneurial behavior of the family firm (Hall et al., 2001). Therefore, we hypothesize that the family characteristic of a firm negatively influences the innovation capacity through its negative effect on the involvement of the employees in the innovation process. Nevertheless, the aspect that there is less use of formal management systems in family firms and that more employees have a personal connection with the firm, make one expect that the relationship between employees and the top is positively influences. Hence, we assume that the family characteristic of a firm positively influences the firms capacity to innovate via its positive effect on the top-down relationship. Our following hypotheses are:

Hypothesis 2c: Involvement of the employees in the innovation process mediates between the family characteristic of a firm and a firm's innovation capacity.

Hypothesis 2d: The way top management interacts with their employees mediates between the family characteristic of a firm and a firm's capacity to innovate.

Teamwork. The importance of cross-functional teams is increasingly emphasized in the innovation context (Song et al., 1997). Siguaw et al. (2006) state that innovation is promoted in organizations who devise inter-functional cooperation. According to Love & Roper (2009) cross-functional teams play a potentially important part in the innovation process enabling knowledge sharing, the development of trust and overcoming spatial and organizational barriers. Offenbeek & Koopman (1996) state that innovation is a continuous process that consists of participation of people and the interaction among them. Additionally, cross-functional teamwork is important for innovation, because it is one of the most effective channels of communication, a primary antecedent of innovation (Burns & Stalker, 1961). Koc (2007) found that cross-functional teamwork strongly contributes to innovation capacity of firms through the idea generation process. **Multi-disciplinary teamwork and effective communication among the different functions of organization are important since they reduce resistance and provide information flow from different aspects** (Linton, 2000). Bain et al. (2001) argue that teams provide ideal conditions for generating new and useful products and processes because of the combined knowledge, and expertise of individuals with different functional knowledge, skills, perspectives, and background. In the same line, McGourty et al. (1996) state that dealing with multifunctional teaming is important to modify an

organization's culture to encourage innovative behavior. Tjosvold (1990) finds evidence that allowing opposing opinions within teams promote mutual influence of team members and, consequently, team effectiveness and innovation. Hence, one can argue that teamwork is very important to be innovative. As a result, we state the following hypothesis:

Hypothesis 3a: Teamwork will have a positive influence on a firm's innovation capacity.

Within family businesses, the team dynamics may be affected given that relationships between group members are often both personal and professional (Dyer, 2003). Sirmon & Hitt (2003) as well state that "family members simultaneously participate in both business and family relationships in their [...] professional lives" (p.341). The duality of these relationships increases the complexity of family businesses and creates a unique context, both positive and negative, compared to non-family businesses (Sirmon & Hitt, 2003). Family relationships may encourage nepotism or interpersonal conflicts (Dyer, 1986). This is not only detrimental to firm performance, but also to the efficiency of working in team. Although, it can be stated that conflicts may create creativity and discussion, what is positive for a firm's innovativeness (Kellermans et al., 2008) Moreover, Zahra et al. (2004) state that the family business culture is group oriented, which indicates that employees in family firms will more easily share knowledge and collaborate. Additionally, the relations are mostly based on kinship and trust (Zahra et al., 2004), which positively influences effective teamwork. Which in turn is positive for a firm's innovation capacity.

Overall, the previous suggests that the family characteristic of a firm creates both positive and negative influences on team efficiency. The duality of the relationships in family firms may diminish the efficiency of teamwork. On the contrary, conflict is not always bad for team efficiency, because it may create creativity. Additionally, the group-oriented culture present in family businesses is positive for collaboration. For these reasons, we hypothesize that the family characteristic of a firm positively influences the firm's innovation capacity through its positive effect on teamwork.

Hypothesis 3b: Teamwork mediates between the family characteristic of a firm and a firm's innovation capacity.

