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Strategic posture, innovation behavior and performance in SMEs: Type, fit and contingencies

Three essays based on the case of French manufacturing SMEs

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Abstract: This doctoral research, conducted on French manufacturing SMEs, investigates the relationship between competitive strategy, innovation, and performance. More specifically, the purpose of this work is to understand whether specific patterns of alignment between competitive strategy and innovation influence firm performance. We propose to explore, in three essays, firstly, the influence of strategic posture on innovation behavior, and the existence of strategy-innovation alignments. Secondly, we explore the influence of industry effects and firm's specific effects on strategic posture, innovation behavior, and on strategy-innovation fit. Thirdly, this research investigates the implication of fit between strategic posture and innovation behavior from a performance perspective. The research enhances the scope of analysis of this relationship to the technical but also marketing and organizational dimensions of innovation. Our model, stemming from the rationale of Miles and Snow's adaptive cycle (1978), contributes to further understanding the content - the conditions for achieving competitive advantage - and the process - the dynamics – dimensions of competitive advantage in small businesses. First, results confirm the existence of differentiated alignments between the Entrepreneurial, Engineering and Administrative characteristics of Miles and Snow's strategic postures and the characteristics of their respective innovation behavior, thus supporting the predictive validity of competitive strategy on firms' innovation behavior. Second, results highlight the influence of distinct but complementary industry and firm contingencies on the strategy-innovation relationship. Finally, we confirm the performance implication of fit between strategic attributes and innovation attributes and emphasize the influence of contingencies on this fit and the related performance.

Key words: Strategic posture, innovation behavior, fit, contingencies, performance, SMEs

Posture stratégique, innovation et performance dans les PME :

types, congruence et contingences

Trois essais basés sur le cas des PME manufacturières françaises

Résumé : cette recherche empirique, menée auprès de PME manufacturières françaises, étudie les relations entre stratégie, innovation et performance. Plus précisément, il s'agit de comprendre si des configurations spécifiques d'alignement entre la posture stratégique et le type d'innovation influencent la performance. Ce travail propose d'étudier à travers trois essais, dans un premier temps l'influence de la posture stratégique sur le profil d'innovation, dans un deuxième temps, l'influence de « l'effet industrie » et de « l'effet firme », en tant que contingences, sur la posture stratégique, le profil d'innovation et l'alignement stratégie-innovation, et enfin, l'existence d'alignements stratégie-innovation privilégiés, en relation avec la performance. Cette recherche étend le champ d'analyse de cette relation aux dimensions techniques, mais aussi marketing et organisationnelles de l'innovation. Le modèle utilisé, fondé sur les principes du cycle d'adaptation permanente développé par Miles et Snow, explore à la fois le contenu - les conditions nécessaires pour générer un avantage concurrentiel - et le process - la dynamique de l'avantage concurrentiel dans les PME. Les résultats confirment l'existence d'alignements spécifiques entre les caractéristiques entrepreneuriales, engineering et administratives des postures stratégiques de Miles et Snow et les caractéristiques des profils d'innovation associés, et valident ainsi le rôle prédictif de la stratégie compétitive sur les comportements d'innovation des entreprises. En second lieu, les résultats soulignent l'influence distincte et complémentaire des contingences spécifiques liées au secteur d'activité et aux capacités stratégiques des entreprises sur la relation stratégie-innovation. Enfin, nos travaux confirment l'impact sur la performance des entreprises de l'alignement entre les caractéristiques respectives de la posture stratégique et des

comportements d'innovation, tout en soulignant l'influence des contingences sur cet alignement et la performance associée.

Mots clés : Posture stratégique, innovation, fit, contingences, performance, PME

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Content

I - General Introduction

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1.1. Two short stories about two French small businesses

The so-called “PRINT Advertising” firm was founded in 1963. Starting from a small individual firm whose reputation was mainly embedded in the talent of its founder to draw and paint outdoor advertising, the firm has today become one of the most profitable SMEs in the field with a 6 million Euros turnover and 22% operating margin. The company managed to encompass both efficiency and flexibility in production with state of the art printing machines and adapted organizational processes in its core historical business together with being an early adopter of proven-successful technical and market opportunities. PRINT innovation practices are strongly market-based. The firm was therefore one of the very first in the printing and signage industry to implement material recycling and to adopt environment-friendly inks, creating its own label “Print Vert”. The firm has been considering entering the emerging market of dynamic signage for two years but is still investigating the appropriate business model. PRINT Advertising has always been very successful in designing, formulating and communicating internally its strategic choices. The company has always attracted and kept the necessary skills to develop on its product-market domain and has implemented a strong culture of “outperforming is really feasible” and “pay for performance” policy. PRINT management always shares its vision with employees, has a strong ability to create a sense of urgency, and strictly sticks to its strategic posture while paying attention to the organizational implementation of the choices made. PRINT foresees a 15-20% growth rate for the next five years. The five-year vision, missions and operating plans have been clearly communicated internally, and PRINT management has challenged the whole company on this objective.

Created in 1936, in the business of mechanics and electrotechnical works, the so-called “HITENSE” firm was taken over by the present CEO in 1993. Since then, the company has specialized in equipment manufacturing, engineering, design and maintenance for high power electrical circuits. The company regularly serves leaders of the chemical (Dow, BASF, Arkema), steel (Alcan) and nuclear (Areva) industry worldwide. HITENSE is recognized by its clients as one of the few remaining companies in Europe able to maintain high power sophisticated circuits as well as to design and manufacture customized solutions. Turnover has remained stable over the past 5 years reaching 2.5 million Euros in 2008 with a 16% net profit. The company employs 20 people among whom 3 research engineers and 15 technicians. HITENSE management has always paid attention to a carefully mastered growth focused on its core technical engineering and manufacturing activities, limiting investments to technical facilities and premises while promoting employee versatility. Top management is technically highly skilled and makes sure that core technical competences are transferred within the company. HITENSEs innovation practices are technology-driven. There are no dedicated marketing activities. The company is applied research-intensive and has developed numerous solutions to cope with energy losses in power circuits and the CEO focuses on providing technical solutions with a high degree of novelty before competition. The company has a strong patenting activity and one of the patented products, “WONDERFOAM”, has been protected worldwide in 2004. This silver foam prevents 95-99% of electricity losses in high power plants and has no substitute so far. WONDERFOAM has been certified by EDF, the French electricity supply leader. Potential outputs for WONDERFOAM are huge in the firm’s present core market (over 1000 plants to equip in Europe) and even bigger in the low-power (housing) and electronics applications. Its technical performances are still unrivaled. The company provides highly differentiated services generating high profitability. The provided benefit is recognized by customers. Still, the company lives and is highly dependent on less than 10 clients. HITENSE has already suffered from this fragility when 7 years ago the Alstom Group decided to internalized its so far outsourced contracts with HITENSE impacting the company’s turnover from 6 million Euros to 3 million in 18 months. Although concerned by the situation, HITENSE management has never adapted nor implemented at the organizational level the various strategic choices that have been formulated over the past five years to solve the situation.

1.2. Research framework

Can we draw from these two examples of different strategy-innovation trajectories in small manufacturing firms some research perspectives? Is there any predominant strategy-innovation patterns linking a firm’s innovation behavior and its strategic posture, here defined as the alignment of the firm organization's design components with strategy and with each other (Porter, 1996)? Does the fit (Vorhies and Morgan, 2003), between strategic posture and associated type of innovation generate superior performance?

This research, built-up on an internal-external approach of competitive strategies using Miles and Snow’s (1978) typology (Defender, prospector, Analyzers and Reactor profiles) completed with Porter’s (1980) framework (cost leadership and differentiation), and on the natures (sustained or disruptive), sources (market or technology based), and activities (technological, marketing, organizational) of innovation (Damanpour, 1991), empirically attempts to demonstrate

(i) The existence of predominant patterns of strategy-innovation relationship.

(ii) The differentiated influence of industry and firm-specific effects, qualified as external and internal contingencies, on strategic posture, innovation behavior and their relationship

(iii) The performance implication of fit between strategic posture and innovation behavior, under the effects of contingencies.

This research focuses on French manufacturing SMEs. The rigorous definition of small businesses has always been difficult over time and has even been controversial in terms of their annual sales, value of assets, or numbers of employees, but scholars generally agree on the idiosyncratic nature regarding their structure of ownership and influence on the industry. For Peterson, Albaum, and Kozmetsky (1986), a small business is one that is independently owned and operated, and that is not dominant in its field of operation. D'Ambroise and Muldowney (1988) posited that for a growing number of researchers and reporting organizations, the small business is generally considered to employ no more than 500 persons and to have sales of less than $20 million. Coulter (2010, p 232) distinguishes between entrepreneurial venture and small business. On one hand, entrepreneurial ventures are organizations that pursue opportunities and are characterized by innovative practices, permanently looking for growth and profit. A small business, on the other hand is *"an independent business having fewer than 500 employees that doesn't necessarily engage in any new or innovative practices and that has relatively little impact on its industry"*. In May 2003, the European Union has given an official definition of SMEs without any consideration regarding their ability to innovate or impact their industry (recommendation n° 2003/361/CE) defining this type of firm as an independent business, with fewer than 250 employees whose sales do not exceed 50 million Euros. This research work reports to this definition of a SME.

Advancing knowledge on strategy in small firms is essential considering the role these firms play in today's economies (Bartelsman et al., 2005, Coulter, 2010). Coulter (2010, p. 232) quotes a recent survey (2007), conducted by US Chambers of Commerce, showing that small businesses represented 99% of all employers, employed over half of all private workers and accounted for 50% of the private sector output. Considering manufacturing industries, Bartelsman et al. (2005), investigating the 1989-94 period, reported that small firms with less than 20 employees represented respectively 69,9% of total manufacturing firms in the United States, 77,9% in West Germany, 73,6% in France, 87,5% in Italy, and 74,9% in the United Kingdom.

This is even more an issue with regard to the significant disadvantages small firms face in the market place in terms of managerial expertise, access to capital, bargaining power with buyers and suppliers, and curve effects (Dean et al., 1998; Pissarides, 1999). Today's context of hypercompetition and high market turbulences characterizing most industries highlights these differences in behaviors between large and small firms. Moreover, considering Southern Europe where SMEs and low innovation industries are over-represented, and where, according to the European Commission (Observatory of European SMEs, 2003, 2007; Vaona and Pianta, 2008), industrial structure has a relative weakness in innovative activities capable to support the introduction of new products and the growth of new markets, investigating the issue of coherence between strategic posture and innovation to generate competitive advantage can provide interesting inputs for industrial policies.

In a recent study based on the systematic review of empirical works published on innovation in manufacturing industries, Becheikh, Landry and Amara (2006) show that among 50 variables identified as determinants of innovation, most studies focus on firm size, R&D intensity, staff capabilities, networking and the industry of business. They point out that even though strategic variables are recognized as significant inputs to provide sustainable competitive advantage, they have been rarely studied as determinants of innovation. In another study focusing specifically on technological innovation in manufacturing SMEs (2006), they show evidence of the influence of competitive strategic profiles on the likelihood to innovate and on the degree of novelty. Working at the European level on product and process innovative performance in small and large firms of manufacturing sectors, Vaona and

Pianta (2008), also showed that small and large firms pursue different strategies in terms of product and process innovation and use different strategic inputs to introduce innovations.

In spite of extensive literature on strategic management, innovation or firm performance, the fit between strategic posture and types of innovation have rarely been examined as determinants of the performance of SMEs. Consequently, exploring this issue for SMEs raises perspectives of research in the field of strategic management and strategic innovation models for a typology of firms usually highly impacted by market forces and highly dependent on their idiosyncratic resources to build-up sustainable competitive advantage.

This raises the need to clarify the concept of fit. Indeed, fit has served as an important determinant for theory construction in many areas of research (Van de Ven and Drazin, 1985) including strategic management (Miles and Snow, 1978; Doty et al., 1993; Porter, 1996; Siggelkow, 2002). Researchers of configurational organization suggest that the fit among the elements of an organization may be evidenced by the degree to which strategy, structure and systems complement one another (Miller, 1996). Still, words such as consistency, congruence, fit, alignment are commonly used by theorists to assume and postulate relationships, but these terms do not usually encompass the same scope and lack of corresponding scheme when they are tested (Venkatraman, 1989). When deciding to use a concept of fit, researchers have to consider two decisions: firstly, the level of precision in the functional forms of fit, that is, the degree of specificity of the theoretical relationships. Secondly, to anchor the concept of fit (and associated tests) to a particular criterion or to adopt a criterion-free specification. Venkatraman (1989) has identified six distinct perspectives of fit using these two dimensions: fit as moderation, mediation, matching, gestalts, profile deviation, and covariation. Fit as Moderation is used when the underlying theory specifies that the impact of a predictor (e.g. strategy) varies across the different categories (product life cycle, organizational type) or characteristics (market forces, degree of business relatedness) of the environment acting as a moderator. Fit as Mediation specifies the existence of a significant intervening mechanism (e.g. organizational structure) between an antecedent variable (e.g., strategy) and the consequent variable (e.g., performance). Fit as Matching is used for strategy concepts in which fit is a theoretically defined match between two related variables. In this perspective, a measure of fit between two variables is developed independent of any relation to performance. Fit as Gestalts is invoked by scholars of the configurational perspective, which adopts a systemic and holistic view of organization (Fiss, 2007). From this perspective, an organization's effectiveness is an outcome of the degree of internal coherence among a set of theoretical attributes, or as a set of relationships that are temporally in a state of balance. This insight has contributed to the concept of equifinality (Miles and Snow, 1978) or the feasible sets of internally consistent and equally effective configurations. Fit as Profile deviation is the degree of adherence to an externally specified profile. This specified profile is considered by the theory it stems from as "ideal". In this perspective, deviation from the ideal profile results in a negative effect on performance. Fit as Covariation is a pattern of internal consistency among a set of underlying theoretically related variables in which any missing variable impacts internal consistency.

For the purpose of our research, we will use a model built on the rationale of Miles and Snow's (1978) framework of strategic profiles. This framework stems from an adaptive cycle of entrepreneurial, technological and administrative choices from which the primary variable is a firm's intended rate of product-market change. This framework suggests recurring clusters of attributes or "gestalts" related to entrepreneurial, technological, and administrative alignments. Moreover, Scholars (Miles and Snow, 1978; Miller, 1996; Porter, 1996) suggest that configuration is at the core of strategic management as a result of alignment between a firm's strategic choice, structure, processes, activities and environment.

With regard to the relationship between strategy, innovation and performance under the effect of contingencies, the gestalts perspective of fit has been empirically tested as a relevant approach (Zahra and Covin, 1994; Zahra, 1996), especially in the context of SMEs (Raymond and St-Pierre, 2010; Raymond et al., 2010). Therefore we will consider fit as gestalt for this research as a configurational perspective to explore the contingency-specific predictive validity of strategy-innovation relationship on performance.

Indeed, little has been explored in the field of strategy research to study the fit between strategic posture, innovation and performance from both the industry effect and firm effect perspective. In the 1990s, the field of strategic management has undergone a significant shift in focus with regard to the sources of sustainable competitive advantage, placing emphasis from industry to firm-specific effects. Williamson (1991) introduces these two major streams of research as strategizing and economizing. The former, the Industrial Organization approach, draws more specifically from Porter's (1980, 1985, 1990, 1991) pattern of competitive strategy and views performance from an outside-in perspective focusing on the influence of market power. The latter, the Resource-Based View and its strategic intent dimension (Hamel and Prahalad, 1989, 1994; Hamel, 1998; Saïas and Metais, 2001) is essentially concerned with the organizational efficiency of the firm and sees performance as a return to firm's idiosyncratic unique resources owned and controlled by the firm. An important set of literature has sought to compare (Conner, 1991; Teece et al., 1997) these two streams and their possible interrelations regarding the generation of sustainable competitive advantage (Spanos and Lioukas, 2001, 2004). However, the effects of industry and firm-specific factors on the alignment between the competitive strategic posture and the type of associated innovation have not been studied as a possible dynamic causal construct of firm performance.

1.3. Expected contributions of the research

In this research, we present a model that links competitive strategic orientation, market forces, firm's resources, innovation, and performance to understand whether specific patterns of alignment between competitive strategy and the type of innovation affect firm performance. We have constructed our model in an attempt to contribute to literature and organizations' management of innovation in four ways.

First, we provide a new approach of the relationship between strategy and innovation, investigating on both the influence of competitive strategic variables on innovation and on the existence of most favorable strategy-innovation alignments. This approach has generally been conducted at the industry level considering sectoral patterns and technological regimes of innovation (Pavitt, 1984; Breschi et al., 2000), but seldom at the firm level. Moreover, our work attempts to contribute to filling-in the gap for a need to enhance the scope of analysis of this relationship, usually focused on technological innovations (Becheikh et al., 2006), to the marketing and organizational dimensions of innovation. Enlarging this analysis beyond technological innovations provides a much richer picture of firm's innovation behaviors and performances (Evangelista and Vezzani, 2010). Carried out with SMEs in manufacturing industries, this research attempts to open perspectives for further studies on strategic management and innovation in this category of firms whose growth has become a priority for most industrialized countries.

Second, we have built a combined model based on Miles and Snow‘s (1978) internal and Porter's (1980) external focus of competitive strategy that leaves possibilities for the emergence of combinations of derived hybrid strategic profiles (Spanos and Lioukas, 2004; DeSarbo et al., 2005) taking into account environment uncertainties as well as firms' specific resources and capabilities. Consequently, this study intends to bring a new methodological contribution to the constructs of competitive strategy and innovation in SMEs, encompassing both industry and firm-specific effects as qualifying factors. Stemming from the rationale of Miles & Snow's adaptive cycle, our research also contributes to further investigating the "content" (i.e. the conditions for achieving competitive advantage), and the "process" (i.e. the dynamics of creating competitive advantage) dimensions of research on strategic management and innovation (Spanos and Lioukas, 2001; 2004) in small and medium firms.

Third, we explore the influence of industry forces and firm's specific effects on strategic posture, innovation behavior, and on the fit within strategy-innovation couples. The research attempts to demonstrate that the fit between strategy and innovation is a dynamic causal construct of firm's sustained competitive advantage. To our knowledge, this research represents the first attempt to encompass the fit between strategic and innovation choices from both external and internal contingencies perspectives, while considering the entire scope of innovation.

Fourth, we eventually attempt to provide SMEs management with operational guidance for coherence between their competitive strategy and innovation choices in order to generate superior performance. As above-mentioned, this guidance addresses both the necessary conditions and the dynamics for achieving superior rents. We therefore attempt to contribute to better understanding the mechanisms for generating competitive advantage in manufacturing firms. This is an important point, because most studies addressing research issues on innovation focus on the innovation capacity rather than on the performance of firms (Amara et al., 2008), which is the ultimate objective that all firms try to achieve when they innovate or decide to change strategic posture. We also expect that this understanding can be of use to provide guidance for the implementation of dedicated regional industrial policies and support programs to foster innovation in small businesses (European Commission, 2003; ERMIS European Interreg IVC project, 2009-2012).

II - Literature review on strategy, innovation, fit and performance

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2.1. Competitive strategy and innovation

2.1.1. Overview of concepts related to strategy

According to Alfred Chandler (1962), strategy can be seen as the determination of the long-run goals and objectives of an enterprise and the adoption of courses of action and the allocation of resources necessary for carrying out these goals. In a broader sense, strategy is the means by which individuals or organizations achieve their objectives. The means are here referred to as the plans, policies, and principles that guide and unify a number of specific actions (Grant, 2008). Definitions of strategy are numerous but all have in common the notion that strategy is focused on achieving certain goals, that it involves allocation of specific resources to achieve these goals and requires consistency, integration or cohesiveness.

Still, the conception of a firm strategy has evolved greatly over the past fifty years. In an unstable and uncertain environment, the purpose of strategy is not to focus on detailed action plans but more about vision, missions, principles and target. In a changing and unpredictable environment, a clear direction is vital for the development of organizations. As Michael Porter (1996, p. 62) has emphasized, *"strategy is not about performing things better than rivals perform them"* – this is a matter of operational effectiveness – strategy means "*performing different activities from rivals' or performing similar activities in different ways"*. Hence, the core of strategy is about making choices.

Strategic management is a determinant component of the strategy of a firm. This is the process of formulating, implementing and controlling the firm strategy (Coulter, 2002; Hill and Jones, 2001). However, the various ways this process is conducted within a firm depend on the determinist or voluntarist attitude and choices adopted by the management of the firm with regard to the external environment (Mintzberg et al., 1998).

Many approaches have addressed the issue of strategic choices from an organizational perspective. Much organizational research has been based on the assumption that organizations respond to the constraints and opportunities of their environment and market and accordingly reshape their mission and structural process (Drucker, 1954, 1974; Chandler, 1962). Following these assumptions, many scholars have worked on the interaction and the fit between strategic choices and organizational structure and processes given the nature of the environment (Miles and Snow, 1978, 2003).

Other scholars (Child, 1972; Weick 1969, 1977) argue that organizations do not respond to preordained environmental conditions but enact the environment thus creating their own scope of action through a series of strategic choices on markets, products, technologies and processes, and financial resources management. Miles and Snow (1978, p. 7) assume that *"management's strategic choices shape the organization's structure and process"* whilst *"structure and process constrain strategy"*. Strategy is therefore conceptually associated with intent whereas structure is associated with action.

As all these researches and studies suggest, strategic choices and structure strongly interact with various influences on the firm's performance depending on their appropriate alignment (Drucker, 1954, 1974; Chandler, 1962). On the other hand, once this alignment is found the firm might have difficulties in trying to develop its activities outside its normal scope of business as Fouraker and Stopford (1968) have demonstrated, then showing that structure and processes, though initially aligned with strategy might constrain further strategic choices. This is because organizational structure and process evolve so as to prevent uncertainty (March and Simon, 1958). Consequently, firm's management search only in their familiar "neighborhood" for solutions to organizational problems or failures (Cyert and March, 1963). These organizational "routines" which tend to reduce uncertainty within the organization have a significant impact on the ability of the firm to formulate and implement processes that will enable the firm to make strategic choices to continue to evolve, i.e. to innovate. The challenge for firm's management then, is to configure and leverage the dynamic capabilities, i.e. capabilities embedded in organizational routines aimed at effecting change (Eisenhardt and Martin, 2000), in such a way as to positively affect firm performance (Zott, 2003).

Strategic choices address two key issues (Grant, 2008): *where to compete?* I.e. the scope of the firm in terms of industries and markets in which it will decide to develop, survive and prosper because these industries present an overall rate of return on capital that exceed the cost of capital. This is the field of corporate strategy also called development strategy. *How to compete?* I.e. the way the firm will attain an advantage over other firms involved in the same industry that will generate a return in excess of the industry average for the firm. This as the field of competitive strategy also referred to as business strategy.

Corporate strategy is the first level of strategic choice to be made within the firm. Indeed, it sets the general orientation and guidelines for the development of the firm as regard to the industries in which it decides to be involved as well as the intensity of its activities in these industries (Andrews, 1971; Ansoff, 1965). Several typologies have been proposed to determine the various development strategies among which a firm has to choose (Coulter, 2002, 2010; Hill and Jones, 2001; Johnson et al., 2005). However, these typologies focus on three key issues:

1- Should the firm specialize in one sole industry or diversify in several lines of business

2- Should the firm develop on the domestic market or internationalize?