Innovation capacity. There is limited research investigating innovation capacity in a family business context, but we can expect that the family characteristic of a firm may have also a direct effect on innovation capacity. Eddleston et al. (2008) state that many family firms do not plan for the future or invest in developing their innovative capacity. Family firms are often characterized as resistant to change (Hall et al., 2001), taking less risk (Naldi et al., 2007) and conservative in their strategic behavior (Sharma et al., 1997). Because innovation requires all these aspects, one can expect that innovation capacity is lower in family firms. Additionally, the culture of family businesses is internally focused. In this culture, knowledge and expertise resides within the family boundaries (Zahra et al., 2004). This internal orientation may stifle entrepreneurial behavior over time (Zahra et al., 2004) and consequently the innovation capacity.

On the contrary, some authors emphasize that family firms have a long term vision (Ward & Aronoff, 1991), because it is the goal of most family businesses to be passed on to later generations. This strengthens the idea of investing in the long run (Le Breton-Miller & Miller, 2006). This long term investment decreases the threat for liquidation (Dobrzynski, 1993) and makes it for family firms easier to pursue innovative strategies (Teece, 1992). Although research investigating innovation within family businesses is limited, a related domain, entrepreneurial behavior, is given a lot of attention in the family business literature (e.g. Kellermanns et al., 2008; Zahra, 2005; Zahra et al., 2004). Empirical research has shown that entrepreneurial activity is a common characteristic of many family firms (Zahra et al., 2004). Since innovativeness is seen as a dimension of entrepreneurial behavior, one can expect that the innovation capacity is something family businesses are investing in.

Overall, one can expect that the innovation capacity in family businesses differs from their non-family counterparts, but contradicting empirical findings nourishes an ongoing debate. Nevertheless, we expect that the risk-avoiding and conservative characteristic of family firms influences the innovation capacity the most, given the importance of these aspects for innovation. Therefore, we expect that the innovation capacity of family firms is smaller than the innovation capacity of non-family firms.

Hypothesis 4: The family characteristic of a firm influences the firm's innovation capacity. More specifically, we expect that family firms score lower on their innovation capacity than non-family firms.

Figure 2 summarizes our hypotheses. Via the effect of the family characteristic of a firm on the innovation antecedents, we expect that the innovation capacity is also influenced. In other words, we assume that the innovation capacity varies, depending on whether or not the firm is a family business.

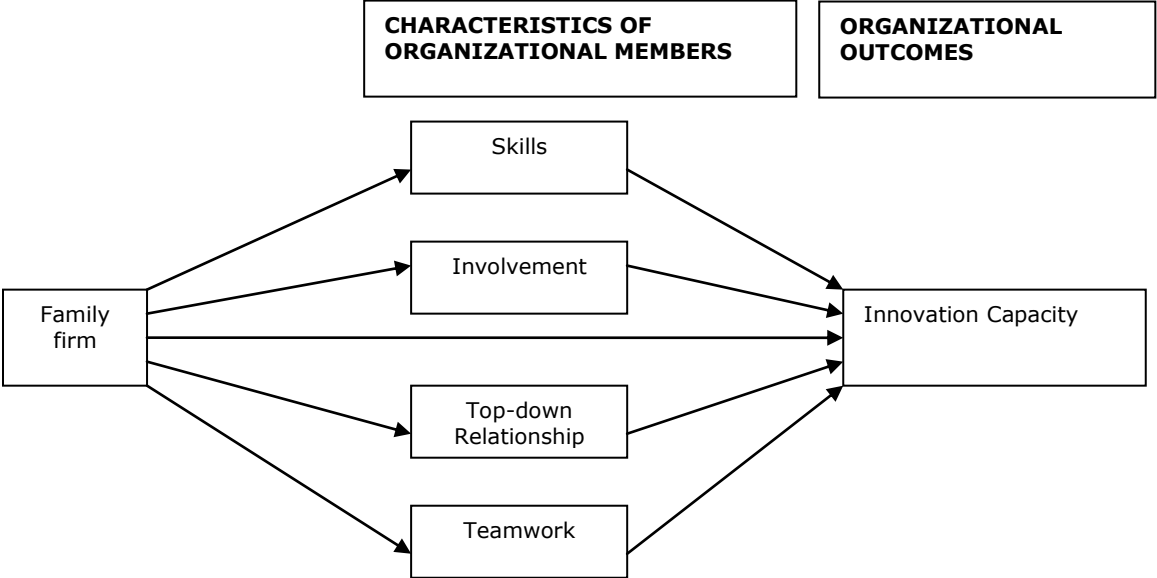


Figure 2: Conceptual framework

RESEARCH METHODOLOGY

Sample. The data for this study are collected in the context of a large-scale policy program named ‘Strategic Innovation’ in the period 2002-2007. Companies from various sectors and of different sizes participated in this project. In this study we took a random sample of 210 companies, located in Belgium and The Netherlands to perform the analysis for this paper. The sample contains 111 private family firms and 99 non-family firms who mainly differ in ownership structure. The two groups have approximately the same division in terms of other characteristics, like the representation of sectors, size, and turnover. The selected firms have at least 10 employees and have a profit motive. Sample characteristics are given in Table 1.

Table 1: Sample characteristics (N=210)

	Family firms (N=111)	%	Non-family firms (N=99)	%
Size				
Small (10-50 employees)	74	66,7	58	58,6
Medium (51-250 employees)	35	31,5	37	37,4
Large (more than 250 employees)	2	1,8	4	4
Turnover				
Less than 2 million	21	18,9	27	27,3
2-10 million	52	46,8	27	27,3
10-50 million	30	27	33	33,3
More than 50 million	2	1,8	9	9,1
Unknown	6	5,4	3	3
Activity				
Industry	57	51.4	36	36.4
Services	35	31.5	41	41.4
Retail	10	9	11	11.1
Other	9	8.1	11	11.1

Research measures. The firm-specific data were obtained through several steps. For this paper the focus is on the second step, that contains a questionnaire that assesses the antecedents that impact the innovation capacity of the firm. In order to measure the organizational antecedents a five-point Likert-type scale was used, which ranges from strongly agree (5) to strongly disagree (1). The owner/manager of the participated firms were asked to indicate to what extent the particular antecedents typify their firm.

Analyses. All antecedents are measured using multiple items. Skills and involvement of the employees are measured using four items. For measuring top-down relationship, six items were used. The fourth antecedent teamwork is measured using five items. The dependent variable, innovation capacity is measured using four items. Factor analysis was applied for each antecedent in order to find different dimensions. Only the six items of the top-down relationship antecedent were reduced to two factors. All other antecedents were not reduced to multiple factors after factor analysis. The new factors of top-down relationship were renamed by interpretation of the factor loadings for the variables and are given in Table 2.

To assure internal consistency, Cronbach's coefficient alpha was conducted for each factor. Since an alpha value of 60% is considered adequate for internal consistency (Hair et al.,

1998), internal consistency was assured for all factors. Cronbach's coefficient alpha values are given in Table 2.

Differences in size are found to affect the relationships under study (e.g. Chrisman et al., 2004; Schulze et al., 2003). Therefore, we used the logarithm of number of employees and the logarithm of annual turnover to control for size.

Table 2: New factors after factor analysis and Cronbach's coefficient alpha values

Original factor	New factors	Cronbach's alpha
Skills	Present skills	76.93
Involvement of the employees	Involvement of the employees	80.11
Top-down relationship	Top-down communication	67.20
	Clarity of direction	67.82
Teamwork	Teamwork	80.34
Innovation capacity	Innovation capacity	71.89

Results. The means, standard deviations, and correlations are shown in Table 3 on the next page. The proposed hypotheses were tested using multiple regression analysis. Results are presented in Table 4 on page 17. Since for all regression models, VIF values are close to 1, the effects of multicollinearity are ignored. In *model one* Table 4, the control for size was entered, however, number of employees and annual turnover are not significantly related to innovation capacity. To test hypotheses 1a, 2a, 2b, 3a which stated that the innovation capacity of a firm is influenced by different human-related antecedents, we use multiple regression. Results are presented in *model two* of Table 4. Hypothesis 1a, which hypothesized that skills positively affect the innovation capacity of a firm is supported. Skills that are present in the company are significantly and positively related with a firm's innovation capacity ($\beta = 0.25$, $p < 0.0001$). Hypothesis 2a, which stated that the involvement of employees in the innovation process will have a positive effect on innovation capacity is also supported. The involvement of the employees is positively and significantly related with the innovation capacity ($\beta = 0.33$, $p < 0.0001$). Hypothesis 2b is partly supported. From hypothesis 2b, which hypothesized that an effective and open top-down relationship has a positive influence on innovation capacity, only the dimension clarity of direction relate positively and significantly with innovation capacity ($\beta = 0.25$, $p < 0.0001$). Hypothesis 3a, which stated that teamwork has a positive influence on the innovation capacity of a firm, is not supported ($\beta = 0.06$, n.s.). According to the results, the adjusted R^2 for model two is 0.408, indicating the total variance of innovation capacity explained by the independent variables.