3- Should the firm focus on closed endogenous development or cooperate with other stakeholders involved in its industry (R&D centers, academic centers, clients, suppliers…) through cooperation agreements or strategic alliances?

When considering the analysis of the empirical literature on corporate strategy and firm performance (Grant, 1988), it seems difficult to establish a consistent relationship between diversification (be it product diversification or international diversification) and the expected firm performance which will induce corporate strategic choices. It depends on the factors that influence the performance impact of diversification. The real issue to address is the relationships between corporate strategy and value creation. Some works have shown (Hitt et al., 1994) that innovation, on the basis of the value it creates, may be a precursor to international diversification by the incentive it generates. Moreover, this incentive continues even after the initial diversification into international markets, in order to capture the value of synergy between international diversification and innovation and hence, the generated out-performance. On the other hand, the relationship between product diversification and innovation (and expected value creation) may be negative depending on the intensity of diversification. In particular, Hoskisson and Hitt (1988) and Baysinger and Hoskisson (1989) found that firms with greater product diversification invested less in R&D than the ones with dominant product firms. They argued that when firms became highly diversified, top executive management shifted from strategic to financial control due to a lack of visibility on the separate businesses and promoted short-term, risk averse operational polices. As a result, they invested less in R&D, thereby reducing innovation efforts. Moreover, Hitt and Hoskisson (1991) argued that reductions in innovation produced lower competitiveness, hence lower firm performance over time.

These outputs, however, are balanced by other studies (Baysinger et al., 1991) who did not find any negative relationship between product diversification and innovation in firms with concentrated ownership. They suggested that concentrated ownership provided incentives to sustain innovation efforts that overcame the disincentives created by diversification. Still, there are no further investigations demonstrating whether these incentives provided by concentrated ownership was related to the size of the organization and more specifically whether smaller firms benefited from this phenomenon.

The issue of the relationship between inter-organization cooperation and innovativeness is also a critical element of corporate strategy, especially for small firms, which may rely more heavily on external knowledge networks as an input to innovation than do large firms. Audretsch and Vivarelli (1994), considering the output of patents in 15 Italian regions, showed that small firms benefit more from external research coming from university research than large firms. Rogers (2004) also brings evidence of the positive association between networking and innovation for small manufacturing firms whereas for non-manufacturing firms, this positive relationship benefits more to medium and large firms.

Competitive strategy is the second level of the strategic choices a firm has to make when formulating its strategy. Competitive strategy is about the various choices with regard to how the firm will compete in the industry and market it has also chosen, that will provide a valuable, i.e. generating profitability disequilibrium in favor of the firm, competitive advantage over competitors of this industry. The competitive advantage that will generate higher rate of profit can be obtained by one of two ways that induce the two core competitive strategies. Either the firm possesses a cost advantage and it can supply an identical offering at a lower cost, or it has developed a differentiation advantage and it can provide a product or a service with a level of differentiation perceived as having a higher value such as clients will agree to pay a premium to acquire it.

In practice, firms do not decide between total differentiation and total cost leadership. They most of the time have to focus on both specific customer and market requirements. Building on the assumption that market forces significantly influence competitive positioning of organizations in an outside-in effect, Porter (1980) defines four generic profiles with regard to strategic choices made by the firm to create value to clients (low costs or differentiation) and depending on the scope of targeted markets (global or focused on specific segments). Four competitive strategies are then induced by this typology: cost leadership, differentiation, cost concentration and differentiation concentration. Each type induces different ways to generate a competitive advantage (see 4.4.1.).

Building on the different assumption that strategic resources are firm-specific and heterogeneously distributed across firms, Barney (1991) examines the link between firm resources and sustained competitive advantage. He therefore determines four qualifying factors - value, rareness, non-imitability, and non-substitutability - of the potential of firm resources to generate sustained competitive advantage in an inside-out effect.

2.1.2. Theoretical framework: Industrial Organization, Resource Based View and configurational perspectives.

The sources of sustainable competitive advantage have been a major issue in the field of strategic management in the 1990s, shifting from industry to firm-specific perspective. The former, the Industrial Organization approach, emphasizes a market power imperative, the latter, the Resource-Based View, focusing on efficiency.

In traditional Industrial Organization theory, as posited in Mason's (1939), and Bain's (1956) framework of industry behavior, firm profitability is a function of industry structure. Under this view, characteristics of the industry are considered as the primary influences on firm performance. Strong emphasis (Conner, 1991) has been put on Bain's and Mason's "structure-conduct-performance" model according to which industry structure (e.g., number of sellers and buyers, product differentiation, barriers to entry, degree of fixed costs vs. variable costs, vertical integration) determines firm conduct (e.g., pricing, advertising), which in turn determines firm's economic performance (Scherer, 1980). In order to explain large performance variances within a single industry, strategy researchers (Porter, 1981;

Fiegenbaum et al., 1988) suggested a “strategic group” level of analysis (Parnell, 2002). Strategic groups describe apparent clusters of firms showing similar or homogeneous behavior within a somewhat heterogeneous industry environment (Fiegenbaum et al., 1988). Three types of strategic groups were considered depending on, first, differing goals between firms, second, differing assumptions about the future potential of the industry, and third, differing skills and resources among competitors of the industry. In order to address the strategic policies of these differing strategic groups, researchers have developed competitive strategy typologies in view of generalizing them across industries. Among these typologies, the most widely used are those of Porter’s (1980, 1985, 1991, 1998), and Miles and Snow’s (1978, 2003).

Porter’s Framework of competitive strategy (1980, 1985, 1991, 1998) proposes an industry “outside-in” approach of market structure. Within this framework, the firm is considered as a bundle of activities whose objective is to adapt to industry environment by building an attractive position in the market. Sustainable competitive advantage stemming from this position depends on the relative influence of the competitive forces (competition rivalry, buyers’ power, suppliers’ power, new entrants, substitute product or technology) encountered by the firm in this market and its ability to understand the market-specific key success factors. In this perspective, the firm has itself little influence on the industry it has decided to be active in after a prior analysis of its capabilities to build up a value chain adapted to the competitive environment. This value chain is associated to three types of generic strategies: cost leadership, differentiation and focus.

However, Porter’s approach relies on two core characteristics that will be challenged by scholars due to their intrinsic weaknesses in changing environments (Barney, 1986, 1991, Mintzberg, 1988; Hamel and Prahalad, 1989, 1994; Grant, 1991; Hamel, 2000; Zajac et al., 2000; Kim and Mauborgne, 1999, 2005;). Firstly, according to Porter (1985), strategy formulation stems from prior analysis of the external environment that afterwards orientates decision. Environment is considered as an immovably parameter on which a firm has no or little influence. Therefore, competitive advantage relies mostly on firm’s ability to better understanding industry structure. Secondly, Porter’s competitive strategies are considered as mutually exclusive. Indeed, each industry is characterized by a set of key success factors that fits an appropriate strategy typology. Any competitive behavior trying to combine different competitive advantages is likely to fail or generate inferior performance (Saïas and Metais, 2001). Still, in the 1990s, the competitive arena being structurally transformed (Prahalad and Hamel, 1994) with increased competitive rivalry and shortened industry life cycles, environment turbulences make it difficult to design strategic behavior on pure exclusive broad generic strategies. Comparative research built on this assumption (Kotha and Vadlamani, 1995) showed the superior effectiveness of Mintzberg’s (1988) typology over Porter’s generic broad typology, based on more fine-tuned differentiation profiles (differentiation by price, marketing image, product design, product quality, product support, and undifferentiation). Complementary to this work, Spanos et al. (2004) provided evidence of higher rents generated by hybrid competitive strategies based on Porter’s typology than by pure strategies.

Miles and Snow (1978) provided new perspectives to the weaknesses of the traditional Industrial Organization approach centered on adaptation and competitive positioning, by introducing the idea of adaptive cycles. They portray the business of a firm as perpetually cycling through sets of decisions on three levels: the entrepreneurial problem (selecting and adjusting product-market domain), the engineering problem (producing and delivering the products), and the administrative problem (establishing control and organizational processes). Miles and Snow (1978) posit that the influence of the industry is more or less moderated by the permanent organizational efforts of the firm in a given segment of the market, and its intended rate of changing its strategic posture and corresponding set of organizational attributes according to external and internal contingencies. They emphasize the need for alignment between product-market domain-related strategic choices and technological and structure-process decisions. The issue of strategic posture, i.e. the alignment of the firm organization's design components with strategy and with each other, is also emphasized by Porter who stresses the importance of fit between organizational design and strategy (1996, p. 73) noting that *"strategic fit among firm's activities is fundamental not only to competitive advantage but also to the sustainability of that advantage. It is harder for a rival to match an array of interlocked activities than it is merely to imitate a particular sales-force approach, match a process technology, or replicate a set of product features."* Miles and Snow (2003) also posit that successful organizations consciously act to create their own environments. Since organizations enact their own environments, it is at least theoretically possible that no two organizational strategies will be the same. That is, every organization will choose its own target market and develop its own set of products or services, and these domain decisions will then be supported by appropriate decisions concerning the organization's technology, structure and process. To a certain extent, Miles and Snow' approach prefigures the firm's strategic intent (Hamel and Prahalad, 1989) underlying firm-specific effect on the generation of competitive advantage.

Contrarily to Industrial Organization theory, the Resource-Based View (RBV) theory emphasizes the central role of the firm, in the formulation of the strategy. Contrary to IO industry-determinism, this strategic intent (Hamel and Prahalad, 1989) of the firm makes it possible for an organization to appropriately use and combine its core competences to transform the competitive environment. This approach is rooted in the works on market disequilibrium and asymmetry of resources (Schumpeter, 1950, Penrose, 1954). Resources embedded in firms are not perfectly mobile and therefore not easily imitable. Barney (1986), Rumelt (1991) and Grant (1991) focus on this idiosyncratic aspect of resources and assume that performance is eventually a return to unique resources and capabilities owned or controlled by the firm.

The dynamic perspective of strategic intent of a firm is based on three key specificities: i) the definition of a strategic vision, which is more the positioning in chosen future than an extrapolation of the present (Hamel, 1991). The achievement of this vision generates the need for a maximum use of firm resources, hence leading to radical innovation due to the associated ambitions and goals; ii) the development of core competences (technological, marketing) needed to achieve the vision. These core competences must be associated to organizational capabilities; iii) once vision and change management have been set-up as priorities, the firm becomes a learning organization. Indeed, Hamel and Prahalad (1989) define a competence as the result of collective learning mainly in order to coordinate different production techniques and integrate new technologies.

More recently, scholars have focused on the issue of permanent transformation due to the emergence of shorter industry cycles and increase of new forms of competition. This hypercompetition imposes to expand industry boundaries beyond established frameworks of reference in order to reconstruct new market spaces with new value chains. This Reconstructionist view (Kim and Mauborgne, 1999, 2005) emphasizes change management and leadership for the organization to self-adapt to changing objectives and rapid repositioning. The issue is then to permanently aligning firm resources, organization and strategy in configurational fit. This permanent transformation requires that, as firms evolve in changing competitive spaces, new sources of value creation, i.e. new business design (Hamel, 2000) may be reinvented to implement disruptive strategies. Zajac et al. (2000, p. 449) empirically support this need for substantial change and posit that *"organizations acting more proactively, even when that proaction goes beyond what changing internal and external* *conditions require, may be better positioned for future performance gains relative to reactive organizations changing too little or too late*".

In order to generate these new sources of value creation, firm business designs must put clients to the fore and do not solely focus on their resources and competences. Client needs should determine the value chain and competences, not the opposite (Slywotsky, 1996). However, these needs cannot be properly identified by usual market studies and require an in-depth understanding of the client profile to adequately design and deliver responses to its present and future unconscious needs and expectations. The business design of an organization should stem from this understanding. Business design refers to the ways an organization selects its clients, designs and differentiates its offering, defines internal and outsourced activities, structures its resources, competences and organization, positions on the selected market, creates utility for its clients and as a result, generates performance and rents (Slywotsky, 1996).

Consequently, the simultaneous consideration of multiple characteristics is required when assessing whether a business is designed in such a way that activities are adequately organized to enable the implementation of its strategy and the impact this has on performance (Doty et al., 1993). Configuration theories (Miles and Snow, 1978; Porter, 1980; Mintzberg, 1983) provide robust bases to scholars in organization and strategic management wishing to address such research questions. Indeed, a configuration is seen has a complex system of firm's organizational elements such as activities, policies, structure, processes and resources (Siggelkow, 2002) and denotes a multidimensional arrangement of the strategic and organizational characteristics of a business. Configuration theorists posit, and have established (Drazin and Van de Ven, 1985; Doty, Glick, and Huber, 1993), that for each set of strategic characteristics, a corresponding ideal set of organizational characteristics generates superior performance.

The context of hypercompetition, thus, imposes firms to permanently re-design organizational characteristics in coherence with strategic choices influenced by environment turbulences, in a process of permanent quest for the fit with the ideal configuration, i.e., the ideal strategy-related organizational profile.

Table 1: Synthesis of major inputs from literature review on strategy used for the research

Theoretical framework	*Major insights*	*Scholars*
Industrial Organization	Structure Conduct Performance: industry characteristics are the primary influences on firm performance	Mason (1939), Bain (1956), Scherer (1980)
Industrial Organization	Organizations respond to environment turbulences by reshaping their mission and structural process	Drucker (1954, 1974) Chandler (1962)
Resource-Based View	Organizations can enact their environment through strategic choices	Child (1972), Weick (1969, 1977)
Industrial Organization Configuration theory	Inside-out approach of the adaptive cycle: organizations generate competitive advantage by aligning and enacting their environment in an on-going adaptive process	Miles and Snow (1978)
Industrial Organization Configuration theory	Outside-in approach of generic strategies: Organizations generate competitive advantage by adapting to environment with dedicated generic positioning	Porter (1980)
Resource-Based View	Resources embedded in firms are not perfectly mobile. Firms can develop and utilize valuable, rare, non easily imitable and non-substitutable resources to generate competitive advantage	Barney (1986, 1991), Grant (1991), Rumelt (1991)
Resource-Based View	Strategic Intent: firms can appropriately use, combine, stretch and leverage their core competences to transform competitive environment	Hamel and Prahalad (1989), Hamel (1991)
Resource-Based View	Permanent transformation of Business Design: hypercompetition and permanent transformation of environment require that firms permanently align their resources, organization and strategy in configurational fit	Hamel (1998, 2000)
Reconstructionist View	Hypercompetition imposes to reconstruct new market spaces with new value chains	Kim and Mauborgne (1999, 2005)

2.1.3. Theoretical framework: articulating strategy and innovation

According to Grant (1991), competitive advantage emerges when change occurs, the sources of change being internal or external to the firm. When considering external change, the generation of a valuable competitive advantage depends on the firm's ability to give a fast and appropriate response to this change and transform it into a business opportunity. The responsiveness to the potential and actual opportunities provided by external changes requires one key resource: information and one key capability: flexibility. Information is necessary to identify and possibly anticipate external changes whereas flexibility makes it possible to rapidly transforming key information into key success factors for the firm. Competitive advantage from internal change is generated by innovation, which provides simultaneously intrinsic competitive advantage while overturning the competitive advantage of other firms.

Many typologies have been advanced to identify the dynamics of innovations, including continuous versus discontinuous (Robertson, 1967), incremental versus radical (Dewar and Dutton, 1986), competence enhancing versus destroying (Tushman and Anderson, 1986), architectural versus product (Henderson and Clark, 1990). However, in a meta-analysis of the effects of determinants and moderators of innovation, Damanpour (1991) shows that the type of organization adopting innovations and their scope are more effective moderators than the type of innovation and the stage of adoption. Hence, organizational performance may depend more on the congruency between innovations of different types than on each type alone (Damanpour and Evan, 1984). This meta-analysis then, suggests that theorists of organizational innovation should consider that *"type of organization should be a primary contingency variable. Organizational types can be identified by industry, sector, structure (Mintzberg, 1979), strategy (Miles and Snow, 1978; Miller, 1986), …Distinguishing types is crucial, as the variance in environmental opportunities and threats for organizations of different types can influence their degree of innovativeness"* (Damanpour, 1991, p 583).

Innovation has long been thought of from a technical perspective, but this approach is no longer valid in the new economy. The third version of the Oslo Manual (OECD, 2005) extends the definition of innovation to *the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations*.

Following this definition, a Product innovation is "*the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics"*. A Process innovation is ¨"*the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software"*. An Organizational innovation is *"the implementation of a new organizational method in the firm's business practices, workplace organization or external relations"*. A Marketing innovation is *"the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing"*.

Hamel (2000) assumes that "*in an economy of continuous change, the unit of analysis for innovation is not a product or a technology, it is a business concept. A business concept is a business model that has been put into practice"*. From this new perspective, successful companies will win thanks to innovative business concepts materialized into new business models derived from new strategies – Strategic innovation. Strategic innovation may imply reconfiguring the value chain of an industry (McKinsey's concept of new game strategy, 1980), or delivering unprecedented customer satisfaction by combining performance outputs so far considered as conflicting such as low cost, quality and novelty (Baden-Fuller, Stopford, 1992). For Hamel (2000), strategic innovation goes beyond new products, new technologies or new markets. Strong and sustainable competitive advantage is embedded in management innovation.

With their "reconstructionist" view, Kim and Mauborgne (2005) see strategic innovation, or value innovation, as the way to create new markets, the "blue oceans", where firms align innovation with utility, price, and cost positions associating simultaneously differentiated and low-cost offerings. In the reconstructionist view, *"the strategic aim is to create new rules of the game by breaking the existing value/cost trade-off and thereby creating a blue ocean"* where competition is irrelevant because the rules of the game are waiting to be set (Kim and Mauborgne, 2005, p. 109).

Innovation also posits the flexibility-stability dilemma (Christensen, 1997) which revolves around the question: how do firms reconcile the need to pursue strategic goals with the need for change in the pursuit of organizational survival when confronted to environment turbulences? Two streams of research have developed on the assumption that on one hand, innovation enhances the growth and survival of firms (Audretsch, 1995; Lawless and Anderson, 1996), and on the other hand, innovation is a complex and risky process, with low success rates (Dean and Snell, 1991; Dougherty and Hardy, 1996). The adaptation perspective derived from the evolutionary theory of the firm (Teece et al., 1997) and the selection perspective built on inertia theory (Hannan and Freeman, 1984) provides insights to handle both aspects of this innovation's dilemma (Meeus and Oerlemans, 2000). The selection approach emphasizes environmental selection due to the limits of firm's influence over environment. An inert behavior i.e., a slower organizational response than the rate at which environment changes, is here considered as the best solution for survival (Hannan and Freeman, 1984). The adaptation approach emphasizes the co-evolution of organizational configuration and environmental dynamics and posits that a fit between strategic postures and environmental change significantly enhances survival chances of firms (Tushman and

Romanelli, 1985; Teece et al., 1997). Meeus and Oerlemans (2000) provided evidence that an inert behavior is detrimental for innovative performance whereas an adaptive, strategy-organization-environment fit behavior is beneficial for innovative performance. Their results stress that small firms seem to be particularly suited to develop adaptive behavior conducive to innovative performance, considering their limited resource base. More generally, high level of innovation, combined with high adaptation, seems to benefit firms more than risk avoidance.

Table 2: Synthesis of major inputs from literature review on innovation used for the research

Theoretical framework	*Major insights*	*Scholars*
Innovation and competitive advantage	Competitive advantage generated by internal change: innovation is firm's ability to generate intrinsic competitive advantage while overturning the competitive advantage of other firms	Grant (1991)
Organizational innovation and contingencies	Type of organization is a primary contingency factor influencing attributes of innovation (administrative/technical, product/process, radical/incremental, continuous/discontinuous)	Damanpour and Evan (1984), Damanpour (1991)
Strategic innovation	In a complex and uncertain environment, Business Concept, i.e. a business model put into practice, should be the unit of analysis for innovation. Competitive advantage is embedded in innovative business concepts derived from new strategies	Hamel (2000)
Selection/adaptation innovation	The flexibility-stability dilemma of innovation: firms need to pursue strategic goals while they also need to change when confronted to environment turbulences. High level of innovation, combined with high adaptation, benefit firms more than risk avoidance	Hannan and Freeman (1984), Christensen (1997), Teece et al. (1997), Meeus and Oerlemans (2000)
Value innovation	Value innovation is a way to create new market spaces (the "blue oceans") by breaking the existing value/cost trade-off	Kim and Mauborgne (1999, 2005)

2.1.4. Strategic management and innovation in SMEs

The specific situation of a Small and Medium size Enterprise - here considered as an independent business, with fewer than 250 employees, whose sales do not exceed 50 million Euros (UE, 2003. Recommendation n°2003/361/CE) - relative to its resource constraints in terms of finance, information, management capacity, etc., emphasizes the need for a clear direction and general orientation to achieve its vision and perform its mission (Coulter, 2002). Clear development strategic choices will then enable the SME to ensure consistency with the competitive and innovation strategy that needs to be carried out to reach corporate objectives. If strategy is about defining simple, consistent, long term goals thanks to a profound understanding of the competitive environment and an objective appraisal of resources needed (Grant, 2008), then, intrinsically, strategic management should help a firm, whatever its size, develop a competitive advantage and hence, facilitate its growth, improve its competitiveness and its performances (Porter, 1996).

Due to the structural nature of SMEs and their inherent flexibility, changing environment, competition intensity and shorter product life cycles could be turned into opportunities and should lead them to naturally exercising strategic management. Indeed, several scholar studies have shown that SMEs with clearly formulated and implemented strategies had better performance than the ones without (Kargar and Parnell, 1996; Berman et al., 1997; Naffzigger and Mueller, 1999).

This is particularly true when considering the sketch of the innovation process and its impacts on a firm's strategic choices (Smith et al., 2008). At the source of this process is the ability of the firm to facilitate and stimulate the generation of "new" ideas. Here, "new" means new to the firm but not necessarily new to the industry, product-market domain of the firm or the wider economy. First, new ideas may come from internal sources such as formal R&D, staff creativity or from external environmental scanning on suppliers, clients, or other sources. Second, these ideas need to be analyzed from a technological, organizational and economic perspective. Third, if these ideas make sense, they may require additional investments in R&D, design, and adjustments in the firm's organizational and marketing processes, in the case of product innovations, before being launched as new products. The fourth step is the marketing of the innovative product or service. This process, a non-linear one that deserves back and forth interactions throughout the various steps, determines the degree of innovativeness, i.e. the propensity of the firm to innovate. Without proper, formulated and managed strategy, this “free riding” innovativeness may lead to non-performance and contrary impacts on innovation according to the Resource Based View theory circular argument that firms learn how to be innovative by success in innovation. Indeed, as pointed out by Smith et al. (pp. 666, 2008) in their meta-analysis of factors influencing an organization’s ability to manage innovation “*If an organization wants to be more effective at developing innovations, this needs to be reflected somewhere within the corporate strategy, otherwise employees will not see how innovation directly impacts on their day-to-day tasks* ”.