Table 3: Descriptive statistics and correlations (N=210)

	Mean	SD	Skills	Involv.	Top-down	Clar.dir.	Team
1. Employees	3.74	0.98					
2. Annual turnover	15.68	1.33					
3. Skills	3.32	0.68					
4. Involvement	3.32	0.73	0.37**				
6. Top-down communication	4.11	0.76	0.12	0.42**			
7. Clarity of direction	3.16	0.72	0.25**	0.50**	0.28**		
8. Teamwork	3.03	0.68	0.40**	0.57**	0.40**	0.51**	
9. Innovation capacity	3.45	0.74	0.45**	0.56**	0.26**	0.50**	0.47**

** Significant at the 0.01 level

Note: Employees and annual turnover are logarithmized

Table 4: Multi Regression analysis; dependent variable: innovation capacity (N=210)

	Model I β (t-value)	Model II β (t-value)	Model III β (t-value)	Model IV β (t-value)
Explanatory Variables				
<i>Step 1: Controls</i>				
Employees	-0.124 (-1.69)	-0.029 (-0.51)	-0.026 (-0.44)	-0.027 (-0.47)
Annual turnover	0.066 (1.21)	0.026 (0.59)	0.019 (0.43)	0.021 (0.49)
<i>Step 2: Main effects</i>				
Present skills		0.250 (3.60)***		0.246 (3.56)***
Involvement		0.327 (4.38)***		0.325 (4.33)***
Top-down communication		-0.004 (-0.06)		0.002 (0.03)
Clarity of direction		0.253 (3.61)***		0.254 (3.62)***
Teamwork		0.062 (0.76)		0.062 (0.76)
<i>Step 3</i>				
Family firm			-0.050 (-0.48)	-0.076 (-0.93)
R ²	0.014	0.429	0.015	0.431
Adjusted R ²	0.004	0.408	0.000	0.407
F-statistic	1.43	20.68***	1.03	18.19***

* Significant at the 0.01 level; ** Significant at the 0.001 level; *** Significant at the 0.0001 level

Note: β-value refer to the unstandardized coefficients of the explanatory variables

In order to test the hypotheses which stated that the family characteristic influence innovation capacity via its effect on the innovation antecedents (hypothesis 1b, 2c, 2d, 3b), we first regressed the innovation capacity on family firm (*model three* in Table 4). Since, family firms is not significant, we have to consider an indirect effect as suggested by Mathieu & Taylor (2006). In order to know if there is a significant relation between family firm and the innovation antecedents, we use multivariate GLM with the innovation antecedents as dependent variables and family firm as independent variable. The results, illustrated in Table 5, show no significant relationship. A first criteria of the indirect effect, is thereby not

fulfilled. In model two we already observed a significant relationship between innovation capacity and the innovation antecedents. We then estimated (*model four* in Table 4) in which the innovation capacity is regressed on both family firm and the innovation antecedents. We must conclude that the addition of family firm does not lead to a change. Therefore, we have to conclude that there is no influence of the family characteristic on innovation capacity via its effect on the innovation capacity antecedents.

Hypothesis 4, which hypothesized that the innovation capacity in family firms is lower in comparison with their non-family counterparts, is tested with an independent t-test. Results showed that there is no significant difference between the two groups of businesses. The means and standard deviations are given in Table 6.

Table 5: Multivariate GLM (N=210)

Independent variable	Dependent variables	β (t-value)
Family firm	Present skills	-0.063 (-0.67)
	Involvement	0.061 (0.61)
	Top-down communication	0.159 (1.52)
	Clarity of direction	0.037 (0.37)
	Teamwork	0.076 (0.81)

Table 6: Independent T test; Innovation capacity (N=210)

	Family firms	Non-family firms
Mean	3,42	3,49
St.dev.	0,74	0,74

DISCUSSION OF THE RESULTS

The research on which this paper is based is twofold. First, we proposed that a firm's innovation capacity is influenced by certain human-related antecedents. Secondly, we suggested that these human-related antecedents might be affected by the family characteristic of a firm, whereby the innovation capacity may be influenced as well.

Hypothesis 1a, which stated that innovation capacity is influenced by the skills present in the company was supported by the findings. The results indicate that skills have a positive influence on a firm's innovation capacity. To be innovative, and consequently competitive, a firm needs to have sufficient skills and knowledge available. *Hypothesis 1b* was not supported

by the results. This hypothesis suggested that the family characteristic of a firm influences the innovation capacity via its effect on skills in the company. Literature suggests that skills and knowledge present in a family firm may be influenced by the 'familiness' of the firm and might differ from the skills and knowledge present in non-family firms. In our analysis, we did not find evidence to support this. As such, we cannot accept the hypothesis that innovation capacity is influenced by the family characteristic of a firm via the effect on skills of the workforce by this family characteristic. A possible explanation might be that we treat the family businesses all alike for conducting the analysis, whereas the group of family business is heterogeneous. For example, the generation in charge of the family business is a central component of its life cycle as important changes in family attributes will occur (Gersick et al., 1997). It is likely that a family business managed by the first generation have more family members as employees who are not necessarily the most competent person for the job. This can hamper the skills and knowledge, which automatically influences the innovation capacity.

Hypothesis 2a proposed that innovation capacity is positively influenced when the employees are involved in the innovation process. Our findings support this proposition. Involvement of the employees in the innovation process relates positively and significantly with innovation capacity. It is positive for a firm's innovation capacity to create an environment where employees feel encouraged and motivated to provide ideas for improvements. The results show that involvement of the employees in the innovation process influences the innovation capacity the most. *Hypothesis 2c* stated that the family firm characteristic influences innovation capacity via its effect on involvement of the employees. Like hypothesis 1b, this hypothesis was not supported. Although literature let us expect that the involvement of the employees in the innovation process is influenced when the firm is family-owned, we did not find evidence in our findings to support this. Again, we can expect that treating the family businesses as a homogeneous group flatted out possible differences with non-family businesses.

Hypothesis 2b, which stated that an effective top-down relationship positively influences innovation capacity, is partly supported by the findings. For the dimension top-down communication, no significant relationship with innovation capacity was found. On the contrary, there was a significant and positive relationship between the second dimension clarity of direction and innovation capacity. Innovation capacity is positively influenced when the top gives clear directions to the work floor about what they expect of them. Additionally,

it will enhance a firm's innovation capacity when companies translate their strategy to clear targets for each business unit. Again, the hypothesis which stated that the family characteristic of a firm influences the innovation capacity because the family characteristic has an effect on the top-down relationship (*Hypothesis 2d*), was not supported. A possible explanation is once more the heterogeneity of the family businesses that is not taken in consideration for this current paper.

We did not find evidence for accepting *hypothesis 3a*, which proposed that teamwork will positively influence innovation capacity. A possible explanation might be that teamwork is a primary condition for effectively managing the whole innovation process, but has no essential influence on the firm's innovation capacity. Additionally, *hypothesis 3b*, which stated that the family firm characteristic of a firm influences innovation capacity through its influence on teamwork was not supported by our findings. Although the literature let us expect that teamwork is influenced by the 'familiness' of a company, we did not find a significant relationship. Once again, this can be ascribed to the treatment of the family businesses as a homogeneous group, which they are not. It is possible that this flattened out some differences.