The relation between firm size and innovation has been stressed by literature emphasizing the advantage of large firms over SMEs. The Schumpeterian approach posits that large firms could more easily innovate due to the size-related resources at their disposal (finance, knowledge, technology, competences…). Small businesses might also be disadvantaged on the financing of innovation considering that even external capital might be reluctant to finance innovation from small firms due to high level of risk or inability to understand technical details (Rogers, 2004). Moreover, large volume of sales can more easily absorb the fixed costs of process innovation (Cohen, Klepper, 1996) and large firms may have access to a wider range of knowledge and human capital skills than smaller firms, thus leveraging innovation efforts. However, Cohen and Klepper demonstrate that this cost-spreading advantage of large-size firms to innovate is not due to large size per se. It stems from two fundamental conditions. First, firms tend to exploit their innovations mainly through their own outputs rather than by selling them in disembodied form. Second, at any given moment, firms do not expect to grow rapidly due to innovation and consequently, the intensity of innovation is strongly related to their output at the time they conduct R&D.

Therefore, the higher the outputs of the firm, the higher the intensity of innovation, suggesting that appropriate innovative strategy generating innovative performance will induce further innovation efforts.

On the other hand, other factors suggest that SMEs may have advantages over larger firms being faster at recognizing and benefiting from opportunities due to their inherent flexibility, shorter decision processes, or entrepreneurial orientation fostering individual innovative initiative via more easily adjustable employee incentives. In other words, SMEs' organizational characteristics are idiosyncratic determinants fostering innovation activities (Ayerbe, 2006). In fact, there appears to be no strong link between innovation and firm size, but it seems that the determinants and attributes of innovation may vary between large and small firms.

Among the qualifying factors of innovation and their relationship with firm size, a first stream of research has emphasized the role of industry factors, and especially the evolution of the industry life cycle and market structure (Acs and Audretsch, 1987; Rogers, 2004). Whereas large firms are more innovative in monopolistic markets and concentrated industries with high barriers to entry, smaller firms tend to have a comparatively higher innovative performance in competitive markets. The knowledge environment in which firms operate has also emerged as one of the influencing factors of the relationship between firms' size and innovative performance. When firms evolve in an innovative environment, with the proximity of R&D centers of large firms and universities, SMEs appear to be more efficient in benefiting from this favorable environment (Audretsch and Vivarelli, 1994). Accordingly, Rogers (2004) stressed that manufacturing small firms tend to be more capable of capturing and digesting the benefits of networking for innovation. However, opposite results were found for non-manufacturing firms.

A second line of research has worked on the direct relationship between firm size and innovation activities. When studying R&D expenses, results showed that they increased more than proportionately than firm size up to a threshold, when proportionality with size occurred (Scherer, 1965). When considering innovative performance measured by patenting activity, R&D productivity tends to decline with firm size (Acs and Audretsch, 1990). This has been explained by the size advantage of large firms over small ones and the accordingly increased incentive to exercise market power when having a large sales base compared to investing in technological innovation (Cohen and Klepper, 1996). From these various works, has emerged the importance of technological regimes as qualifying factors of market structures and innovative performances. Indeed, a firm's innovation strategy and the structure of the market in which it has decided to be active are conjointly influenced by technological opportunities, appropriability conditions of innovations, sectoral innovation systems, growth potential and demand (Breschi et al., 2000; Malerba, 2004; Pavitt, 1984). Consequently, sectoral as well as firm size classes' innovative performances are associated to different types of innovative efforts; meaning that the different innovative performances that can be observed in small and large firms across industries are rooted in different strategic postures and related operational objectives (Pianta and Vaona, 2008). In SMEs, where selection of strategy is critical for survival given their intrinsic specificities, the appropriate implementation of competitive strategy is an important determinant of the firm's propensity to innovate and of the degree of novelty of innovation. Besides, strategic management seems to play a central role in the process of innovation (Becheikh et al., 2006).

The relationships between business strategic choices and innovative efforts in small and medium firms have been demonstrated in a few studies (Meredith, 1987; Lefebvre and Lefebvre, 1993). Meredith (1987) has suggested that smaller firms, less hampered by organizational inertia than larger ones, can more easily make strategic choices regarding their business and innovation strategy, introduce product or process innovation more rapidly and hence reinforce their competitive positioning. Lefebvre and Lefebvre (1993) have shown that a link tends to exist between a manufacturing SME's competitive positioning and its innovative efforts. Therefore, smaller firms need to make sure that their innovation strategy closely fits to their competitive strategy in order to derive the full benefits provided by innovation. Pianta and Vaona (2008) have demonstrated the specificities of small and medium size firms when introducing innovations as well as the relationships between business strategies pursued by SMEs and their innovative performance on product and process innovations. A strategy for opening new markets is generally a driving force for product innovation aiming at technological competitiveness whereas a process innovation behavior is more specifically related to the search for production flexibility and price competitiveness. The need for congruence between strategic orientation and operational activities, in small firms is emphasized by Ebben and Johnson (2005, p. 1257) using the typology of flexibility or efficiency strategies. Their results show that *"What matters most in regard to efficiency and flexibility strategies is not which one a small firm pursues, but that a small firm does not attempt to pursue both….It supports configuration theory in that the strategy chosen is not as important as whether it allows for consistency in operations"*.

Configuration theories can help supporting an investigation of the operational aspects of strategy and the related attributes of innovation activities. Indeed, configuration theorists have long held that the congruence among strategy, technology, organizational structure and operating processes are key in the overall effectiveness of a firm (Ebben and Johnson, 2005). Moreover, empirical studies and research works on firm's strategy and configuration have provided evidence that external fit between strategic posture and environment, and internal fit between strategic posture and organizational characteristics are important predictors of firm performance (Miles and Snow, 1978, 1994; Porter, 1996; Olson et al., 2005).

Strategic management plays a key role in the process of innovation management in SMEs. Indeed, it is a primary determinant of both their likelihood to innovate and of the degree of novelty of innovation. Moreover, SMEs seem to have increased their awareness of the importance of a managed strategic posture in the process of understanding external and internal contingencies, and allocating appropriate resources to generate sustained competitive advantage (Becheikh et al., 2006). Still, strategic management is a complex process that requires the creation of fit among a firm's activities: *"If there is no fit among activities, there is no distinctive strategy and little sustainability."* (Porter, 1996, p. 75). When selecting its strategic posture, a firm must thoroughly understand the relationships between resources, capabilities, competitive advantage and performance, and particularly, the mechanisms through which competitive advantage can be sustained over time (Grant, 1991). However, hypercompetition and permanent transformation question strategic choices over time and require, non-linear strategies, adapting strategic posture to the degree of uncertainty of the environment (Saïas and Metais, 2001). Strategic innovation, i.e. a systemic approach of innovation encompassing the whole business model of the firm in order to combine distinctiveness with coherence, should support such strategies (Hamel, 1998). This permanent competitive adaptation to environment changes requires a permanent adaptation of the firm's organizational strategy, through the appropriate alignment between strategic choice, structure and processes (Miles and Snow, 1978). This is a challenging issue for SMEs. Indeed, whereas smallness provides derived strategic advantages such as flexibility in the generation and the diffusion of innovation, it also hampers the adoption of innovation (Nooteboom, 1994). Even though competitive strategic positioning seems to guide, to a large extend, innovative efforts in SMEs (Lefebvre and Lefebvre, 1993), what matters in fact is the consistency within firm's organizational configuration related to chosen strategic posture considering external and internal contingencies.

2.2. Competitive strategy, fit and performance

2.2.1. Competitive strategy and performance: industry and firm-specific perspectives

Firm performance is, at least partly, determined by how effectively and efficiently the firm's competitive strategy is implemented (Walker and Ruekert, 1987; Olson et al., 2005). However, the issue of terminology, levels of analysis (i.e. industry, individual, work unit, or organization as a whole), and conceptual bases for performance assessment have been debated by various streams of research (Venkatraman and Ramanujam, 1986). Still most research works on performance at firm's level, from a strategic management perspective, view business performance as a subset of firm's organizational effectiveness in the context of its environment, measured in terms of financial and market performance (Venkatraman and Ramanujam, 1986). We adopt this view of performance in this research, considering both internal and external contingencies effects on firm's competitive strategy.

Many works have been conducted to compare the relative impact of industry versus firm-specific effects on performance comparing the Industrial Organization and the RBV approaches. Grant (1991) and Barney (1991) suggest that an appropriate match between a firm's resource profile and its product-market activities should optimize its performance. Other studies, decomposing above mentioned effects into strategy, industry, and firm-assets effects, have shown that both industry and firm-level influences are significant determinants of market performance and profitability (McGahan and Porter, 1997; Spanos, Lioukas, 2001). In order to optimize firm performance, an appropriate matching between the firm's available resources (i.e. core competences) and the requirements of its product-market activities related to its generic competitive strategy (Miles and Snow, 1978; Porter, 1980; Miller, 1986) should be achieved (Kor and Mahoney, 2005; Vories and Morgan, 2003).

In Porter's framework, firm performance is a function of industry and firm effects through market positioning (Grant, 1991; Porter, 1991). As industry structure is also impacted by firm activities, firm performance is influenced by these two correlated determinants. According to Porter, industry structure influences the sustainability of performance. On the other hand, firm's positioning reflects the ability of the firm to built-up a competitive advantage over its rivals active in the same market. This competitive advantage enables the firm to exercise market power, hence, generating rents. These rents result from the firm's ability either to defend its attractive position against competitive forces (defensive moves) or to influence them favorably (offensive moves) (Porter, 1991, 1998). Porter's strategy of defensive moves (1998) is implemented by creating a protected position in which competitors, after having analyzed firm's competitive positioning will conclude that the move is unwise. Offensive moves strategy can be classified as cooperative or threatening. The former are based on a thorough analysis of competitors' goals and assumptions and intend to increase the firm's rents that do not reduce the performance of its competitors or threaten their goals unduly. The latter are conducted to threaten competitors' position while significantly improving the firm's competitive advantage. However, the expected rents of offensive moves strongly depend on the ability of the firm to adequately using its resources and competences to predict and influence retaliation.

In Porter's perspective, resources occupy an intermediate position in the chain of causality regarding firm performance. Firm capabilities stem either from performing activities, i.e. the successful implementation of strategic choices, or acquiring them from the competitive environment, or both. In each case, firm's available assets reflect prior managerial and strategic choices. Hence, performance reflects activities resulting from an appropriate choice of strategy, conducted with the appropriate resources and skills, organizational structure, control procedures and inventive systems (Porter, 1980). In this approach, firms within an industry or within a strategic group vary very little in terms of the strategically relevant resources they control and the strategies they pursue (Porter, 1981; Rumelt, 1984; Scherer, 1980). In this model, competitive advantage relies on a link between a firm's internal characteristics and performance, based on low heterogeneity and high mobility of resources between firms within the same industry (Barney, 1986)

In the resource-based approach, the issue of strategy-resources and resources-performance relationships are viewed from the opposite angle. The relationships between firm-specific characteristics and performance are rooted in two alternative assumptions: i) firms are heterogeneous with regards to the resources and capabilities on which they base their strategies and ii) these resources and capabilities are not perfectly mobile across firms and generate heterogeneity among industry stakeholders. Resources are tangible and intangible assets attached semi-permanently to the firm such as brand names, patents, internal technology, efficient processes, skilled staff, commercial agreements, etc. Capabilities refer to the firm's ability to exploit and combine those resources through efficient organizational routines. These capabilities possibly enable the firm to generate sustainable competitive advantage when the underlying resources are Valuable, Rare, non-Imitable and non-Substitutable (Barney, 1991; Grant, 1991). Hence, sustainable firm performance refers to that which stems from these unique stocks of assets.

From the Industrial Organization perspective, strategic choices are made according to a careful evaluation of available resources (firm's strengths and weaknesses) to address industry opportunities and threats. Strategies are then followed over time according to the opportunities imposed by the market and the constraints resulting from firms' accumulated and acquired assets and capabilities. Current or future strategic decisions are therefore largely influenced by past resource deployments and generally lead to reinforcement of strategic profile. Of course, because of constant environmental changes, firm's management has to decide on strategic alternatives to defend or increase their competitive advantage and performance. However, these choices will be deeply influenced by past strategic trajectories and available resources.

Accordingly, and in contrast to the industry perspective, the Resource-Based View assumes that a firm's strategy should stem from firm's unique resources and capabilities. Moreover, the firm's ability to build up and maintain a competitive advantage strongly depends on the capacity of its idiosyncratic resources to generate rents. In this perspective, persistent difference in firm's performance require that either the firm's offering be differentiated or reach a low-cost position compared to its competitors (Conner, 1991). This is similar to Porter's model, but differs from the IO approach in the fact that rents stemming from such a firm's competitive positioning, result from acquiring and deploying underlying assets rather than from industry structure, and that the sustainability of this competitive position in the market place rests primarily on the costs of resources involved in the implementation of the pursued strategy (Barney, 1986, 1991).

The major point here is, irrespective of resources being acquired or internally built, the assumption of significant and sustained firm heterogeneity regarding resource endowments. Indeed, this heterogeneity is generally associated to firms' ability to establish barriers to imitation (Rumelt, 1991) and to efficiently maintaining their accumulated stock of resources over time. Sustained performance then ultimately returns on unique assets owned, developed and controlled by the firm. Therefore, a given strategy will generate sustainable performance differential if and only the resources used to conceive and implement it are valuable, rare, imperfectly imitable, and non-substitutable (Barney, 1991). Accordingly, Spanos and Lioukas (2001) posit the argument that rents stemming from such assets can be categorized into two interrelated dimensions: (a) rents stemming directly from the efficient implementation of the given strategy currently pursued, and (b) indirectly from enabling the firm to conceive and develop its strategy configuration.

The two above-described perspectives can be seen as fundamentally compatible. Indeed, both industry and firm perspectives are based on the assumption that firm above-normal performance can be possible and that to this end, an attractive strategic position is crucial. Moreover, both theories are similar in assuming that this strategic positioning is rooted in competitive advantage built up on a balance of internal and external determinants. In his later works, Porter (1991, 1996, 1998) also reinstates the firm as the critical unit of analysis. This complementary theoretical approach is necessary to explain the different dimensions of performance. Where industry forces influence a firm‘s market performance and profitability, the efficient use of its idiosyncratic assets acts upon accomplishments in the market arena (i.e., market performance) and via the latter, on profitability (i.e., financial performance) (Spanos and Lioukas, 2001). These results comfort other studies (McGahan and Porter, 1997; Rumelt, 1991) and seem to suggest that industry and firm effects are not only both potentially significant in explaining firm’s performance, but they need to complement each other considering that they impact distinct but strongly linked dimensions of performance.

When considering firm’s effects on performance, one should also consider firm’s organizational configuration. Organizational configuration can be defined as commonly occurring clusters of attributes of organizational strategies, structures, and processes (Miller, 1986, 1996; Mintzberg, 1990). At the heart of configurational perspective is the assumption that increased understanding of organizational phenomena is better achieved by identifying distinct, internally consistent sets of firms than by seeking to uncover relationships that hold across all organizations.

To this end, the configurational perspective emphasizes the need to classify organizations into typologies according to two streams of theory; an inductive approach – leading to industry-specific typologies, and a deductive approach – that first sort organizations into configurations and then tests theory-based predictions about their relative performance whatever the industry context (e.g. Zajac and Shortell, 1989). The deductive approach, which has received empirical support (Ketchen et al., 1993), portrays configuration as jointly produced by organizational and environmental attributes that are critical to competition regardless of industry. At the organizational level of analysis, configurational theories typically posit higher effectiveness for organizations that resemble one of the ideal types defined in the theory. Configurational theorists among which Mintzberg, (1979, 1983), Miles and Snow (1978), Porter (1980) have also attributed organization's effectiveness to the ability of the firm to appropriately handle contextual (such as industry environment, size, age, technology), structural (the way resources and capabilities are organized) and strategic factors. Further studies (Doty et al., 1993; Olson et al., 2005; DeSarbo et al., 2005) have demonstrated that superior organizational effectiveness and performance is achieved by organizations able to implement specific fit among contextual, structural and strategic factors. Configuration theory also posits the principle of strategic equifinality, i.e. the idea that within a particular industry or environment, there is more than one way to prosper. However, and this is the core of configuration theory, there are not an endless number of ways to prosper. Instead, there are a few basic patterns that businesses can select from in order to achieve their aims, in both an on-going lagging and leading process – the adaptive cycle described by Miles and Snow (1978) - through which a firm's management system have to provide solutions to the entrepreneurial (the choice of the product-market domain the firm wants to be active in) and engineering (the choices of technologies for production and distribution of firm's products) issues encountered to date, but also have to lead the organization into the future by anticipating and preparing for the entrepreneurial and engineering issues that lay ahead. In essence, firms should permanently seek fit between strategy and environment, and between strategy and structure (Ketchen, 2003).

Today's hypercompetition and permanent market transformation emphasize the need for these complementarities. The sole industry "adaptation" or firm "intent" approaches cannot address the issues generated by permanent disequilibrium and can end-up being very costly due to the required organizational changes. A firm should modulate its strategic posture according to the level of uncertainty of this changing environment. The recent works on disruptive strategy (Saïas and Metais, 2001) also emphasize the need to go beyond the fit or intent strategic views. They suggest that strategic choices should consider a "meta" level of the business design where the issue is no longer adaptation or transformation but an in-depth understanding of the competitive environment of the firm. Hence, a firm should be able to design its strategic posture (using its strategic resources and capabilities) in line with situational challenges. D'Aveni (1999) proposes four patterns of competitive environment with different levels of turbulences and their different impacts on firm competences, associated to different strategic postures depending on the relevance to modify the existing competitive framework. The above-mentioned principle of systematic modification of strategic configuration according to contextual and structural factors supports this view. For Saïas and Metais (2001), strategic choices consist more in designing and adapting different strategic postures according to their relevance, considering firm's distinctive competences, with a changing and uncertain environment than in following a dominant strategic model.

2.2.2. Strategic posture, configuration and fit

The multidimensional nature of competitive strategy suggests that the configurational approach is particularly relevant to the study of strategic management (Vorhies and Morgan, 2003). Indeed, the contributions of configuration theorists to various strategy typologies (e.g. Miles and Snow, 1978; Porter, 1980) have played a significant role in the development of the field. More specifically, configuration theory has provided major insights in the exploration and understanding of the determinants of firm's performance. Notably, scholars applying the deductive approach of configuration – the structural contingency theorists - have brought to the study of organizations the notion that fit between structural characteristics and environment is required. Thus, central to structural contingency theory is the proposition that the structure and process of an organization must fit its context (characteristics of organization's culture, environment, technology, size or task) to be effective (Drazin and Van de Ven, 1985). Considering environmental conditions as determinant factors of the relative success of organizational types (or configurations), research works have investigated the links among environmental conditions, organizational configurations, and performance, borrowing from two streams of thought: strategic choice and organizational ecology.

The strategic choice perspective is rooted on the assumption that strategic managerial decisions concerning the ways and means a firm will use to respond to environmental conditions are significant determinants of organizational configuration (Child, 1972). In essence, Child's strategic choice approach to organization-environment relations argues that strategic decisions serve to define the organization's relationship with the broader environment. Therefore, organizations do not respond to preordained environmental conditions, but instead can create their own environment through a series of choices regarding markets, products, technologies, desired scale of operations, and so forth. Thus, firms not only adapt to their environment, but also enact them through their actions (Miles and Snow, 1978, 2003; Weick, 1977). Theoretically, considering the multiplicity of possible choices given the range of these factors, the number and types of environment a firm could enact are numerous. However, the type of environment that firms can effectively and efficiently enact is constrained by what is known about allocating, structuring and developing resources in the form of organizations (Miles and Snow, 1978, 2003). Therefore, the strategic choice perspective only makes sense if it is seen in an evolutionary cycle of both pro-action and re-action where choice and environmental constraints are closely interdependent determinants of organizational configuration (Child, 1997).

In contrast with the strategic choice perspective, the organizational ecology perspective posits that the environment is the primary determinant of firm's outcomes (Hannan and Freeman, 1984). Organizational ecologists depict environments as composed of multiple niches – such as industries – providing both resources and constraints to a population of organizations. A key assumption of this perspective is that, within each niche, certain organization forms, or configuration of structure and processes are selected to be successful, and others fail (Ulrich and Barney, 1984). As organizations are hampered by strong inertial forces, they cannot easily change their configuration. Consequently, significant differences in performance between possible designs of configuration are expected.

Although these two streams differ on strategic choice or environment being the major determinant of organizational performance, they both emphasize the existence of a limited set of most favorable associations between firm's strategic posture, structure and processes as qualifying factors of firm performance. These different ideal types of configurations are then viewed as the forms of structure and processes a firm should select and tend to implement depending on it strategic posture. The question is: Does the search for this ideal strategy-structure-process alignment (or fit) posited in configurational theories lead to superior performance when applied by a firm? Several studies (Hambrick, 1981, 1983; Shortel and Zajac, 1990, Doty et al., 1993; Ketchen et al., 1993; James and Hatten, 1995) have brought strong and consistent support in favor of this assumption. Therefore, many configurational theorists working on the systems approach (i.e. on the multiple dimensions of organizational design and context) have considered the concept of fit as the extent to which an organization is similar to an ideal type along multiple dimensions (Doty et al., 1993). Deviations from ideal type designs should then result in lower performance (Van de Ven and Drazin, 1985).

The assumption of the existence of multiple ideal types of organization that maximize fit and effectiveness posited by configuration theories induces the complementary assumption of equifinality. Katz and Kahn (1978, p. 30) wrote on the matter that *"a system can reach the same final state (e.g., the same level of organizational effectiveness) from differing initial conditions and by a variety of paths"*. The concept of equifinality holds that superior organizational performance can be achieved through a variety of different strategies (Katz and Kahn, 1978; Venkatraman, 1990) and that overall firm performance is less dependent on a specific strategy than on the way the firm configures its resources to implement the chosen strategy. Consequently, within a particular industry or environment, a firm could possibly select its configuration within a set of equally effective and internally consistent patterns of structure and process (Drazin and Van de Ven, 1985), as long as certain strategic posture-structure-process alignments posited by the theory are respected. Equifinality implies that strategic choice flexibility (Child, 1972) is possible when designing organizational characteristics to achieve superior firm performance. As structure and process are critical components of strategy implementation, performance is therefore contingent on how well structure and process are aligned with the requirements of a specific strategic posture.

According to Miles and Snow (2003), the process of achieving fit, between strategy and the environment, and between strategy and structure, is the starting point of a firm's competitive strategy. Porter (1996) also emphasizes strategic fit among many activities as a key determinant to the generation and the sustainability of competitive advantage. This has been supported by empirical studies on configurational effectiveness showing that fit among organizational characteristics is an important predictor of firm performance (Ketchen et al., 1997; Slater and Olson, 2000; Olson et al., 2005). The quality of the organizational configuration is therefore a central issue when studying firm performance. Configuration can be defined as the degree to which an organization's elements are orchestrated and connected by a single theme (Miller, 1996). Among the determinants of a high degree of configuration, Miller (1990a, 1990b, 1992) suggests that the alignment between strategy, structure, process and culture shaped by this central goal or focus is an important indicator of configurational effectiveness. Consequently, organizational fit may be evidenced by the degree to which strategy, structure and systems complement one another (Miller, 1992), and the essence of a firm's distinctive competences and competitive advantage may not stem from the possession of specific resources or skills, which can be imitated of purchased by competitors, but rather from the above mentioned orchestrating focus and the idiosyncratic mechanisms that ensure complementarity among the firm's market domain, its skills, resources and routines, its technologies, its operating units, and its decision making process (Miller, 1996). Moreover, the internal alignment between a firm's organizational structure and its entrepreneurial orientation seems to create a general capability for action facilitating both reactive and proactive firm behavior allowing the firm to act in response to environmental turbulences or uncertainty (Green et al., 2008). Ultimately, whereas firms tend to adopt different strategic posture based on different environmental forces and organizational resources, in a process of dynamic strategic fit, this strategic fit seems to be *unique* for a particular organization's profile at a particular point of time. Hence, firm's strategic posture needs to be continuously aligned and realigned with internal resource profiles as well as external environmental factors (Zajac et al., 2000). This leads us to consider that a firm's profiles of innovation activities conducted in view of generating competitive advantage via internal change (Grant, 1991), should be aligned and realigned with firm's profiles of strategic postures, in a dynamic adaptive process (Miles and Snow, 1978, 2003), as the change of entrepreneurial orientation dictates the need for adapting firm's organizational configuration accordingly, to generate sustainable superior performance.

Table 3: Synthesis of major inputs from literature review on strategy, fit, and performance used for the research

Theoretical framework	*Major insights*	*Scholars*
Structural contingency theory: Fit as consistency	The structure and process of an organization must fit its context to be effective	Drazin and Van de Ven (1985)
Structural contingency theory: Equifinality of fit	Within an industry or environment, there exist a variety of equally effective strategies leading to superior performance as long as certain strategy-structure-process alignments are respected	Katz and Kahn (1978), Drazin and Van de Ven (1985), Venkatraman (1990)
Strategic choice theory	Firms do not respond to preordained environmental conditions, but instead can create their own environment through a series of choices regarding markets, products, technologies, …	Child (1972, 1997), Weick (1977), Miles and Snow (1978),
Organizational ecology theory	Environment is the primary determinant of firms' outcomes as it provides both resources and constraints. Consequently, firms cannot easily change their configuration and some are selected to succeed and others to fail	Hannan and Freeman (1984), Ulrich and Barney (1984)
Configuration theory: Generic strategies and organizational effectiveness	Organizational effectiveness depends on the ability of the firm to match contextual, structural and strategic factors	Mintzberg (1979, 1983), Miles and Snow (1978), Porter (1980), Doty et al. (1993), Miller (1990, 1992, 1996)
Configuration theory: Fit, generic strategy and resources	Fit between firm's available resources and the requirements of the chosen competitive strategy optimizes performance	Miles and Snow (1978), Porter (1980), Miller (1986), Vories and Morgan (2003), Kor and Mahoney (2005)
Configuration theory: Generic strategy and causal logic of performance	Both market forces and firm resources have a direct influence on firm's competitive strategy, hence, indirectly on performance, as well as a direct effect of firm's market and economic performance	Spanos and Lioukas (2001)
Configuration theory: Ideal strategic profiles	There exist favorable designs of strategy-structure-process alignment leading to superior performance. Deviations from ideal type designs result in lower performance.	Hambrick (1981), Drazin and Van de Ven (1985), Shortel and Zajac (1990), Doty et al. (1993), Ketchen et al. (1993), James and Hatten (1995)
Configuration theory: Dynamic strategic fit	firm's strategic posture needs to be continuously aligned and realigned with internal resource profiles as well as external environmental factors	Zajac et al. (2000), Miles and Snow (1978, 2003)

III - Research questions and model development for the essays

III - Research questions and model development for the essays

Are there any favorable strategy-innovation alignments linking a firm's competitive strategic posture and the type of innovation policy conducted? What is the differentiated influence of industry specific and firm's specific effects on strategic posture, innovation, and on strategy-innovation fit? Does the fit between strategic posture and associated type of innovation generate superior performance?

This empirical research, conducted on French SMEs in manufacturing industries through three essays, investigates the relationships between competitive strategic orientation, innovation profile and performance. More specifically, the purpose of this work is to understand whether specific patterns of alignment between competitive strategy and innovation influence firm performance. This research also explores the influence of industry and firm's specific effects, used as contingencies, on strategic posture, innovation, and on strategy-innovation fit. Our work, built-up on an internal-external approach of competitive strategies using Miles and Snow's (1978) strategy typology, completed with Porter's (1980) framework of generic strategies, considers both the strategic orientation (market or technology based) and structural implementation (technological, marketing, organizational) of innovation. We empirically attempts to demonstrate, as illustrated in the conceptual framework described in Figure 1:

(i) The existence of predominant patterns of strategy-innovation alignment,

(ii) The differentiated influence of industry and firm contingencies, on strategic posture, innovation behavior and their relationship,

(ii) The performance implication of fit between strategic posture and innovation behavior, under the effects of contingencies.

Hence, this research contributes to further investigating the content (i.e. the conditions for achieving competitive advantage), and the process (i.e. the dynamics of creating competitive advantage) dimensions (Spanos and Lioukas, 2001, 2004) of research on strategy and innovation management in small and medium firms.

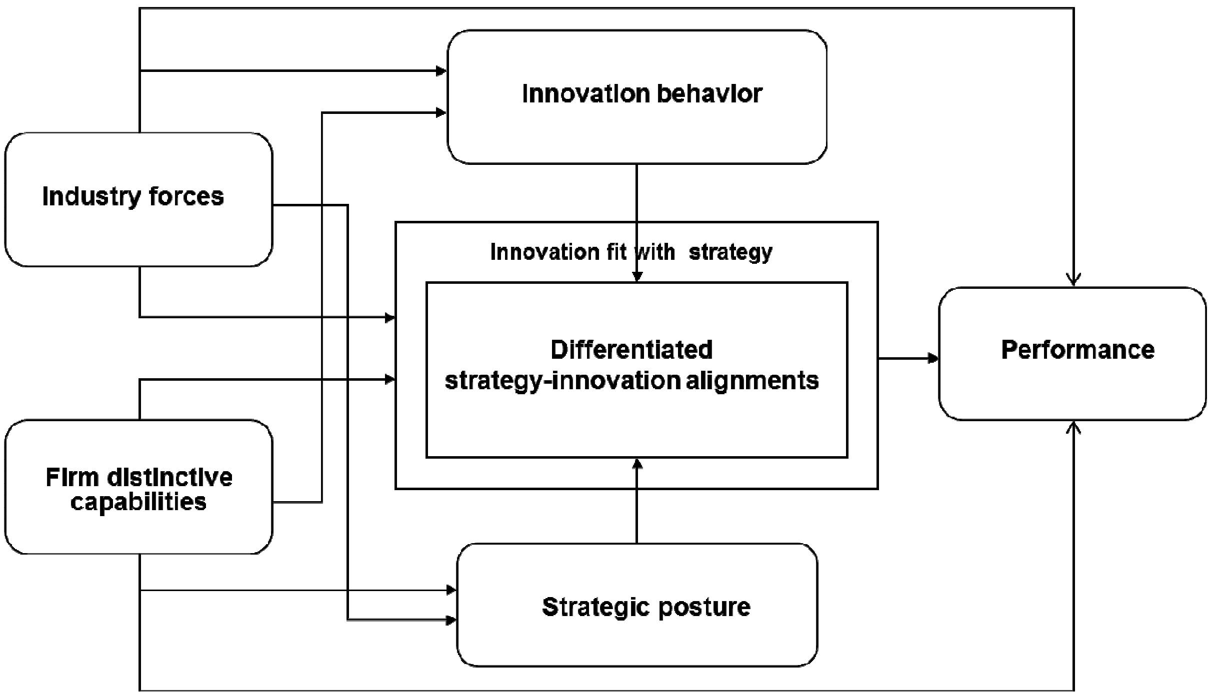


Figure 1: Overall conceptual framework of the thesis

3.1. 1st essay: "Strategic posture and innovation behavior in SMEs: Type and relationship"

In this first essay, we present a model that links strategic posture and innovation behavior to understand whether there exist specific patterns of coalignment between competitive strategy and types of innovation in SMEs. We have constructed our model in an attempt to contribute to literature and organizations' management of innovation in several ways.

First, we intend to provide a new approach of the relationship between strategy and innovation, investigating on both the influence of competitive strategic variables on innovation, and on the existence of predictive strategy-innovation alignments, as illustrated in the conceptual framework described in Figure 2. This approach has generally been conducted at the industry level considering sectoral patterns and technological regimes of innovation (Pavitt, 1984; Breschi et al., 2000), but seldom at the firm level. Second, our work attempts to contribute to filling-in the gap for a need to enhance the scope of analysis of this relationship, usually focused on technical innovations (Becheikh et al., 2006), to the marketing and organizational dimensions of innovation. Third, we have built a combined model, based on Miles and Snow‘s (1978) internal and Porter’s (1980) external focus of strategy, that leaves possibilities for the emergence of combinations of different strategic posture attributes characterizing derived hybrid strategic profiles (Spanos and Lioukas, 2004; DeSarbo et al., 2005, 2006) with differentiated innovation behavior attributes characterizing different natures, sources and activities of innovation.

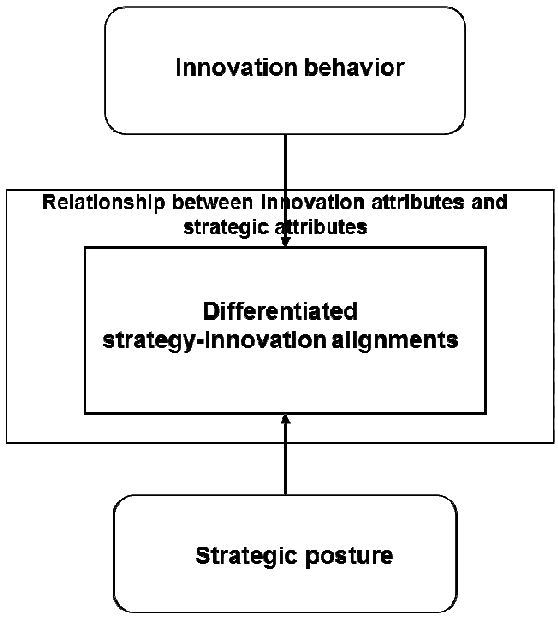


Figure 2: Conceptual framework of first essay

3.2. 2nd essay: "Strategic posture and innovation behavior in SMEs: The impact of industry and firm contingencies on type and relationship"

In this second essay, we present a model that interrelates strategic posture, innovation behavior, market forces and firm's resources and capabilities, used as external and internal contingencies, to understand the differentiated influence of contingencies on strategy and innovation management and on strategy-innovation coalignment. We have constructed our model to contribute to strategic and innovation management in several ways.

First, even though several works have studied on one hand the influence of industry and firm effects on strategy (Venkatraman and Prescott, 1990; McGahan and Porter, 1997, D'Aveni, 1999; Spanos and Lioukas, 2001; Spanos et al., 2004) as well as their influence on innovation behavior (Damanpour and Gopalakrishnan, 1998; Meeus and Oerlemans, 2000; Tidd, 2001; Koberg et al., 2003; Vega-Jurado et al., 2008; Peneder, 2010), we provide a new insight by investigating the causal relationship of the influence of external and internal contingencies on strategic posture and innovation behavior characteristics. Second, we enhance the scope of our investigation to technological as well as marketing and organizational innovation. Third, our model explores the moderating role of industry and firm contingencies to strategy-innovation coalignment. Indeed, our model, based on Miles and Snow's (1978) internal and Porter's (1980) external focus of strategy, leaves possibilities for the emergence of situation-specific combinations of different strategic posture attributes characterizing derived hybrid strategic profiles (Spanos and Lioukas, 2004; DeSarbo et al., 2005, 2006) with differentiated innovation behavior attributes characterizing different natures, sources and activities of innovation. Consequently, this model enables demonstrating the differentiated influence of industry and firm-specific effects as qualifying factors of strategic posture and innovation behavior, as illustrated in the conceptual framework described in Figure 3.

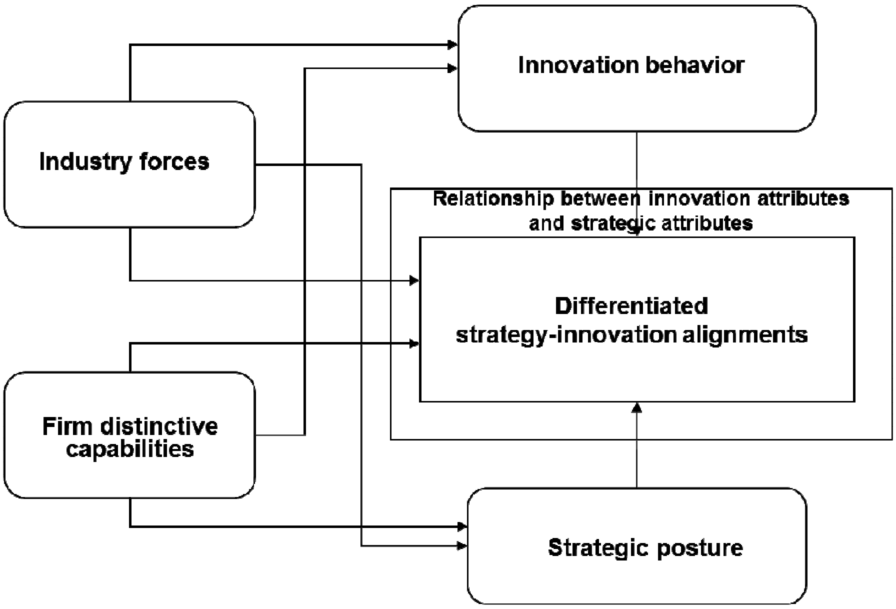


Figure 3: Conceptual framework of second essay

3.3. 3rd essay: "Strategic posture and innovation behavior in SMEs: Fit, performance, and contingencies"

This third empirical research, complementary to the first and second essays, investigates the relationship between competitive strategy, innovation, and performance, under contingencies. We propose to explore, in this essay, strategy-innovation fit, from a performance perspective. More specifically, the purpose of this work is to understand, on one hand, whether specific patterns of alignment between competitive strategy and innovation influence firm performance, and on the other hand, the dynamics of these alignments and influence under industry and firm-specific effects, as illustrated in the conceptual framework described in Figure 4. The research attempts to complement the seminal works conducted by Zahra and Covin (1994) on the performance implications of fit between competitive strategy and innovation in several ways.

First, we bring insights to the causal logic of strategy-innovation fit. Thus, we contribute to further understanding the dynamics of performance generation in SMEs. Second, we demonstrate the moderating role of industry and firm contingencies on the performance implication of this fit. Third, as emphasized by Zahra and Covin (1994) we enhance the scope of analysis to the marketing and organizational dimensions of innovation behavior. To this prospect, our model is based on derived, hybrid strategic types, stemming from the rationale of Miles and Snow's adaptive cycle (1978) and Porter's generic strategies, together with combinations on different natures, sources and activities of innovation, which enable the emergence of situation-specific profiles. This research provides a theoretical and managerial contribution to further understanding the causal logic for achieving competitive advantage in small firms.

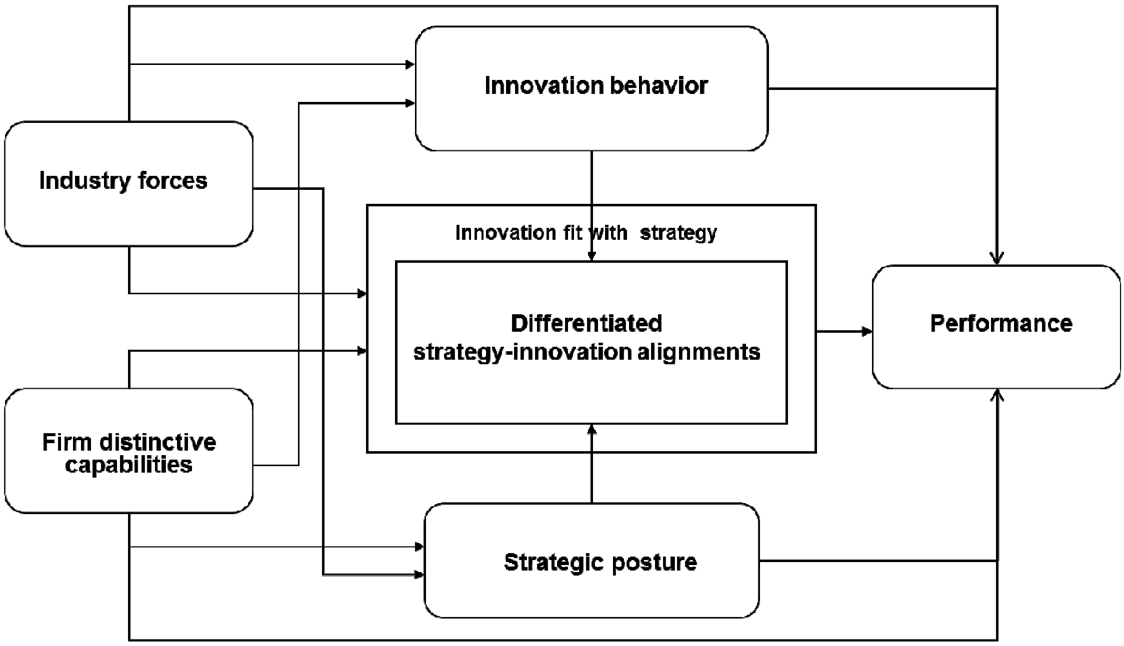


Figure 4: Conceptual framework of third essay

3.4. Model development for the research

This study attempts to extend research on Miles and Snow (1978) and Porter (1980) strategic frameworks by focusing on (i) the predictive relationship between strategic profiles and innovation behavior, under contingencies effects (ii), as a configurational condition for firm performance. Miles and Snow (2003) posit that the essence of the adaptive cycle lies in the predictive relation between a given strategic choice and the associated choice of a particular combination of technologies and capabilities demanded by this strategic choice. They also posit that this association, in turn, influences the design of organizational structure and administrative processes to fit technology. The adaptive cycle, thus, emphasizes the stability of firms' strategic posture, in a path-dependence logic of entrepreneurial, engineering and administrative choices, which tends to ignore industry and environment peculiarities (Hambrick, 1983; DeSarbo et al., 2005). Hambrick suggests that Miles and Snow's differentiated strategic posture effectiveness conditioning on industry-specific and firm-specific attributes should be further investigated. DeSarbo et al. show that empirical clustering of firms tend to be highly context-dependent and do not precisely match Miles and Snow typology and suggest that in different context, differentiated qualifying attributes should be expected.

Then, a contingency-related investigation of strategy-innovation relationship from a performance perspective seems to require the use of a model enabling the emergence of situation-specific derived strategic and innovation profiles. Therefore, our conceptual model, built on the a priori strategic and organizational characteristics of Miles and Snow's (1978) and Porter's (1980) predefined typologies, also enables the emergence of combinations of derived hybrid strategic profiles. Doing so, the model leaves possibilities to consider firms likely to select a strategic posture based on their idiosyncratic capabilities and on their competitive positioning relative to environmental contingencies. Such derived strategic postures are then likely to provide a better understanding of firms' innovation behavior to cope with environmental uncertainty, and of the way they manoeuver using their resources and capabilities towards the achievement of strategic goals. Consequently, we allow the selection of optimal interrelations between strategic posture and innovation behavior attributes to be objectively and empirically determined. With regard to here above literature review and discussion, we can depict our overall approach of strategy-innovation relationship under the impact of industry and firm contingencies, in a composite model as illustrated in the conceptual framework described in Figure 5.

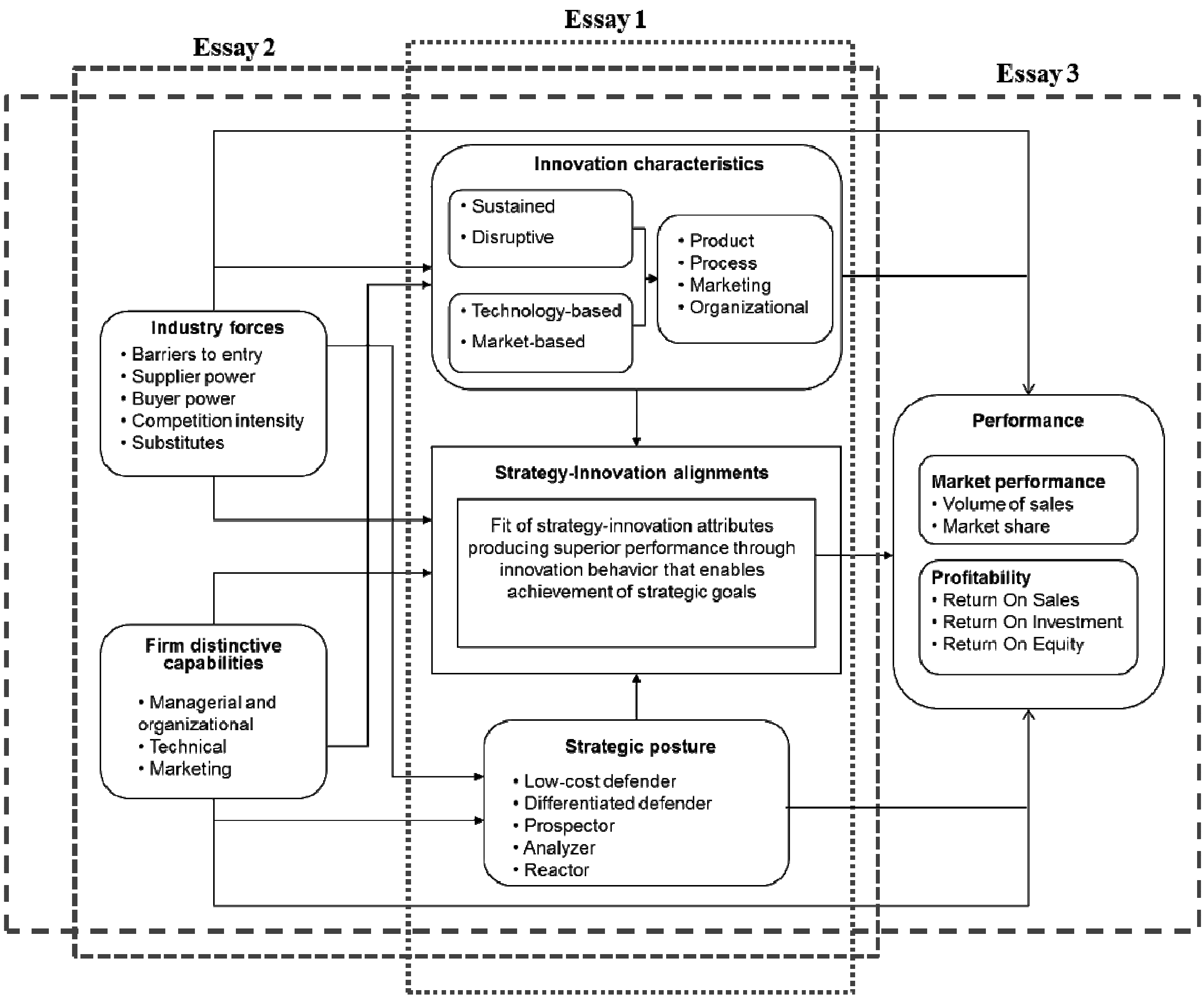


Figure 5: Model development for first, second and third essay.