There is also no evidence for accepting *hypothesis 4*. This hypothesis stated that the innovation capacity of family firms is expected to be lower in comparison with the innovation capacity of non-family firms. Because of certain general characteristics assigned to family-owned businesses, for example their internal focus, it can be expected that innovation capacity of family businesses is lower than non-family businesses. Nevertheless, we did not find evidence for this. A possible explanation is that innovation capacity is influenced by many different characteristics of a firm. It might be that both groups of businesses have positive and negative characteristics that influence innovation capacity. But this lead not automatically to a difference innovation capacity.

CONCLUSION

To conclude, this study had the purpose to investigate the influence of human-related antecedents on innovation capacity. Furthermore, we examined if the family characteristic of a firm influenced the human-related antecedents, and as such the innovation capacity.

There is only limited research investigating innovation in a family firm context. However, family firms are expected to have unique characteristics caused by their 'familiness'. The literature let one expect that the family firm characteristic of a firm affect the innovation capacity through its influence on the innovation capacity antecedents. For this paper, the focus was on the human-related antecedents like skills of the workforce, involvement of the employees in the innovation process, top-down relationship and teamwork. We conducted regression analyses for examining our hypotheses.

Results showed that the following human-related antecedents have a positive influence on innovation capacity: skills present in the company, involvement of the employees in the innovation process, and the clarity of direction of the top to the work floor. Unfortunately, we did not find any evidence of the influence of the family characteristic of a firm on the human-related antecedents and the innovation capacity.

There are different explanations for these results. As such, we will make some suggestions for further research. First, we did not make any distinction in the family business group. Recent studies, however, acknowledge the heterogeneity within the group of family businesses (e.g. Sharma, 2004; Chrisman et al., 2005; Dyer, 2006; Westhead & Howorth, 2007). It is recommended to make a distinction in family businesses for further research on this topic. For example, family firms in a different generational phase have different characteristics. Hence, generation is a possible variable to divide the family businesses, because it can be expected that family businesses in different generational phases differ in the human-related antecedents. Secondly, it can be expected that when we control for other variables like years in business or sector, results will change. Thirdly, there are, beside the ones we investigated, many other antecedents that influence a firm's innovation capacity. For further research, it is advisable to investigate if the family characteristic of the firm has an influence on innovation capacity through its effect on other innovation antecedents. Finally, it can be suggested to also consider an moderating effect of the family characteristic on innovation capacity instead of a mediation effect. It is possible that the relationship between of innovation capacity antecedents and innovation capacity alter when the a firm is family-owned. Preliminary analysis on this part indicate that there are indeed some significant interaction effects. Hence, it recommended to take this in consideration for further research on innovation within a family firm context.

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Appendix 1: Description of variables

Name of the variable		
Basic Factor	New factors	
Skills		<p>We have sufficient expertise (knowledge and experience) to develop new products/services or internal processes.</p> <p>Our company has the right technical competences and expertise to realize innovation.</p> <p>Our company has sufficient managerial know how to run our innovations effectively</p> <p>Our company has sufficient skills and expertise to effectively introduce new developments.</p>
Involvement		<p>Our employees are motivated to be involved in the innovation process.</p> <p>The involvement of our employees with our company is large.</p> <p>Most employees are open for changes.</p> <p>Our employees are actively involved in the innovation process.</p>
Top-down relationship	<p>Effective top-down communication</p> <p>Clarity of direction</p>	<p>The hierarchy in our company is no roadblock for effective communication.</p> <p>Problems can be openly discussed between management and employees in our company.</p> <p>We discuss strategy and innovation on a regular base.</p> <p>Strategic policy is translated to clear goals for every business unit and department.</p> <p>Company management clearly communicates what is expected from employees.</p> <p>Employees are rather coached instead of ordered.</p>
Teamwork		<p>People with different expertise work well together in our company.</p> <p>The cooperation among teams and departments is effective in our company.</p> <p>We are effective in managing the innovation process.</p> <p>We are familiar with working in multi-disciplinary teams.</p> <p>Our project management is one of our strengths.</p>
Innovation capacity		<p>Top-management in our company is very committed to innovation.</p> <p>Our company is a frontrunner in the renewal of product/services/processes.</p> <p>We are successful in responding to developments in the market.</p> <p>In our company, we are conscious about the necessity of innovation.</p>