IV - 1st essay

"Strategic posture and innovation behavior in SMEs: Type and relationship"

IV - 1st essay: “Strategic posture and innovation behavior in SMEs: Type and relationship”

4.1. Abstract

This empirical research, conducted on French manufacturing SMEs, investigates the relationship between firm’s strategy and innovation. More specifically, our work attempts to understand the relationship between strategic posture and innovation behavior. Our investigation enhances the scope of analysis of this relationship to the technical, marketing and organizational dimensions of innovation. In order to encompass the various attributes of strategic posture and innovation, we use a hybrid model, synthesizing both the internal focus of competitive strategy provided by the rationale of Miles & Snow’s adaptive cycle and Porter’s external approach. Our expected contribution is also an attempt to extend research on Miles and Snow and Porter typologies to their predictive validity regarding innovation behavior, by explicitly modeling the relationship between a firm’s strategic orientation and organizational configuration, and innovation management. Our conceptual model, even though built on the a priori strategic and organizational attributes of Miles and Snow’s and Porter’s typologies, leaves possibilities for combinations of different strategic posture attributes characterizing derived hybrid strategic profiles with differentiated innovation behavior attributes characterizing different natures, sources and activities of innovation. Results confirm the existence of differentiated alignments between the Entrepreneurial, Engineering and Administrative characteristics of Miles and Snow’s strategic postures and the characteristics of their respective innovation behavior. Working on the adaptive attributes of empirically-derived strategic types provides a more accurate representation of the strategic behavior of French manufacturing SMEs, while understanding the strategy-innovation

dynamics at each step of Miles and Snow's adaptive cycle on an enhanced scope of firms' innovation behavior. Therefore, on top of theoretical and methodological contributions, this research also provides managerial insights with respect to how manufacturing SMEs should align competitive strategy and innovation policy from a configurational effectiveness perspective.

4.2. Key words

Strategic posture, innovation behavior, alignment, fit, SMEs

4.3. Introduction

Literature has emphasized the distinctiveness of the strategy and innovation concepts, although strongly related. Scholars have also suggested that the type of organization should be a primary contingency variable when studying innovation (Damanpour, 1987, 1991, 1996; Zahra and Covin, 1994; Damanpour and Gopalakrishnan, 1998). There is a substantial body of empirical and theoretical literature on strategy that emphasizes the crucial role played by innovation as a source of competitive advantage (Lefebvre and Lefebvre, 1993; Porter, 1996; Teece et al. 1997; Eisenhardt and Martin, 2000). However, most studies focus on firm size, R&D intensity, staff capabilities, networking, and the industry of business, whereas competitive strategy variables have rarely been studied as determinants of innovation (Becheikh et al., 2006b). Yet, empirical research (Vaona and Pianta, 2008) has demonstrated that large firms and small firms pursue different innovation strategies and use different strategic inputs to introduce innovations. Working with manufacturing SMEs, Becheikh et al. (2006a) showed evidence of the influence of competitive strategic posture - here defined as the alignment of the firm organization's design components with strategy and with each other

- on the process and the attributes of innovation. Indeed, the core characteristics of small scale seem to generate derived characteristics of core strategies (Nooteboom, 1994). Smallness provides potential flexibility and closeness to the customer, while hampering economies of scale, scope and experience. This fosters strategies for competitive advantage through customization addressing low volume niche markets, and innovation providing low volume temporary monopolies, where according to Nooteboom the advantages count and the disadvantages do not. Moreover, when investigating on the generation and the diffusion of innovation in small firms, scholars (Nooteboom, 1994; Van Dijk et al., 1997) emphasize specific superior behavioral qualities related to small businesses over large firms, such as the ability to translate technology in a variety of new technology-product-market combinations. However, in the process of adopting innovations, small firms tend to lag behind, mainly because of lower expected returns, due to firm size, compared to risk (Nooteboom, 1994). Moreover, studies on the specific category of SMEs have put to the fore that different strategic postures should lead to different innovation practices (Lefebvre and Lefebvre, 1993; Becheikh et al., 2006b). A substantial stream of research has also demonstrated that strategic and innovation attributes co-activate and interrelate, and should align towards fit as a source of competitive advantage (Miles and Snow, 1978, 2003; Damanpour, 1996; Porter, 1996; Ayerbe, 2006).

From these insights, we can formulate the research questions of this first essay: Are there any predominant patterns of alignment in SMEs between strategic posture and innovation behavior? By answering to this question, we intend to explore the dynamics of the relationship between attributes of strategic posture and innovation behavior. Furthermore, we aim at identifying some predictive logic as regards the strategy-innovation relationship.

This research contributes to a necessary further exploration of the determinants of the fit between strategic posture and innovation behavior in manufacturing SMEs. Indeed, in spite of extensive literature on strategic management and innovation, the fit between strategic posture and types of innovation have rarely been examined as determinants of innovation effectiveness. Becheikh et al. (2006a) showed that most studies on innovation focus on firm size, R&D intensity, staff capabilities, networking and the industry of business. They point out that even though strategic variables are recognized as significant inputs to provide sustainable competitive advantage, they have been rarely studied as determinants of innovation. In another study focusing specifically on technological innovation in manufacturing SMEs (2006b), they showed evidence of the influence of competitive strategic profiles on the likelihood to innovate and on the degree of novelty. Working at the European level on product and process innovative performance in small and large firms of manufacturing sectors, Vaona and Pianta (2008), also showed that small and large firms pursue different strategies in terms of product and process innovation and use different strategic inputs to introduce innovations. Advancing knowledge on strategy and innovation management in manufacturing SMEs is a critical issue, considering the role these firms play in today’s economies (Bartelsman et al., 2005, Coulter, 2010). This is a particular focus of European policies in Southern Europe where SMEs and low innovation industries are over represented, and where industrial structure is weak in generating innovation activities capable to support the introduction of new products and the growth of new markets (Observatory of European SMEs, 2003, 2007).

We expect to contribute to raise new perspectives of research and to provide theoretical, methodological and managerial insights in the field of strategic management and strategic innovation models in SMEs, in several ways. First, in order to explore the alignment between strategic and innovation profiles, we have built a conceptual model enabling the emergence of hybrid strategic and innovation profiles at the firm’s level. This model combines Miles and Snow’s (1978) internal and Porter’s (1980) external focus of competitive strategy, thus leaving possibilities for combinations of derived strategic profiles. The model also enables combinations of innovation profiles regarding the nature, source and activity attributes of innovation. Doing so, we investigate strategy-innovation relationship by both studying the interrelations of strategic and innovation attributes and demonstrating the existence of predictive strategy-innovation alignment with a firm-specific perspective. Second, we enhance the scope of analysis of this relationship, usually focused on technical innovation (Becheikh et al. 2006a), to the marketing and organizational dimensions of innovation (Ayerbe, 2006). Enlarging this analysis beyond technological innovations provides a much richer picture of firm's innovation behavior and performance (Evangelista and Vezzani, 2010). Third, we intend to contribute to further understanding the causal logic of the relationship between attributes of strategic posture and innovation behavior in SMEs. To this end, we bring a new methodological insight into the constructs of strategy and innovation in SMEs. Building on Porter's assumption (1996, p. 70) that strategy is about combining activities in a sense that strategic posture *"determines not only which activities a company will perform and how it will configure individual activities but also how activities relate to one another"*, we investigate strategy-innovation relationship from a fit perspective throughout Miles and Snow's (1978) cycle of organizational adaptation. Therefore, we explore the formation of specific strategy-innovation alignments by studying the correspondence of empirically-derived strategic profiles with the actual strategic postures of Miles and Snow's framework (Hambrick, 2003; DeSarbo et al., 2005, 2006) while also conducting this exploration for innovation profiles. We also attempt to complement Zahra and Covin (1993, 1994) seminal works on the fit between competitive strategy and innovation policy. To this aim, we investigate the dynamics and the predictive validity of strategy-innovation relationship by enhancing the scope of analysis to different natures, sources and activities of innovation.

This paper is organized as follows. Having outlined the focus and the expected contributions of the research above, the following sections review the extant literature on strategic posture, explore the dynamics of innovation behavior, and investigate strategy-innovation relationship using a configurational view. We then develop our conceptual model and research hypotheses, and present the empirical background of the research giving details of data and methods. Empirical results and findings are introduced followed by a discussion. We finally provide insights on theoretical, methodological and managerial implications of this first essay, while considering the limitations of this investigation and directions for further research.

4.4. Literature review on strategic posture and innovation behavior

4.4.1. Strategic posture: a "configurational" view

The sources of sustainable competitive advantage have been a major issue in the field of strategic management in the 1990s, shifting from industry- to firm-specific perspective. The former, the Industrial Organization approach, emphasizes a market power imperative (Mason, 1939; Bain, 1956, Scherer, 1980; Porter, 1981; McGahan and Porter, 1997), the latter, the Resource-Based View, focuses on organizational efficiency (Barney, 1991, 2001; Grant, 1991, Hamel, 1998, 2000). Consequently, the simultaneous consideration of multiple characteristics is required when assessing whether a business is designed in such a way that activities are adequately organized to enable the implementation of its strategy and the impact this has on the generation of competitive advantage (Doty et al., 1993). Configuration theories (Miles and Snow, 1978; Porter, 1980; Mintzberg, 1983) provide robust bases to scholars in organization and strategic management wishing to address such issues. Indeed, a configuration is seen has a complex system of firm's organizational elements such as activities, policies, structure, processes and resources (Siggelkow, 2002) and denotes a multidimensional arrangement of the strategic and organizational characteristics of a business. Configuration theorists posit, and have established (Drazin and Van de Ven, 1985; Doty, Glick, and Huber, 1993), that for each set of strategic characteristics, a corresponding ideal set of organizational characteristics generates superior performance.

Configuration theories emphasize the classification of organizations (or strategies?) into typologies. The two dominant typologies of competitive strategy used by scholars of configuration theories are Porter's external focus on customers and competitors (1980, 1985, 1990, 1991, 1998) and Miles and Snow's internal focus on intended rate of product-market change (1978, 2003). Miles and Snow have developed a systemic approach (the adaptive cycle – see Figure 6) of how firms define and address their product-market domains (the Entrepreneurial problem) and design processes and structures (the Engineering and Administrative problems) to develop and maintain competitive advantage in those domains. Miles and Snow (1978, 2003) have accordingly defined four profiles of firms and the corresponding business strategies. (1) the "Defenders" attempting to limit uncertainty by creating stable competitive positioning via specialization and looking for the maximum efficiency on a specific product-market domain, (2) the "Prospectors" permanently looking for new products and market opportunities, (3) the "Analyzers" applying a prospector-following strategy to develop new opportunities while securing a stable product-market domain, (4) the "Reactors" undergoing market changes without consistent entrepreneurial response.

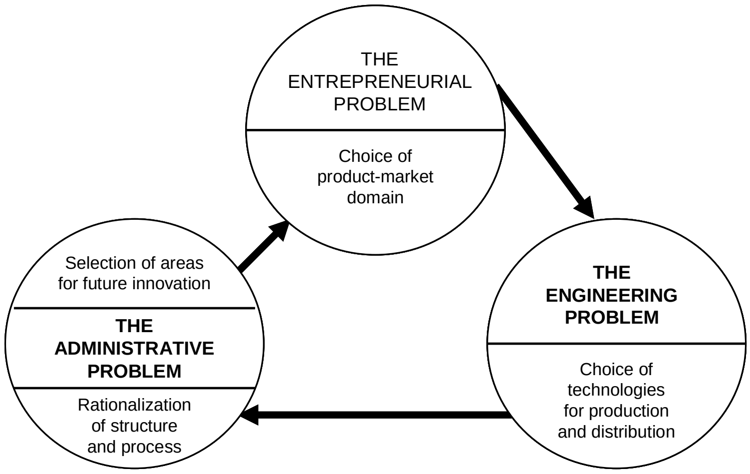


Figure 6 – The adaptive cycle
Source: Figure from R.E. Miles, C.C. Snow - Organizational Strategy, Structure, and Process – Stanford University Press, 2003, p. 24, Figure 2.1.

(1) The Defender profile: the characteristics of Defenders are embedded in the entrepreneurial question such firms want to address i.e. how to “seal off” a portion of the total market to create a stable set of products and customers? Answers to this question are usually found in a narrow and stable competitive domain, aggressive maintenance of the domain (competitive pricing and high-level customer service), a tendency to focus on development inside the domain, incremental growth mainly through market penetration, some product development closely related to current goods and services. The engineering and administrative resultants of the Defender profile provide solutions to the following issues: “how to produce and distribute goods or services as efficiently as possible?”, and “how to maintain strict control of the organization in order to ensure efficiency?” Technological efficiency is central to organizational performance and mainly focused on single, core, cost-efficient technology. Administrative systems of Defenders are vertically integrated with functional structure, centralized control and high degree of formalization. Planning is production intensive and cost-oriented. Organizational performance is measured against previous years based on efficiency, and favors production and finance. Such organizations

have simple hierarchal coordination mechanisms ideally suited to maintain stability and efficiency but poorly suited to identify and respond to product or market opportunities.

(2) The prospector profile: Prospectors' entrepreneurial issue is to "locate and exploit new product and market opportunities". To this end, such organizations select a broad and continuously developing domain, permanently scan a wide range of environmental conditions and events, tend to generate change in the industry, and ensure growth via product and market development. Such growth may also occur in spurts stemming from breakthrough innovations. To address their engineering and administrative problem of "how to avoid long-term commitments to a single technological process?" and "how to facilitate and coordinate numerous and diverse operations?" Prospectors tend to develop multiple technologies and a low degree of routinization and mechanization. Technology is mainly embedded in people. At the administrative level, Prospectors promote a product-structure organization with low degree of formalization and decentralized control. Planning is broad rather than intensive, and problem solving oriented. Organizational performance is measured against key competitors, and favors marketing and R&D. Such administrative structure is ideally suited to maintain flexibility and effectiveness according to strategic posture, but may underutilize and misutilize resources.

(3) The Analyzers profile: "how to locate and exploit new product and market opportunities while simultaneously maintaining a stable base of core products and customers?" this is the entrepreneurial issue Analyzers want to address. To this end, they endeavor to operate in hybrid domains both stable and developing. Their environment scanning activities are mainly limited to marketing with some cross-fertilization on research and development. They focus on steady growth embedded in market penetration and product-market development. They invest low in R&D but have strong ability to imitate demonstrably successful products, thus minimizing risk. For Analyzers, the engineering problem is to be

efficient in both the stable and the changing portion of their product-market domain. They usually build-up dual technological capabilities with a focus on applied research. This generally goes with moderate technical efficiency. Analyzers have to differentiate the organization's structure and processes to accommodate both stable and dynamic areas of operation. They encompass this issue via intensive planning between marketing and production on stable activities and comprehensive planning between marketing, applied research and product-market managers on new products and markets. A matrix structure usually combines functional divisions with product units. Control is moderately centralized with complex and possibly expensive coordination mechanisms. Organizational performance is measured on the basis of both efficiency and effectiveness and favors marketing and applied research.

(4) The Reactor profile: according to Miles and Snow, Reactors are unstable organizations that do not possess a set of mechanisms that allows them to respond consistently to their environment over time. Frequently, such organizations are unable to cope appropriately with environment change and uncertainty. Three main reasons can be identified for these failures. First, top management has not clearly articulated and formulated the organization's strategy. Without a unified, cohesive statement of the organization's direction and intent, consistent and aggressive competitive behavior is hampered. Second, management does not fully shape the organization's structure and processes to fit with the chosen strategy. Consequently, without this alignment, the strategic posture is just a statement, not an effective guide for behavior and action. Third, the tendency of management to maintain the firm's strategy-structure relationship despite changes in environmental conditions. Table 4 synthesizes the configurational framework of Miles and Snow's typology.

Table 4: Characteristics of Defender, Prospector, and Analyzers profiles
Source: Table from R.E. Miles, C.C. Snow – Fit, Failure & the Hall of Fame – Free Press, 1994, p. 13, Table 1.1.

Organizational Characteristics	Defenders	Prospectors	Analyzers
Product-market strategy	• Limited, stable product line • Cost efficiency through scale economies • Market penetration	• Broad, changing product line • Product innovation and market responsiveness • First in to new markets	• Stable and changing product line • Process adaptation, planned innovation • Second in with an improved product
Research and development	• Process skills, product improvement	• Product design, market research	• Process and product adaptation
Production	• High volume, low-cost specialized processes	• Flexible, adaptive equipment and processes	• Project development shifting to low-cost production
Organizational structure	• Functional • Dominant coalition functions : production and finance	• Divisional • Dominant coalition functions : product R&D and marketing	• Mixed project and functional matrix • Dominant coalition functions : production, marketing and product development
Control process	• Centralized, managed by plan	• Decentralized, managed by performance	• Stable units managed by plan; projects managed by performance
Planning process	• Plan => Act => Evaluate	• Act => Evaluate => Plan	• Evaluate =>Act => Plan

The Miles and Snow framework remains the most enduring strategy classification system available (Hambrick, 2003). Still, researchers have commented on the need to further investigating the underlying assumptions of the framework (Hambrick, 1983; Conant et al., 1990; Shortel and Zajac, 1990; DeSarbo et al., 2005). Hambrick noted (1983) that little consideration was given to the environment-strategy relationship in the model. Despite the inferred role of environmental factors studied by Hambrick (1983) and Zajac and Shortel (1989), environmental effects remained empirically uninvestigated (DeSarbo et al., 2005). This is a relevant issue as Miles and Snow (1978) stress that the various strategic types would perform equally well in any industry, as long as the strategy is well implemented, i.e. that the fit between firm's strategic posture, structure and processes is appropriate. This stance is however inconsistent with the more typical view that an environment favors certain types of strategies. In an attempt to resolve some of these criticisms, DeSarbo et al. (2005) have shown empirical evidence of mixed-type profiles dominating the Miles and Snow's pure classification (1978) in terms of performance, and better explanatory power in terms of relationship between strategic capabilities, environment uncertainties, and performance.

Shortly after Miles and Snow and their strategy typology, Porter (1980) presented his set of generic competitive strategies relatively to how outperforming competitors in the way of coping with forces that influence a specific market or industry namely, the bargaining power of buyers, the bargaining power of suppliers, the threat of substitute products or services, the threat of new entrants, and the rivalry among existing firms. Porter suggests that competitive strategy should be focused on how a firm creates customer value compared with its competitors via either a differentiation or low costs positioning, and how it defines its scope of market coverage either focusing on a specific market segment or marketwide.

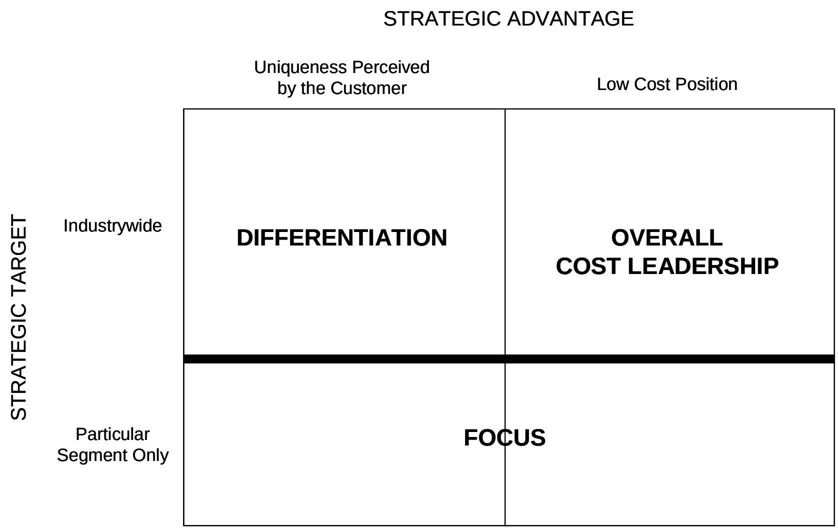


Figure 7: Porter's Generic Strategies
Source: Figure from M. Porter – Competitive Strategy – Free Press, 1998, p. 39, Figure 2.1.

Porter posits that the purpose of a Low-Cost strategy is to *"achieve overall cost leadership in an industry through a set of functional policies aimed at this objective. This requires aggressive construction of efficient-scales facilities, vigorous pursuit of cost reductions, from experience, tight cost and overhead control, avoidance of marginal customer* *accounts, and cost minimization in areas like R&D, service, sales force, advertising, and so on"* (Porter, 1998, pp.). A Low-Cost positioning enables a firm to favorably handling market forces compared to competitors because intense rivalry and bargaining can only *"continue to erode profits until those of the next most efficient competitors are eliminated, and because less efficient competitors will suffer first in the face of competitive pressures"* (Porter, 1998, pp.). The Differentiation strategy aims at "*creating something that is perceived industrywide as being unique"* (Porter, 1998, p. 36). A firm ideally differentiates through several dimensions, still without ignoring costs issues but not considering these as strategic objectives. If achieved, differentiation provides competitive advantage and a defensible position for coping with all market forces through customer's loyalty, higher margin, and uniqueness. The third Porter's generic strategy consists in choosing either to focus or not on a specific category of buyers, segment of the product line or geographic market. It may take many forms and combinations. This strategy is rooted in the idea that the firm is able to serve the selected narrow strategic target more effectively or efficiently than competitors who are competing more widely. As a result, the firm achieves either differentiation from better meeting the needs of this particular target, or lower costs in serving this target, or both. The skills and resources needed for a focus strategy are a combination of the ones above mentioned for low-cost or differentiation directed at the particular strategic target. Table 5 synthetizes the organizational characteristics of Porter's Generic Strategies.

Table 5: Organizational characteristics of Porter's Generic Strategies
Source: Adapted from M. Porter – Competitive Strategy – Free Press, 1998, pp. 40-41.

Generic Strategy	Commonly Required Skills and Resources	Common Organizational Requirements
Overall Cost Leadership	• Sustained capital investment and access to capital • Process engineering skills • Intense supervision of labor • Products designed for ease in manufacture • Low-cost distribution system	• Tight cost control • Frequent, detailed control reports • Structured organization and responsibilities • Incentives based on meeting strict quantitative targets
Differentiation	• Strong marketing abilities • Product engineering • Creative flair • Strong capability in basic research • Corporate reputation for quality or technological leadership • Long tradition in the industry or unique combination of skills drawn from other businesses • Strong cooperation from channels	• Strong coordination among functions in R&D, product development, and marketing • Subjective measurement and incentives instead of quantitative measures • Amenities to attract highly skilled labor, scientists, or creative people
Focus	• Combination of the above policies directed at the particular strategic target	• Combination of the above policies directed at the particular strategic target

Despite strong empirical support and theoretical refinements (Hambrick, 1983; Wright, 1987), Porter's typology has been questioned on its conceptual limitations (Kotha and Vadlamani, 1995). Indeed, research works have (a) questioned Porter's assertion that generic strategies are mutually exclusive by arguing that generic strategies are underlying dimensions of competitive strategies (Hill, 1988; Wright, 1987; Spanos et al., 2004); (b) argued that generic strategies are not collectively exhaustive, and are not fully appropriate to describe competitive strategies adequately (Christman et al., 1988; Wright, 1987); and (c) questioned the relevance of Porter's simple notions of low-cost and differentiation in environments characterized by increased global competition and technological change (Mintzberg, 1988).

To address some of these criticisms, Miller (1986) and Mintzberg (1988) have completed Porter's framework of competitive strategies. On the basis of Porter's works, Miller suggests two different types of differentiation strategies. One type, marketing differentiation highlights the creation of a positive image through marketing techniques such as advertising, market segmentation and high perceived value by customers. The second, innovative differentiation – based on product innovation – involves the application of new or flexible technologies to unanticipated customer and competitor reactions. Mintzberg (1988) proposed an alternative typology of generic strategies that starts by distinguishing Focus from Differentiation and Cost Leadership, arguing that Focus defines the scope of a market domain on a resource-based perspective, whereas Differentiation and Cost-Leadership reflect how a firm competes in that market domain (Kotha and Vadlamani, 1995). Mintzberg also posits that low-cost positioning does not intrinsically provide a competitive advantage unless it is linked to below average market prices. He therefore refines Porter's typologies into Undifferentiation and Differentiation by marketing image, by product design, product quality and product support.

Although both approaches have their own strengths and limitations (Walker and Ruekert, 1987), Miles and Snow's (1978, 1994, 2003) works have largely helped to crystallize the concept of strategic equifinality and to develop today's "configurational view" of strategy. The concept of equifinality suggests that, within a particular industry or environment, there is more than one way to prosper even though there are not an infinite ways to prosper. Still, the mutual exclusiveness of generic strategies has been questioned and considered as imperfect and variable (Rich, 1992; Campbell-Hunt, 2000; Vorhies and Morgan, 2003; DeSarbo et al, 2005). The generic competitive strategy approach, embedded in the Industrial Organization theory, posits that there exist ideal types or benchmarks of comprehensive strategy in each industry (Doty et al., 1993; Campbell-hunt, 2000). However, the Resource-Based view of the firm emphasizes that resources and capabilities are firm-specific and vary among firms within industry (Barney, 1991, 2001; Grant, 1991) and that the correspondence between real configurations and ideal generic strategic types varies in terms of performance. Empirically hybrid, derived types often over perform generic types (Spanos et al, 2004; DeSarbo et al, 2005). This is because strategic types empirically-derived from field samples tend to be highly context-dependent and do not neatly fall into pure generic typologies. However, derived strategic configurations can be viewed as second-order derivatives of generic configurations in conjunction with an industry-capability context-dependent framework (DeSarbo et al., 2005). Given this perspective, complementary to the equifinality concept, it is posited that the more empirically-derived configurations will contain dimensions of a generic configuration the more the efficiency of the configuration (Spanos et al., 2004). This suggests that configuration effectiveness will improve as real configurations of strategic posture will approximate ideal generic types of strategic postures (Campbell-Hunt, 2000).

Synthesis

Firm's effectiveness relies on the relationship between strategic orientation and organizational adaptation in a given context (Miles and Snow, 1978, 1994; Porter, 1996; Barney, 1991; Grant, 1991; Spanos and Lioukas, 2001). The fit among strategy and organizational characteristics is a good predictor of this configurational effectiveness (Venkatraman, 1990; Slater and Narver, 1994, 1995; Ketchen et al., 1997). Configuration theories encompass this multidimensional aspect of competitive strategy suggesting different typologies of organizations with reference to different environmental and managerial configurations. The two dominant configuration strategies, Miles and Snow's (1978) and Porter's (1980) provide two perspectives based, for the former, on a typology relying on an internal focus on the firm's intended rate of product-market change, and for the latter, on generic strategies stemming from an external focus on customers and competitors. However, from a resource-based perspective, firm's resources and capabilities, need to be firm's specific to provide sustainable competitive advantage (Barney, 1991; Grant 1991). Today's hypercompetitive and changing environments suggest that hybrid strategic postures, derived from ideal generic strategic types might be better predictor of configuration effectiveness providing that such derived strategic postures approximate these ideals without deviating too much from the optimal generic profile (Campbell-Hunt, 2000; Spanos et al., 2004; DeSarbo et al., 2005).

4.4.2. Innovation behavior: natures, sources and activities

Many typologies have been advanced to identify the dynamics of innovation, including continuous versus discontinuous (Robertson, 1967), incremental versus radical (Dewar and Dutton, 1986), competence enhancing versus destroying (Tushman and Anderson, 1986), architectural versus product (Henderson and Clark, 1990), and more recently, open versus closed innovation (Chesbrough, 2003; Almirall and Casadesus-Masanell, 2010). However, as pointed out by Damanpour (1991, p. 582), *"organizational performance may depend more on the congruency between innovations of different types than on each type alone"*.

Christensen (1997) distinguishes two fundamental types of innovation, considering the intrinsic nature of innovation i.e., the degree of novelty: Sustaining innovation, which continues, gradually, to improve existing offering characteristics for existing customers and markets, and disruptive innovation, which provides a radically different set of characteristics likely to appeal to a significantly different segment of users on the market. Most of the time, disruptive innovations are underestimated or disregarded by existing firms and their customers, as they appear to be inferior to existing solutions in terms of benefits and performance due to a lack of ex-ante comparisons and reference framework (Tidd, 2001). This is particularly true for those firms that operate on a stable product-market domain as a chosen strategic posture. Consequently, the potential of disruptive innovations is more likely to be exploited by new entrants whose strategic orientation is to take advantage of new technological or market opportunities. Therefore, segmentation of current markets into stable product-market domains and secured relations with existing customers will reinforce sustaining innovation focused on addressing the needs of major clients, but will fail to identify and benefit from potential disruptive innovations that could leverage new market opportunities and more favorable market spaces (Kim and Mauborgne, 1999).

Many scholars have emphasized the need to foster this degree of novelty of innovation as a way of improving competitive advantage and creating opportunities for firms to access new markets (Lyn et al., 1996; McDermott and Handfield, 2000; McDermott and O'connor, 2002). The degree of novelty has been studied via two main streams of research on the novelty or changes in products or production processes depending on either the customers' perspective, or the firm's perspective. The customers' perspective refers to novelty in products providing superior advantages for customers, greater functionality, improvement in performance features, and added value to the marketplace. The firms' perspective uses a resource-based view of the firm and focuses on the amount of specific resources, development time and changes to technology necessary for firms to undertake radical innovations (Amara et al., 2008). Adopting this firms' perspective to study the factors that foster the novelty of innovation in established manufacturing SMEs, Amara et al. (2008, p. 453) emphasized that various types of learning capabilities, i.e. "*the assets that enable firms to transform and exploit their resources in order to develop (product or process) innovations*", impact both the presence and the degree of novelty of innovation. More specifically, they posit that investing in training of employees, interactions with other research and information networks, as well as field practice in the marketing of innovations, have the highest impact on the degree of novelty of innovation of studied SMEs.

Still, Moss Kanter (2010) emphasizes the false dichotomy that presents sustaining and disruptive innovations as polar opposites. She points out that breakthroughs do not come to life and become market successes without the many incremental, continuous changes that make big innovation possible, such as new processes or market development techniques.

Indeed, firms need solid foundations and sustained innovation-oriented routines for generating innovations of all kinds. *"Incremental and breakthrough innovations go together. …Perhaps we should refer to highly successful innovations not simply as blockbusters but as block-by-blockbusters"* (Moss Kanter, 2010, p. 38).

Adoption and appropriability of knowledge spillovers play a central role in the trade-off between open and closed innovation (Almirall and Casadesus-Masanell, 2010) when considering that open innovation *"embraces external ideas and knowledge in conjunction with internal R&D"* (Chesbrough, 2003, p. 41). Indeed, whereas in a closed innovation approach, firms must generate their own ideas and internally control their development, manufacturing, marketing, distribution and service, in an open innovation model, firms commercialize external and internal ideas by deploying outside, as well as in-house, pathways to the market (Chesbrough, 2003). So doing, firms can market internal innovations outside the boundaries of their current business and open new market spaces (Kim and Mauborgne, 2005). Learning from choices made by others allows the firm to discover areas of the product-market domain that would not be easy to figure out and to address (Almirall and Casadesus-Masanell, 2010). However, closed and open innovation approaches might require different organizational configurations and might probably generate competitive advantage in different market segments and industries. Indeed, Christensen et al. (2002), suggest that vertical integration favors competitive advantage in the tiers of the market where customers are under-served by the functionality or performance available from products in the market. On the opposite, more stratified or disintegrated industry structure will be more adapted to tiers of the market that are less demanding (or satisfied by the existing offer) of functionality and where shorter time to market due to hypercompetition is essential. Nevertheless, whatever the market segment, firms still need to convert the outputs of their R&D activities into products and services that satisfy market needs. Depending on market turbulences, this process goes far beyond the boundaries of the firm and seems to anchor open innovation in any organization's routine because, in short, *"firms that can harness outside ideas to advance their own businesses while leveraging their internal ideas outside their current operations will likely thrive in this new era of open innovation"* (Chesbrough, 2003, p. 41)

Various studies have been conducted on the relationship between the strategic orientation, the technology or market-based source of innovation, and firm performance (Zhou et al., 2005). Some studies have provided empirical results for the positive link between market orientation and firm performance (Jarowski and Kohli, 1993; Slater and Narver, 1994). Further works have emphasized the role of market-based innovation in facilitating the market orientation-performance relationship (Hurley and Hult 1998). However, other studies have questioned these outputs and assert that an excessive emphasis on customers could lead to low-value innovations and R&D, hence leading to a decrease in the firm's innovative competence (Frosch, 1996; Christensen and Bower, 1996). Customers being inherently shortsighted, market-oriented organizations may lose the foresight of creative innovation when focusing on serving existing customers' needs (Hamel and Prahalad, 1994). Besides, customers are unable to encompass the latest market trends or technologies and consequently may not provide firms with a real insight into product innovation. Some scholars have even promoted a "don't listen to your customers" recommendation while pursuing breakthrough innovations (Meredith, 2002).

Hult and Ketchen (2001) have showed that, as a component of competitive positioning, market orientation positively affects firm performance but should be considered together with other key firm capabilities such as entrepreneurial and organizational dynamics. These insights have been completed by the outputs of Verhees and Meulenberg (2004) on the relationship between market orientation, innovativeness, product innovation and performance in small firms. Their results show that market orientation influences product innovation, positively or negatively, depending on the strategic posture dimension of innovation, here characterized as the innovativeness of the owner. Market orientation may slow down product innovation when the strategic posture of the firm is highly innovative in the product-market domain, whereas market intelligence may speed up product innovation in firms where the strategic posture of the owner is less innovative.

Other scholars, focusing on breakthrough innovations have studied the relationship between strategic orientations and breakthroughs (Zhou et al., 2005). Whereas their outputs show that a strategic technology orientation has a positive impact on technology-based innovations but has no effect on market-based ones, they also demonstrate that a strategic market orientation facilitates technological product innovation by helping identify and meet mainstream customers' latent or unmet needs, hence achieve competitive advantage and superior performance. Other inputs seem to demonstrate that market orientation tends to limit market-based innovation that should initially address the needs of new and emerging markets. Indeed, a market-oriented firm, whose main objective is to serve its best customers, is less likely to invest sufficiently in pursuing opportunities in emerging markets (Christensen and Bower, 1996).

In contrast, a stream of scholars (von Hippel, 1986, 1988; Morrison et al., 2000; Langerak et al., 1999; Franke and von Hippel, 2003; Lüthje and Herstatt, 2004; Lettl et al., 2006; Lettl, 2007) have emphasized the positive influence of upstream-market orientation on radical innovation by the identification of users – namely lead users – who experience needs significantly earlier than others, and are proactively looking for - and contributing to - solutions to meet these needs. When firms identify such users, they also potentially identify upstream market trends that they can serve earlier than competition. However, to develop radical innovations, firms depend on both technological and market related capabilities. Indeed, "lead manufacturers" are firms that recognize the potential of emerging technologies earlier than others, and have the absorptive capacity, thanks to their strengthened market research orientation, to identify promising market trends to use the potential of these technologies (Lettl et al., 2006). With regard to SMEs, generally operating under R&D budget restrictions, such a proactive market orientation to identify “lead users” can be a suitable strategy for generating competitive advantage through disruptive innovations (Lettl et al., 2006). Complementary to these outputs, Zhou et al. (2005) also emphasize that market forces are significant contributors to breakthrough product innovations. Demand uncertainty stimulates both technological and market-based innovations by inciting firms to introduce more creative products to lead rather than follow the market. Still, they note that the impacts of these market forces are significantly influenced by the entrepreneurial orientation of the firm, notably its favorable attitude toward change.

Technological innovation is not the sole dimension of a firm’s innovation activities having been studied in relationship with market orientation. Han et al. (1998) have empirically established the direct positive influence of market orientation at the global firm’s organization level, measured in terms of both technical and administrative innovations implemented. Organizational innovation, in turn, positively influences business performance, and plays a mediating role in the market orientation-firm performance relationship. Slater and Narver (1995) have also demonstrated this relationship between organizational innovation and firm performance, viewing organizational learning as a mediating process. They posit that organizational innovation stems from the development of new knowledge or insights that facilitate organizational changes and increase firm performance. Slater and Narver (1995) and Han et al. (1998) thus emphasize the importance of organizational innovation as the ability to learn and reconfigure more rapidly in dynamic and turbulent markets.

In any case, an appropriate balance should be found between a firm’s technological and market orientation (Vazquez et al, 2001). Indeed an organization’s strategic posture should combine a long-term vision of its technological orientation together with overlooking specific market needs and the technological level required to be active on this market. The issue is here to achieve an optimal equilibrium between both orientations in such a way to develop technology that provides a competitive advantage to deliver the most possible benefits to both the market and the firm (Hamel and Prahalad, 1994). Working on product and process innovative performance in small and large firms, Vaona and Pianta (2008) showed that firms use different inputs to introduce product and process innovations. Product innovations mainly results from a search for technological competitiveness, based on market-oriented innovation, dedicated to increase the quality and variety of goods, whereas process innovation results from the search for production flexibility rooted in a price-competitiveness strategy.

In an attempt to liaise competitive strategies of small firms, the likelihood to innovate and the degree of novelty of innovation, Becheikh et al. (2006) have demonstrated the negative impact of low-cost leadership strategies on the likelihood to innovate, but a positive impact on the degree of novelty, suggesting that such a strategy could drive radical process innovation in order to substantially lower production costs. They also conclude that a differentiation strategy is a strong qualifying factor of the degree of novelty of innovation.

Therefore, consistent with these different insights, it seems appropriate, for the purpose of our research, to encompass the multi-dimensions of innovation: Its *nature*, here qualified as the intended degree of novelty of innovation: sustained - aiming at continuously improving existing offering features for existing customers and markets - or disruptive – aiming at proposing an offering with radically different characteristics to new markets or users; its *source*, here qualified as the strategic base of innovation, rooted in the entrepreneurial strategic posture of the firm: market-based or technology-based; and the type of *activity* of innovation; product, process, marketing, and organizational. As previously posited, we will consider open innovation as inherently routed in today's firm innovative posture, considering that in many industries, the logic that supports internally oriented, centralized approach to R&D has become obsolete (Chesbrough, 2003).

Interestingly, these different aspects of innovation can be seen as various innovation dimensions of the three components of the adaptive cycle described in Miles and Snow's strategy typology (1978). Indeed, the Entrepreneurial issue deals with the choice of the products and markets where the firm has decided to generate and sustain competitive advantage. The Engineering issue involves the creation of a system that puts into actual operation solutions to the entrepreneurial problem. This requires selecting an appropriate technology (an input-transformation-output process) for producing and delivering the chosen products as well as forming new information, communication, and control linkages to ensure proper operation of the technology. The Administrative issue is on one hand, involved with the rationalization and stabilization of those activities that successfully solved problems faced by the firm during the entrepreneurial and engineering phases. On the other hand, it is also involved with the formulation and implementation of those processes that will enable the firm to continue to evolve and to generate effective competitive advantage depending on the intensity of environment turbulences and on firm's management strategic intent (D'Aveni, 1999; Hamel, 1998). As pointed out by Miles and Snow (2003, p. 27), *"these three adaptive issues are intricately interwoven … (and even though) adaptation frequently occurs by moving sequentially through the entrepreneurial, engineering, and administrative phases, the cycle can be triggered at any of these points"*.

The OSLO Manual (OECD, 2005) provides a definition of the types of innovation that complements the degree of novelty and strategic base dimensions of innovation, and consequently, is well adapted to Miles and Snow's strategy typology. Following the OSLO manual, an innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations. From this perspective, the minimum requirement for an innovation is that the product, process, marketing method or organizational method must be new (or significantly improved) to the firm. This encompasses products, processes and methods that the firm is the first to develop as well as those that have been adopted from other firms or organizations. Consequently, innovation activities are all scientific, technological, organizational, financial and commercial steps, including investment to increase the stock of knowledge and the use of this new knowledge, which actually lead to, or intend to lead to, the implementation of innovations.

Synthesis

The dynamics and typologies of innovation are strongly related to the attributes of firm's strategic posture. Innovation leverages firm's ability to generate competitive advantage in an internal change process, in order to adapt to external environment (Grant, 1991). Consequently, innovation strategies stems from the entrepreneurial choice of the firm, be it technology, market-oriented or both, to serve existing customers with improved offering or to take advantage of opportunities to build new and more favorable competitive spaces (Kim and Mauborgne, 1999). Innovation, at the organizational level, also leverages a firm's ability to develop new knowledge that facilitates change and reconfiguration (Hamel, 1998) in a dual process combining long-term strategic view, and immediate, technological, marketing, or organizational innovative answers, that should benefit to both the market and the firm (Miles and Snow, 1978; Hamel and Prahalad, 1994; Vasquez et al., 2001). The OSLO Manual (OECD, 2005) encompasses the various dimensions of innovation typologies. Therefore, for the purpose of our research, we investigate the innovation behavior of firms and their activities related to improving their products, processes, marketing, and organization, as defined in the OSLO Manual. We complement this approach by also integrating the different natures - sustained or disruptive, and sources – technology or market based - of innovation to take into account the overall dimensions of innovation behavior.

4.4.3. Strategy and innovation: relationship, configuration and prospects of fit

Strategic posture and innovation behavior: two related but distinct concepts

In order to explore the relationship between strategy and innovation, empirical research generally follows a strategic choice approach viewing innovation as a means for achieving the goals of competitive strategy, thus considering strategy as a predictor of innovation activities (Kotabe, 1990). Zahra and Covin (1993, 1994) suggest that competitive strategy and innovation are related but distinct variables. The strategic choice approach, therefore, emphasizes the central role of strategic posture attributes as predictors of innovation behavior attributes, without precluding the reverse relationship in the long run (Schroeder, 1990; Zahra and Covin, 1994).

The adoption of innovations is conceived to encompass the generation, development, and implementation of new ideas or behaviors. An innovation can be of various types; it can be a new product or service, a new production process technology, a new structure or administrative system, or a new plan or program pertaining to organizational members (Damanpour, 1991). Thus, innovation can be defined as the adoption of an internally generated or purchased device, system, policy, program, process, product, or service that is new to the adopting organization (Damanpour and Evan, 1984). This definition shows that when firms adopt innovations, they enter in a process pertaining to all parts of the organization and all aspects of operations with the intent to contribute to the generation of superior performance or effectiveness than the existing configuration. Therefore, the objective of innovation is to change an existing organization, whether as a response to changes in its internal or external environment or as a preemptive action taken to influence this environment.

The OSLO Manual (OECD, 2005) encompasses above-mentioned typology of innovation, as well as its scope, objectives, and related activities. It focuses on innovation at the level of the firm, the various types of activities of innovation - product, process, marketing, and organizational – as well as the degree of novelty, considered as "significantly new" to the firm, of the adopted innovation. According to the OSLO Manual (2005, p. 48), "*a product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics*". Product innovations aim at sustaining the loyalty of existing customers in existing markets thanks to novelty and differentiation or taking advantage of market opportunities providing access to new clients. Product innovations can utilize new knowledge or technologies or can be based on new uses or combination of existing knowledge or technologies. *"A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software used to create, produce and provide the new product"* (OSLO Manual, 2005, p. 49). Process innovation can be intended to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products. Production methods involve the techniques, equipment and software used to create and produce goods and services. Delivery methods concern the logistics of the firm and encompass equipment, software and techniques to source inputs, allocate supplies within the firm, or deliver final products. Process innovations also cover new or significantly improved techniques, equipment and software in ancillary support activities, including purchasing, accounting, computing and maintenance.

Many scholars have emphasized that firm's strategic objectives, when adopting product or process innovations, impacted the organizational attributes required for implementing these innovations (Miller and Friesen, 1982; Zahra and Covin, 1993; Zhou et al., 2005; Vaona and Pianta, 2008). Zahra and Covin (1993), investigating the alignment between technology policy and competitive strategy in manufacturing firms operating in 28 mature industries, found out that technology innovations tend to align with competitive strategy in a comprehensible, intuitively meaningful, and often predictable manner. They therefore suggest that technology policy decisions should be evaluated in terms of their collective fit with competitive strategy, rather than as independent decision. Miller and Friesen (1982) assume that an "entrepreneurial" profile will naturally develop product innovation unless the firm sets up structural integration, strict analytical and strategic planning, centralized decision-making and information processing. They also predict that environmental factors have low order positive correlations on product innovation. The opposite is put to the fore with "conservative" firms. This suggests that goals and strategies rather than environment and formal structure are key impetuses for product innovation within "entrepreneurial" firms. Comparatively, influence of market forces, information processing, decision-making and structural processes are key determinants of product innovation adopted by "conservative firms". Zhou et al. (2005) emphasize a difference in adopting product innovation between firms operating in technology or market oriented context. A market orientation and the associated organizational structure facilitates product innovations that use advanced technology and offer greater benefits to mainstream customers (technology-based product innovations), but inhibits innovations that target emerging market segments (market-based product innovations). A technology orientation is beneficial to technology-based innovations but has no impact on market-based innovations. In their investigations on product innovation, Vaona and Pianta (2008) showed evidence of positive and significant relation between a market expansion strategy and technological (product and process) innovation, whatever firm size. They also suggest that a strategy for opening new markets is a key determinant for product innovation, whereas the aims of production flexibility, opening new markets, and investments in innovation-related machinery are positively and significantly associated with process innovation.

According to Narver et al. (2004), a firm should be innovative in its approach to (1) learning about and tracking customer needs; (2) the development of new products or services that address those needs; and (3) the development and implementation of internal processes that enhance customer need understanding and product development. This market orientation can be either responsive, i.e. attempting to understand and to satisfy customer's expressed needs, or proactive, i.e. attempting to understand and satisfy customers' latent needs. Narver et al. (2004) demonstrated that a proactive market orientation is a stronger positive determinant of new-product success than responsive market orientation. In their research on the relationship between strategic management factors and technological innovation in manufacturing SMEs, Becheikh et al. (2006b) empirically predict that strategic management practices - the formal implementation of a formulated competitive strategy - R&D activities, and the number of advanced technologies used in production, are the only variables which significantly influence the likelihood to adopt technological innovations or the degree of novelty of such innovations.

The OSLO Manual (2005, p. 40) states that a "*marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing*". Marketing innovations aim at better addressing customer needs, opening-up new markets, or newly positioning a firm's product on the market, with the objective of increasing the firm's sales. Marketing innovations include significant changes in product design that are related to a new marketing concept. These changes refer to changes in product form and appearance that do not alter the product's functional or user characteristics. They also include changes in product packaging where packaging is the major determinants of the product's appearance. New methods in product placement mainly concerns the introduction of new sales channels here referring to the new ways used to sell goods or services to customers, excluding logistics methods such as transport and storing, which are related to process innovation. New marketing methods of product promotion involve the use of new concepts for promoting goods and services and generating differentiated awareness to existing and new clients. Innovations in pricing concerns the use a new pricing strategies to market the firm's goods and services. Examples of marketing innovations are: yield management techniques in the Tourism industry, new design linked to a new branding, concept stores to build product awareness, can packaging of wine, ready-made vegetable baskets delivered once a week at buyers' workplace…

The question whether different strategic profiles were associated to different types of marketing structure and innovation orientation has been investigated by several researches (Narver et al., 2004; Olson, et al., 2005). Using Miles and Snow strategic profiles, Olson et al. demonstrated that Prospectors' marketing structure had the highest level of innovation orientation and market orientation and was characterized by the lowest levels of cost-efficiency orientation. They favored highly informal and decentralized organization of marketing activities with a proactive market orientation aiming at discovering and satisfying the latent, unstructured needs of customers through observation of customers' behavior to uncover new market opportunities. The marketing teams of Analyzers had a more formal set of policies and guidelines even though, as followers of Prospectors' offerings, rapid decision making by product and market experts were required. Their marketing innovation activities were mainly focused on imitation or incremental innovations and their concern for cost-efficient solutions was high. When analyzing low-cost Defenders, outcomes showed that this strategic posture led to superior performance when marketing innovation activities were structured as moderately informal and highly decentralized and directed to support process innovation, to address the internal/costs orientation of the firm. This was preferable to product innovation in a responsive market orientation aiming at satisfying the expressed needs of existing customers. Top-performing Differentiated Defenders mainly differed from Low-Costs Defenders is the higher level of specialization of marketing teams. These specialists also focused their marketing innovation activities to deliver solutions facilitating process innovation while optimally serving expressed needs of current clients.

"An organizational innovation is the implementation of a new organizational method in the firm's business practices, workplace organization or external relations." (OSLO Manual, 2005, p. 51). Organizational innovations are intended to increase a firm's performance by reducing administrative or transaction costs, improving workplace satisfaction (and thus labor productivity), gaining access to non-tradable assets (such as non-codified external knowledge) or reducing costs of supplies. What distinguishes organizational innovation from other organizational change is the implementation of a new organizational method that has not been used before in the firm or results from management strategic decisions. Innovations in business practices involve the implementation of new methods for organizing the routines and procedures for the conduct of work (new CRM, quality management framework…). Innovations in workplace organization concern the implementation of new methods for distributing responsibilities and decision making among employees for the organization of work within and between firm activities (and organizational units), as well as new concepts for structuring activities such as the integration of different business activities or the structuring of a new value chain. Organizational innovations in a firm's external relations involve new ways of organizing relations with other firms or institutions, such as new types of outsourcing or subcontracting, or new forms of cooperation with external parties (clients,

research units, suppliers …). Examples of organizational innovations are: ERP systems for integrated monitoring of firm's activities, artist production via internet, remote work, best practice communities, lean management techniques, technology transfers from universities …

Research works on organizational innovation, as characterized by the OSLO Manual, mainly refer to it as "administrative" innovation that involves organizational structure and administrative processes (Damanpour, 1991; Han et al., 1998). Even though the term innovation largely refers to technical innovation on new product or processes, technical innovation, as well as marketing innovation, involve not only improvements in process or product-related dimensions but also innovations facilitating the administrative aspects of the organization. Damanpour and Evan (1984) emphasizes that the distinction between administrative and technical innovations is important because they imply potentially different decision-making processes. Whereas technical innovations are related to basic work activities pertaining to the conception, production and delivery of new products or services, administrative innovations are indirectly related to these basic work activities of the firm and more directly related to its management. High formalization and high centralization seems to facilitate administrative innovations and the inverse conditions seem to facilitate technical innovations (Damanpour, 1987).

Still, technological innovation and organizational innovation seem to complement one another. When investigating this complementarity and the diffusion mechanisms of technological and organizational innovation, Ayerbe (2006) underlines this "co-activation" process and emphasizes the "inductive" role of technological innovation and the "supportive" role of organizational innovation. The study of the respective determinants of the two innovation types shows that technological innovation fosters and triggers organizational innovation, whereas organizational innovation even though primarily initiated by strategic reorientations, increase of activity or internal dysfunctions, facilitates and supports new product development or process innovation. Besides, Ayerbe's investigation puts to the fore the importance of strategic technological choices on the evolution of the organizational configuration. These findings support the adaptive cycle approach posited by Miles and Snow (1978, 2003) as a general physiology of organizational behavior where entrepreneurial (strategic posture), engineering (technological choices), and administrative (structure-process and innovation) adaptive issues are intricately related.

Strategy and innovation: configurations and prospects of fit

When investigating the various dimensions of fit from a firm's innovation behavior and strategic posture perspective, scholars have emphasized the need to align technology policy decisions in terms of their collective fit with strategic posture rather than as independent decisions, especially in the resource-constrained context of SMEs (Thornhill, 2006). Indeed, strategic posture seems to moderate the relationship between technology policy and firm effectiveness whereas technology policy's fit with strategic posture is a significant predictor of firm effectiveness. However, innovation effectiveness seems to derive from the proper configuration of strategic attributes, suggesting that differentiated co-alignments of strategic posture attributes should lead to differentiated co-alignments of innovation behavior attributes (Raymond and St-Pierre, 2010a). Although little research has been conducted to extend these investigations to marketing and organizational innovations (Becheikh et al., 2006), there are significant inputs to further investigate in this direction if, as stated by Porter (1996, p. 73) *"strategic fit among many activities is fundamental not only to competitive advantage but also to the sustainability of that advantage. It is harder for a rival to match an array of interlocked activities than it is merely to imitate a particular sales-force approach, match a process technology, or replicate a set of product features"*.

According to Damanpour (1991), the type of organization adopting innovations and their scope are more effective moderators than the type of innovation and the stage of adoption. Hence, organizational performance may depend more on the congruency between innovations of different types than on each type alone (Damanpour and Evan, 1984). Hambrick and McMillan (1985) suggest that a preliminary postulate in choosing appropriate innovation behaviors is to coordinate these choices with a firm's competitive strategy. This coordination (or fit) means that firms should only emphasize innovations that are consistent with the thrust of their strategic orientation (Zahra and Covin, 1994). Many scholars have emphasized the strong relationship between strategic posture and innovation behavior in SMEs (Lefebvre and Lefebvre, 1993; Becheikh et al., 2006a; 2006b; Vaona and Pianta, 2008; Raymond and St-Pierre, 2010a). Achieving and maintaining a distinctive competitive strategy may require differentiated innovative efforts (Lefebvre and Lefebvre, 1993) where different strategic attributes influence different innovation behavior attributes such as the nature (sustained or disruptive), the source (market or technology-based), and the type (product, process, marketing, or organizational) of innovation activities (Blumentritt and Danis, 2006). Cozzarin and Percival (2006, p.209) have also suggested the complementarity of innovation behaviors and outcomes with many organizational strategies, showing that *"to be successful, change must be implemented simultaneously along a number of related [organizational] dimensions. Organizations that adopt only one or two key components of a new organizational paradigm may fail simply by virtue of this complementarity"*. From this perspective, Zahra and Covin (1993, p. 470) emphasize the need to evaluate technology policy decisions in terms of their collective fit with competitive strategy rather than independently. Accordingly, this fit should be considered on a dual dimension addressing fit within strategic posture, i.e. between strategic attributes, as a predictor of organizational effectiveness (Miles and Snow, 1978, 2003; Porter, 1996; Olson et al., 2005) and fit within innovation behavior, i.e. between innovation attributes, as a predictor of innovation effectiveness. Indeed, complementary to organizational fit (Miles and Snow, 1994, Porter, 1996) as a source of sustained competitive advantage, several research works also strengthen the need for innovation fit. Damanpour and Gopalakrishnan (2001) provide positive implications on firm performance in services industry for the synchronous adoption of product and process innovations. Pisano and Wheelwright (1995) argued that the simultaneous development of new products and processes is necessary to the effective launch of new products, the easier marketing of complex products, and faster penetration of new markets. Bantel and Jackson (1989), Zahra and Covin (1994) and Ayerbe (2006) found positive associations between administrative and technical innovations, while Germain (1996) reported positive associations between radical and incremental innovations.

Synthesis

When innovating, firms enter in a "reconfiguration" process that affects all parts of the organization and all aspects of operations, where innovation is a means for achieving the goals of competitive strategy. Competitive strategy and innovation are two related but distinct concepts where strategic posture attributes play a central role as predictors of innovation behavior attributes, without precluding the reverse relationship in the long run (Schroeder, 1990; Zahra and Covin, 1994). Types of technological innovation, either product or process focused, should fit with the objectives of the competitive strategy they support (Miller and Friesen, 1982; Zahra and Covin, 1993; Zhou et al., 2005; Vaona and Pianta, 2008). Marketing innovation also seems strongly influenced by the entrepreneurial orientation of the firm, suggesting that different strategic profiles are associated to different market innovation orientations (Narver et al., 2004; Olson et al., 2005). Strategic posture and innovation behavior attributes seem to be interrelated in alignment patterns where different firm's strategic postures imply potentially different innovation behaviors (Damanpour and Evan, 1984; Han et al., 1998). Similarly to the adaptive process of strategic choices highlighted in Miles and Snow's framework (1978, 2003), innovation behavior attributes seem to complement one another in a "co-activation" process where technological innovation seems to play an inductive role, and where organizational innovation has a supportive influence (Ayerbe, 2006).

4.5. Model development and hypotheses

4.5.1. Model development

From the above discussions, it is clear that, considering the multiple combinations of interrelations between strategic postures, attributes of innovation, and organizational configurations, an investigation on the strategy-innovation relationship requires a clear distinction among strategy typologies, also encompassing associated structure and processes, for a better understanding of innovation behaviors. Many research works on strategy-innovation relationship posit that from an organizational effectiveness perspective, firm's configuration of strategic positioning is a predictor of innovation behavior and that firms adopting different strategic postures should consequently adopt differentiated innovation behaviors (Zahra and Covin, 1993; 1994; Lefebvre and Lefebvre; 1993; Blumentritt and Danis, 2006; Becheikh et al. 2006a, 2006b; Raymond and St-Pierre, 2010a). Thus, studying innovation efforts in manufacturing SMEs, Lefebvre and Lefebvre (1993, p. 304) suggest that "*competitive positioning guides, to a large extent, innovative efforts*". However, the sole configuration perspective of strategy-innovation relationship may hamper the understanding of the causal logic of pairwise relationship between strategic posture attributes and innovation behavior attributes. This may lead to a sole "universalistic" approach of "best practices" of strategy-innovation configurations that all firms should adopt according to their strategic orientation. Consequently, the proper understanding of within and between interrelations of strategic posture and innovation behavior attributes is central for the understanding of organizational determinants of innovation. Indeed, the type of organization is a primary contingency variable of innovation effectiveness, as the variance in environmental opportunities and threats for organizations of different types can influence their degree of innovativeness (Damanpour, 1991, 1996). Organizational performance may in fact depend more on the congruency between different types of innovation attributes than on each type alone (Damanpour and Evan, 1984; Damanpour and Gopalakrishnan, 2001) as it seems that innovation attributes co-activate, with each other and with strategic attributes (Ayerbe, 2006). Exploring the dissemination mode of technological and organizational innovations in SMEs, Ayerbe suggests that organizational innovations stem from strategic reorientations, new business development or internal dysfunctions, and support and facilitate new product or process innovations, which in turn stimulate and generate new organizational innovations.

Miles and Snow's (1978) typology of Prospectors, Defenders and Analyzers, distinguish among different organizational types, each type exemplifying a certain combination of innovation attributes and other contingency factors. However, finer distinctions among the strategic posture attributes of firms pursuing the same competitive strategy would be useful for a better understanding of innovation behavior (Damanpour, 1996). This is particularly critical, from an organizational effectiveness perspective, as hybrid strategic postures of combinations of attributes derived from generic configurations seem to outperform generic types (Spanos et al. 2004; DeSarbo et al., 2005).

A contingency perspective seems therefore also valuable for this research in order to encompass this finer distinction within and between strategic and innovation attributes, as contingency theory posits that the relationship between the relevant independent variable and the dependent variable will be different for different levels of the critical contingency variable (Van de Ven and Drazin, 1985; Venkatraman, 1989; Delery and Doty, 1996). Central to the contingency theory is also the proposition that *"the structure and process of an organization must fit its context (characteristics of the organization's culture, environment, technology, size or tasks) if it is to survive or be effective"* (Drazin and Van de Ven, 1985, p. 515). In the frame of our research, this means that we need to explore how specific innovation behavior attributes will interact and fit with specific strategic posture attributes in a prospect of organizational performance.

Following these insights, this work requires the simultaneous consideration of the multiple and individual characteristics of the strategy and organizational dimensions of innovation. Configuration theories do provide largely developed literature on the interrelations between business-level strategy and organization, assuming that for each strategic posture, there exist an ideal set of organizational characteristics. As previously mentioned, the configuration typologies mostly used by scholars are Porter's framework (1980) of generic strategies consisting in "overall cost leadership", "differentiation" and "focus" using either a cost leadership or differentiation positioning, and Miles and Snow's typology (1978) of "Defenders", "Prospectors", "Analyzers", and "Reactors". Porter posits that the critical issue to generate competitive advantage is the appropriate fit between these generic strategies and market forces driving industry competition. He also concentrates on competitive actions actually implemented by the firm under certain contingencies, rather than the different kinds of actions intended to be taken by the firm considering different strategic postures. Walker and Ruekert (1987) see a major limitation in this approach when trying to explain factors related to successful implementation of strategies because differences between "intended" strategies and "realized" strategies may also be due to ineffective implementation of the intended strategy.

Miles and Snow's typology (1978) overcome at least some of these limitations, as the primary element underlying their typology is the firm's intended rate of product-market change. Indeed, they classify firms according to their strategic intensions and suggest different alignments between structure, processes and management profile, and these strategic intensions. Miles and Snow's framework therefore encapsulates central elements of the strategic choice process, and the resource-based view and dynamic capabilities perspectives developed in the strategic intent approach (Hamel and Prahalad, 1989). They posit that first, organizations are continually trying to adapt to their environment – the adaptive cycle. Second, there are various basic ways to adapt – the organizational typology. Third, in adapting, the firm must seek fit – between strategy and the environment, between strategy and structure. Fourth, strategic intent and managerial philosophy is a critical issue because some managerial philosophies are much more open to adaptation and innovation than others (Ketchen, 2003). Eventually, a key argument for using Miles and Snow's (1978) theory of strategy, structure and process is that significant streams of research present alternative interpretations of their theory that allow it to be interpreted both as a contingency theory (Hambrick, 1983; Zajac and Shortell, 1989) and as a configurational theory (Segev, 1989; Doty et al., 1993).

Of the several strategy classification systems introduced over the past 30 years, the Miles and Snow typology has been supported through extensive theoretical and empirical examination (Hambrick, 1983; Segev, 1987; Shortell and Zajac, 1990). Research has also suggested a general congruence between Miles and Snow's typologies and Porter's cost leadership and differentiation categories (Segev, 1989). Besides, in consistency with the strategic choice process and the resource-based view of competitive advantage, Miles and Snow typology (1978) views the organization as a cohesive system in dynamic interaction with its environment. Segev also emphasizes (1987) the interest of Miles and Snow's model of adaptive cycle in the way that it liaises strategy types and strategy-making. His works show that on average, for any given industry, the level of performance of Defenders, Prospectors and Analyzers is similar. However, a higher level of performance requires a higher level of congruence between the entrepreneurial issue (i.e. the strategic choice of firm's product-market domain), the engineering issue (technological innovation to appropriately implementing strategic choice) and the administrative issue (administrative innovation to support the implementation of strategic choice and optimize the use of resources). In other words, in line with today's configuration view of strategy, a higher organizational effectiveness will be achieved if, depending on the product-market domain in which the firm has decided to be active, it is able to mobilize the appropriate resources, and design them to efficiently implementing the relevant strategic choices related to above mentioned product-market domain.

As above-mentioned, a further interest to use the Miles and Snow's typology is its focus via the adaptive cycle on the relationship between business strategic choices (the entrepreneurial problem) and the congruence with the corresponding operational levels (the engineering and administrative problems). The importance of this congruence has been empirically studied with works on configuration showing the necessity of fit among organizational characteristics as an important predictor of firm performance (Ketchen et al., 1997; Ebben and Johnson, 2005). Focusing on small firms, Ebben and Johnson bring support to this congruence between strategic choices and their organizational implementation showing no significant differences in performance outputs between upstream strategies as long as the congruence is respected.

Although Miles and Snow's framework emphasizes the internal relationship between strategic posture, structure and processes, its generic character ignores industry and environment peculiarities (Hambrick, 1983). They stress that the various strategic profiles would perform equally well as long as strategic posture, structure and processes are properly aligned. This postulate of “systematism” seems inconsistent with the more commonly accepted view that certain contingencies favor certain types of strategy (DeSarbo et al., 2005). In order to encompass both Miles and Snow’s (1978) internal and Porter’s (1980) external focus of competitive strategy, Walker and Ruekert (1987) propose a hybrid model synthesizing the two dimensions. Their approach of hybrid business strategies has been frequently cited in the management literature, and supported in empirical studies (Slater and Olson, 2000, 2001; Olson et al., 2005). Consequently, we have considered in this research the following competitive strategy profiles: Low-Costs Defenders, Differentiated Defenders, Prospectors, and Analyzers. According to Walker and Ruekert (1987, p. 17), “*this hybrid typology defines business strategies in terms of two major dimensions: (1) the unit’s desired rate of new product-market development (consistent with the Prospector, Analyzers, and Defender categories of Miles and Snow) and (2) the unit’s intended method of competing in its core business or established product markets (either through maintaining a low cost position or by differentiating itself by offering higher quality or better service, as suggested by Porter)”*.

Similarly to Walker and Ruekert’s model, Reactor profiles are not studied in this research. Indeed, according to Miles and Snow (1978, 2003), these are unstable organizations that do not possess a set of mechanisms allowing them to design and implement well-defined or consistent approaches to either new product-market development or ways of competing in established markets over time. However, despite Walker and Ruekert’s assumption on Analyzers being an intermediate type between the Prospector strategy at one extreme and the Defender strategies at the other, we allow the emergence of Analyzer profiles, as our research aims at exploring the differentiated pairwise relationship between strategic and innovation attributes. Indeed, Miles and Snow (2003, p. 68) posit that “*the Analyzer is a unique* *combination of the Prospector and Defender types, and it represents a viable alternative to these other strategies".* Therefore, this hybrid form of strategic posture is likely to be adopted by SMEs in view of achieving superior organizational effectiveness to adapt to changing external and internal contingencies (Spanos and Lioukas, 2004; DeSarbo et al., 2005). Hence, we trust that investigating the causal logic of the pairwise relationship between strategic attributes and innovation attributes of Analyzers may provide both theoretical and managerial contribution to the understanding of the specific entrepreneurial and structural determinants of Prospector and Defender postures driving the strategy-innovation co-alignment of Analyzers.

The present study attempts to extend research on the Miles and Snow (1978) and Porter (1980) strategic frameworks to the predictive validity of their strategy typology on innovation behavior by explicitly modeling the relationship between a firm's strategic posture and innovation behavior. In their comprehensive assessment of the reliability and validity of Miles and Snow's strategic types, Shortell and Zajac (1990, p. 829) had already drawn attention to the need for further investigate on this issue, raising questions such as *"What behavior should we expect of Prospectors, Analyzers, and Defenders? Are Prospectors and Analyzers likely to adopt an innovation earlier than Defenders? Does this timing depend on the type of innovation?"*

According to Miles and Snow (1994), successful Prospectors, Defenders or Analyzers are all innovative but in different ways. Prospectors are particularly innovative in developing new technologies and products either by anticipating where the market is going or by shaping the market's direction, while Defenders are innovative in efficiently delivering an existing line of products and services to their customers. Analyzers are innovative in doing both by moving fast as well as efficiently. They operate with a base of established products to which they add carefully chosen new products after having used their process engineering and manufacturing skills to upgrade them and by using their marketing skills to sell them.

Our conceptual model, built on the a priori strategic and organizational characteristics of Miles and Snow's (1978) and Porter's (1980) predefined typologies, leaves possibilities for the emergence of combinations of strategic posture attributes characterizing derived hybrid strategic profiles. Indeed, if we consider that a firm will select a specific strategic type based on its idiosyncratic capabilities and on environment uncertainties, the selected strategic type may not completely fit one of Miles and Snow's and Porter's generic categories. This is specifically true when using Miles and Snow's framework in the context of SMEs, which generally pursue different innovation strategies and use different strategic inputs than large firms to introduce innovations (Cohen and Klepper, 1996; Vaona and Pianta, 2008). Furthermore, complementary works revisiting Miles and Snow's (DeSarbo and al., 2005) and Porter's (Spanos et al., 2004) generic frameworks have shown that derived, hybrid strategic types clearly dominate the traditional typology in terms of organizational effectiveness. In order to identify the differentiated predictive relationship between strategic posture attributes and innovation behavior attributes, while encompassing both contingency and configurational approaches, our model allows the selection of optimal interrelations and typologies to be objectively and empirically determined (DeSarbo et al., 2005). With regard to here above literature review and discussion, we can depict our overall approach of alignment patterns between strategic posture and innovation behavior in a composite model as illustrated in the conceptual framework described in Figure 8.

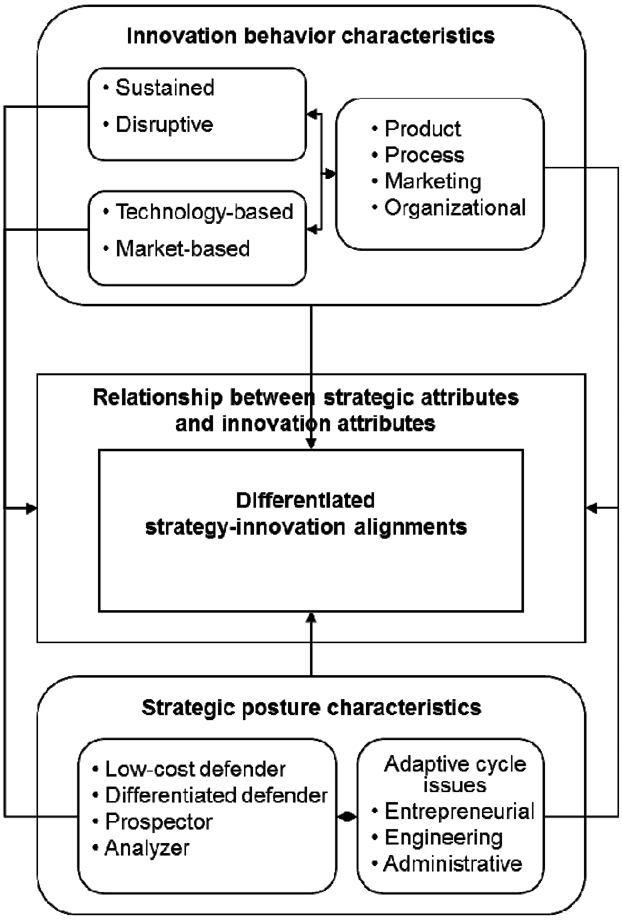


Figure 8: Relationship between strategic posture and innovation behavior.

4.5.2. Hypotheses

Miles and Snow (1978) describe four types of organizations that represent alternative ways of moving through the adaptive cycle of Entrepreneurial, Engineering, and Administrative choices. Their framework of strategic types characterizes the firm's intended rate of internal change of strategic posture, i.e. of innovation (Grant, 1991). Three of these strategic types, - The Defender, the Analyzers, and the Prospector – are "stable" forms of organization. Consequently, when a firm pursues one of these strategies, and designs the organization accordingly, then the firm may generate sustainable competitive advantage in its particular industry. Contrarily, if the firm does not design its organizational configuration according to the pursued strategy, then it will be slow to respond to opportunities and is unlikely to generate sustainable competitive advantage in its industry.

Miles and Snow (1994) posit that successful Prospectors, Defenders or Analyzers are all innovative but in different ways and adapt their innovation behavior alongside the adaptive cycle (see Figure 9). Prospectors are particularly innovative in developing new technologies and products by either anticipating or shaping the market’s direction, while Defenders are innovative in efficiently delivering an existing line of products and services to their customers. Analyzers are innovative in doing both by moving fast as well as efficiently.

What characterizes the innovation behavior of Defenders, Prospectors and Analyzers, as defined by Miles and Snow (1994), is the permanent search for and maintenance of fit as a source of sustainable competitive advantage - strategic fit between the organization and its environment and internal fit among strategy, structure, and management processes. The adaptive cycle process emphasizes that firms should perpetually cycling through sets of decisions to achieve this fit on the three dimensions of the cycle. Accordingly, a firm that makes decisions in the entrepreneurial domain in the direction of being a Prospector will, make Prospector-oriented decisions in the engineering domain, and then in the administrative domain, then even more so again in the entrepreneurial domain, and so on. With enough cycles and permanently increased external and internal fit, a given firm will become a good, comprehensively aligned and stable, Prospector, Analyzer, or Defender. If the firm fails in the fit between strategic posture and innovation behavior in this perpetual adaptive process, it will be an incongruent, unstable and poor performing Reactor (Hambrick, 2003). Through this adaptive cycle approach, Miles and Snow (2003) posit that a given entrepreneurial choice requires the choice of a specific combination of technologies and capabilities, which in turn influences the design of aligned organizational structure and administrative processes.

Eventually, the choice of structure and process to fit technology influences future entrepreneurial posture.

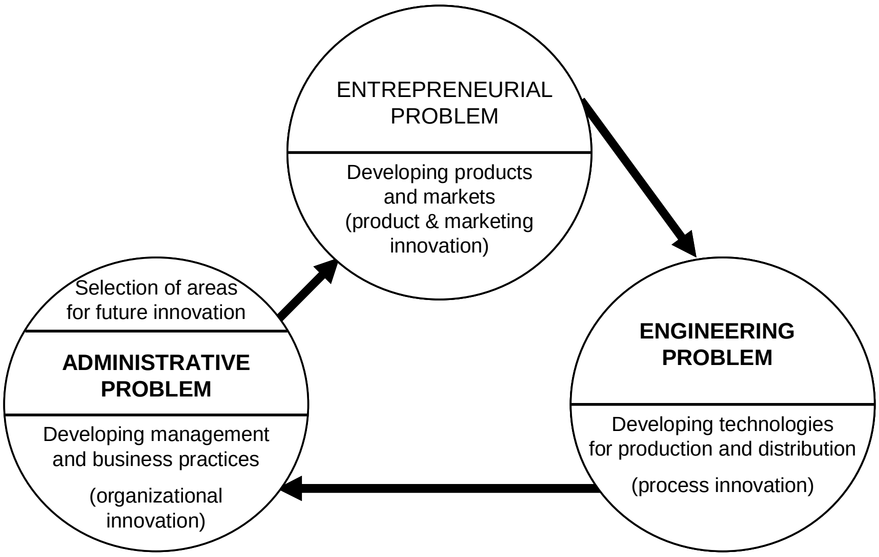


Figure 9: The adaptive cycle of innovation. Source: L. Raymond, J. Saint-Pierre (2010), adapted from Miles and Snow (1978)

Scholars of the strategic choice approach have emphasized the relationship between strategic posture and innovation attributes as a conditional predictor of organizational effectiveness, where innovation is viewed as one of the significant determinants for a firm to achieve the goals of competitive strategy (Hambrick, 1983; Kotabe, 1990). Indeed, the strategic choice approach suggests that innovation is significantly correlated to firm financial performance (Kotabe, 1990), while also putting to the fore differentiated types and sources of innovation associated with differentiated performance (Damanpour et al., 1989). However, Zahra and Covin (1994, p. 193) posit that *"the strength and direction of these associations will be contingent upon the competitive strategy employed"*. They strengthen Schroeder's assumption (1990, p. 38) that *"an innovation is deployed differently by firms in various strategic groups, and adapted to provide benefits which support specific strategic posture"*.

Using successively Porter's and Miles and Snow's frameworks of strategic posture, Zahra and Covin (1993, 1994) suggest that different strategic attributes are consequently associated with different innovation attributes from a performance perspective. Investigating the relationship between product innovation and different strategic postures as gestalts, Raymond and St-Pierre (2010) also highlight the differentiated influence of different strategic configurations on innovation performance. Besides, as co-alignment between strategic attributes and innovation attributes seems conditional to organizational effectiveness, theorists of configurations have also emphasized internal consistency within strategic posture attributes (Miles and Snow, 1978, 2003; Miller, 1996; Porter, 1996) and within innovation behavior attributes (Damanpour and Evan, 1984; Zahra and Covin, 1994; Damanpour and Gopalakrishnan, 2001).

Although the strategic choice perspective emphasizes the centrality of strategy as a "predictor" of a firm's innovation behavior (Hambrick, 1983; Kotabe, 1990; Zahra and Covin, 1993; 1994), insights from other investigations and exploration suggest the reverse relationship as well (Schroeder, 1990; Hamel, 1998; Miles and Snow, 2003; Ketchen, 2003). This puts to the fore innovation as a "business model" influencing strategic choices (Hamel, 1998). Investigating the impact of process innovation upon competitive strategies, Schroeder (1990, p. 38) sees *"a firm's response to the changing competitive environment created by an innovation as the determinant of the innovation being an opportunity or a threat"*. Hence, an innovation can significantly affect the competitive strategic posture of a firm.

Emphasizing the use of the "adaptive cycle" as a dynamic classification for adaptive responses (entrepreneurial, technological, and administrative) of firms to their competitive environment, Miles and Snow (2003) suggest that entrepreneurial, technological, and administrative choices strongly interrelate, and that today's adaptive choices tend to constrain tomorrow's structure and entrepreneurial choices. Complementarily, scholars of entrepreneurial orientation and innovation (Rausch et al., 2009; Perez-Luno, 2011) suggest that both entrepreneurial orientation and innovation practices are stable and enduring characteristics of a firm. Strategic posture can then be considered a relevant predictor of innovation behavior with regard to the natures (disruptive or sustained), the sources (technology or market-based) and the activities (process, product, marketing or organizational) of innovation. Miles and Snow (Ketchen, 2003, p. 99) also point out that *"both Prospectors and Defenders are "path dependent" and are likely to engage in only limited search for new alternatives"*, thus suggesting that, providing there is a consistent strategy-structure relationship, innovation behavior is likely to impact a firm's strategic posture. The managerial implications of this strategy-innovation coactivation reemphasize the need to consistently aligning strategic posture and innovation behavior. Further to their research on associations between the strategy and innovation variables, Zahra and Covin (1994) call for complementary investigations to explore the causal mechanisms underlying the role of strategy as predictor of a firm's innovation behavior. The present research attempts to contribute to this exploration as well as to understand the overall causal logic of the coactivation process between strategy and innovation attributes.

Thus, we suggest testing, at each strategic choice's level of Miles and Snow's adaptive cycle, the following proposition:

The different strategic posture characteristics characterizing the adaptive choices of Low-Cost Defenders, Differentiated Defenders, Prospectors and Analyzers correlate with differentiated characteristics of innovation behavior.

Building on this proposition, we will propose a line of arguments predicting the relationship between strategic posture and innovation behavior. We will structure this hypothesis development according to the three studied dimensions of innovation behavior, namely the natures, the sources, and the activities of innovation.

The strategic posture of Defenders as defined by Miles and Snow and the entrepreneurial problem they have to solve in order to *"seal off" a portion of the total market to create a stable set of products and customers"* (2003, p. 48), is characterized by the selection and the aggressive protection through competitive pricing (Low-Cost Defenders) and/or superior customer service (Differentiated Defenders) of a narrow and stable product-market domain, a tendency to focus on new product development only related to current goods or services, while ignoring developments outside domain, and a cautious and incremental growth through market penetration. Defenders favor continuous improvements in technology to maintain overall efficiency. Zahra and Covin (1993) also suggest that a price competitiveness or a superior customer service-brand loyalty orientation is positively associated with a strong technological orientation. The R&D attributes of this orientation have been investigated by Langerak et al. (1999, p. 215) showing that *"R&D departments of Defenders ignore industry changes that have no direct influence on their operations and appear to emphasize R&D capabilities that are focused on achieving cost reductions"*. In so doing, Defenders tend to emphasize improvement of technological processes for new product development. Moreover, Lüthje and Herstatt (2004) report that when there is low heterogeneity of clients' needs on a market, innovations tend to be driven by the willingness of manufacturers to spread their technological development costs to a mainstream of users sharing the same needs. Consequently, Defenders tend to develop innovations requiring a low understanding of heterogeneous needs from various typologies of clients but a high understanding of technologies required to serve efficiently homogeneous needs of a known typology of users i.e., technology-based innovations. Concerning firm's innovativeness, scholars (Tushman and Romanelli, 1985; Koberg et al., 2003) brought significant insights to the fact that the degree of novelty of innovation was increased by the degree of uncertainty of the environment. Other works (Amara and Landry; 2005) show that the existence of "strong ties" such as the ones linking a firm only to the clients or suppliers of its specific product-market domain hamper the firm's ability to take advantage of new market opportunities, as would Prospectors do. The Defender configuration is supported by strong, controlled, vertical and formalized management systems, with a production and finance-oriented dominant coalition required to promote maximum efficiency and technological specialization (Miles and Snow, 1978, 1994). Olson et al. (2005) suggest that this formal organization and cost-control orientation is associated to both Low-Cost and Differentiated Defenders.

Miles and Snow (1978) define the entrepreneurial problem of Prospectors as the permanent search for locating and exploiting new product and market opportunities in broad and continuously developing domains. They are characterized by continuous intelligence of wide range of environmental conditions and events, and a growth supported by product and market development that can occur in spurts and may create change in the industry. Prospectors rely on flexibility of technological processes, multiple technologies, R&D activities emphasizing product design and market research, and low degree of routinization supported by decentralized control and horizontal information systems favoring a product R&D and marketing dominant coalition (Miles and Snow, 1978, 1994, 2003). Prospectors also tend to emphasize R&D capabilities of scanning and networking with users to identify customer needs, monitoring market developments and interfunctional collaboration. The market orientation of their R&D team is therefore primarily externally, rather than internally motivated (Langerak et al., 1999) and generates innovations that substantially differ from existing market offers (Lüthje and Herstatt, 2004). Consequently, the high uncertainty of their product-market domain, should lead Prospectors to emphasize both technology and market-based innovation. Indeed such a dual orientation will lead to new products that will perform better and which the firm will market easier (Gatignon and Xuereb, 1997). According to Miles and Snow, (2003, p. 59) *"The variability in the Prospector's product-market mix is* *reflected in the organization's technology which must be flexible enough to accommodate changing domains"*. Their organizational configuration therefore facilitates the development of "weak ties" linking the firm to the many different categories of sources of technology and market information likely to enable Prospectors introducing innovations with a high degree of novelty (Amara and Landry, 2005). As suggested by works on complexity theory (Tushman and Romanelli, 1985; Koberg et al., 2003), the broad and continuously developing product-market domains chosen by Prospectors stimulate this high level of innovativeness.

The key to success for Analyzers is to quickly bring out either improved or less expensive versions of products that Prospectors introduced while defending core markets and products (Olson et al., 2005). This dual demand is made possible with well-structured marketing activities required to perform complex tasks while minimizing resources commitments (Vorhies and Morgan, 2003). As creative imitators, Analyzers emphasize the importance of R&D capabilities regarding market sensing, customer linking through close interfunctional coordination and technology monitoring (Day, 1994). As a result, Analyzers grow through continuous market penetration as well as permanent search for differentiation through improved products or services and market development emphasizing both efficiency on core stable product-market domains as well as flexibility in order to be fast followers of Prospectors (Miles and Snow, 2003). "*Consequently, Analyzers must maintain a continuous dialogue with customers to assess the shortcomings of pioneer offerings and thus identify opportunities for themselves. Furthermore, they must monitor constantly the activities of their competitors to ascertain their competitors' success and failures"* (Langerak et al., 1999, p. 215). Such firms emphasize operational excellence with continuous inputs of new ideas and improvements from inside or outside the organization that can be implemented immediately to serve as a basis for bigger potential ideas (Moss Kanter, 2010).

Thus, we predict the following relationship between strategic posture and the natures (Hypotheses 1 and 2), and the sources (Hypotheses 3 and 4) of innovation:

Hypothesis 1: The propensity to adopt a behavior of sustained innovation is positively related to the degree of stability of product-market domain (a), of cost-control orientation (b), of scope of product-market domain (c), of differentiation orientation (d), of search for process efficiency (e), of search for cost reduction (f), of search for product (g) and market (h) novelty, of production productivity (i), of formal administration (j)

Table 6 synthetizes the strategic posture-sustained innovation relationship and shows that there are consistent combinations of strategic posture characteristics in relation to the propensity to adopt sustained innovation behavior. These consistent combinations correspond to specific strategic postures namely Low-Cost Defenders, Differentiated Defenders, Prospectors and Analyzers.

Table 6: Hypothesis 1 (summary): Positive impact of strategic posture on the propensity to sustained innovation

Strategic Posture	Low-Cost Defender	Differentiated Defender	Prospector	Analyzer
Differentiation orientation		X (H1d)	X (H1d)	X (H1d)
Scope of product-market domain			X (H1c)	X (H1c)
Cost-control orientation	X (H1b)	X (H1b)		X (H1b)
Stability of product-market domain	X (H1a)	X (H1a)		X (H1a)
R&D Process	X (H1e)	X (H1e)		X (H1e)
R&D Market			X (H1h)	X (H1h)
R&D Product		X (H1g)	X (H1g)	X (H1g)
R&D Costs	X (H1f)			
Production Flexibility				
Production Productivity	X (H1i)			X (H1i)
Formal administration	X (H1j)	X (H1j)		X (H1j)
Flexible administration				

Hypothesis 2: The propensity to adopt a behavior of disruptive innovation is positively related to the degree of differentiation orientation (a), of scope of product-market domain (b), of search for product (c) and market (d) novelty, of flexible administration (e)

Table 7 synthetizes the strategic posture-disruptive innovation relationship and shows that there are consistent combinations of strategic posture characteristics in relation to the propensity to adopt a disruptive innovation behavior. These consistent combinations correspond to specific strategic postures namely Prospectors.

Table 7: Hypothesis 2 (summary): Positive impact of strategic posture on the propensity to disruptive innovation

Strategic Posture	Low-Cost Defender	Differentiated Defender	Prospector	Analyzer
Differentiation orientation			X (H2a)	
Scope of product-market domain			X (H2b)	
Cost-control orientation				
Stability of product-market domain				
R&D Process				
R&D Market			X (H2d)	
R&D Product			X (H2c)	
R&D Costs				
Production Flexibility				
Production Productivity				
Formal administration				
Flexible administration			X (H2e)	

Hypothesis 3: The propensity to adopt a behavior of technology-based innovation is positively related to the degree of stability of product-market domain (a), of cost-control orientation (b), of scope of product-market domain (c), of differentiation orientation (d), of search for process efficiency (e), of search for cost reduction (f), of search for product (g) and market (h) novelty, of production productivity (i) or flexibility (j), of formal administration (k), of flexible administration (l)

Table 8 synthetizes the strategic posture-technology-based innovation relationship and shows that there are consistent combinations of strategic posture characteristics in relation to the propensity to adopt a technology-based innovation behavior. These consistent combinations correspond to specific strategic postures namely Low-Cost Defenders, Differentiated Defenders, Prospectors, and Analyzers.

Table 8: Hypothesis 3 (summary): Positive impact of strategic posture on the propensity to technology-based innovation

Strategic Posture	Low-Cost Defender	Differentiated Defender	Prospector	Analyzer
Differentiation orientation		X (H3d)	X (H3d)	
Scope of product-market domain			X (H3c)	
Cost-control orientation	X (H3b)	X (H3b)		X (H3b)
Stability of product-market domain	X (H3a)	X (H3a)		X (H3a)
R&D Process	X (H3e)	X (H3e)		X (H3e)
R&D Market			X (H3h)	
R&D Product		X (H3g)	X (H3g)	
R&D Costs	X (H3f)			
Production Flexibility			X (H3j)	
Production Productivity	X (H3i)			X (H3i)
Formal administration	X (H3k)	X (H3k)		X (H3k)
Flexible administration			X (H3l)	

Hypothesis 4: The propensity to adopt a behavior of market-based innovation is positively related to the degree of scope of product-market domain (a), of differentiation orientation (b), of search for process efficiency (c), of search for product (d) and market (e) novelty, of production flexibility (f), of flexible administration (g)

Table 9 synthetizes the strategic posture-market-based innovation relationship and shows that there are consistent combinations of strategic posture characteristics in relation to the propensity to adopt a market-based innovation behavior. These consistent combinations correspond to specific strategic postures namely Prospectors and Analyzers.

Table 9: Hypothesis 4 (summary): Positive impact of strategic posture on the propensity to market-based innovation

Strategic Posture	Low-Cost Defender	Differentiated Defender	Prospector	Analyzer
Differentiation orientation			X (H4b)	X (H4b)
Scope of product-market domain			X (H4a)	X (H4a)
Cost-control orientation				
Stability of product-market domain				
R&D Process				X (H4c)
R&D Market			X (H4e)	X (H4e)
R&D Product			X (H4d)	X (H4d)
R&D Costs				
Production Flexibility			X (H4f)	X (H4f)
Production Productivity				
Formal administration				
Flexible administration			X (H4g)	X (H4g)

A low-Costs orientation, as posited by Porter (1998), emphasizes the pursuit of productivity through cost reductions, from experience, tight cost and overhead control, and cost minimizations in areas like R&D, service, sales force, and advertising. Zahra and Covin (1993) also suggest that a cost-leadership orientation is, from a financial performance perspective, positively associated with new process development and automation. Studying the innovation orientation of best performers among Low-Cost Defenders, Olson et al. (2005) suggest that efforts at process innovation should be specifically supported. Differentiated

Defenders differ from their Low-Cost counterparts by their focus on retaining customers through attention to superior service, product quality and novelty, or image (Olson et al., 2005). Consequently, they place a continuous emphasis on customer-oriented innovations and innovative behaviors directed to mainstream clients (high product quality, product and service engineering, selective distribution, superior customer service and relationships) likely to develop corporate reputation for quality or technological leadership and increase brand loyalty as a barrier to entry (Porter, 1980, 1985, 1991, 1998) without neglecting cost-related issues (Slater and Olson, 2001). Zahra and Covin (1994) also strengthen that Defenders should generally develop process innovation behaviors. Cho and Pucik (2005) provide support in this direction suggesting that a quality orientation leverages the overall innovativeness of a firm and through innovativeness fosters market penetration.

Due to the high uncertainty of their product-market domains, Prospectors have to identify users searching for innovative technological and marketing solutions to their unmet needs as a source of market related knowledge (Lettl, 2007). In so doing, Prospectors tend to develop product and marketing innovations to serve the needs of these lead-users, i.e. early-adopter clients, before these needs are shared by the majority of the customers in the market segment (von Hippel, 1986, 1988; Lüthje and Herstatt, 2004). As above mentioned, due to the wide scope of their product-market domain orientation, Prospectors need to develop capabilities to leverage R&D collaborations with other organizational functions in order to effectively exploit new product or market opportunities (Miles and Snow, 1978; Langerak et al., 1999). Miller and Friesen (1982) have also assumed that an “entrepreneurial” profile will naturally develop product innovation unless the firm sets up structural integration, strict analytical and strategic planning, centralized decision-making and information processing, as would Defenders do. Other researches also support the idea that an organization innovativeness and creativity is facilitated by interactions across work-groups, departments, and other discrete subgroups (Kanter, 1988; Perry-Smith and Shalley, 2003).

The pursuit of organizational effectiveness enables Analyzers to being fast followers of Prospectors. They operate with a base of established products to which they add carefully chosen new products. Analyzers typically do not originate these products but use their process engineering and manufacturing skills to make a new product even better adapted to market needs, and deploy their well-structured marketing skills to sell it (Miles and Snow, 1994; Vorhies and Morgan, 2003). Analyzers also tend to leverage their process and product R&D capabilities by forming or participating in strategic alliances (Langerak et al., 1999). As they must operate and maintain a more complex administrative structure based on productivity and efficiency as well as flexibility and effectiveness (Miles and Snow, 2003), Analyzers also develop new organizational configurations able to support structural conflict. In such configurations, *"…formulating procedures for a new product's timely introduction by minimizing costs and by handling any adverse consequences that may arise as a result of incorporating the new product into the system"* (Miles and Snow, 2003, pp. 77) is a critical issue. Indeed organizational and technological innovations co-activate one-another in a process where organizational innovation facilitates and supports new technological developments whereas technological innovation induces organizational innovativeness (Ayerbe, 2006).

Thus, we predict the following relationship between strategic posture and the activities of innovation (Hypotheses 5, 6, 7, and 8):

Hypothesis 5: The propensity to adopt a behavior of process innovation is positively related to the degree of cost-control orientation (a), of differentiation orientation (b), of search for process efficiency (c), of search for cost reduction (d), of production productivity (e), of formal administration (f)

Table 10 synthetizes the strategic posture-process innovation relationship and shows that there are consistent combinations of strategic posture characteristics in relation to the propensity to adopt a process innovation behavior. These combinations correspond to specific strategic postures namely Low-Cost Defenders, Differentiated Defenders, and Analyzers.

Table 10: Hypothesis 5 (summary): Positive impact of strategic posture on the propensity to process innovation

Strategic Posture	Low-Cost Defender	Differentiated Defender	Prospector	Analyzer
Differentiation orientation		X (H5b)		
Scope of product-market domain				
Cost-control orientation	X (H5a)			X (H5a)
Stability of product-market domain				
R&D Process	X (H5c)	X (H5c)		X (H5c)
R&D Market				
R&D Product				
R&D Costs	X (H5d)			
Production Flexibility				
Production Productivity	X (H5e)			X (H5e)
Formal administration	X (H5f)	X (H5f)		X (H5f)
Flexible administration				

Hypothesis 6: The propensity to adopt a behavior of product innovation is positively related to the degree of differentiation orientation (a), of search for product novelty (b), of flexible administration (c)

Table 11 synthetizes the strategic posture-product innovation relationship and shows that there are consistent combinations of strategic posture characteristics in relation to the propensity to adopt a product innovation behavior. These consistent combinations correspond to specific strategic postures namely Differentiated Defenders, Prospectors, and Analyzers.

Table 11: Hypothesis 6 (summary): Positive impact of strategic posture on the propensity to product innovation

Strategic Posture	Low-Cost Defender	Differentiated Defender	Prospector	Analyzer
Differentiation orientation		X (H6a)	X (H6a)	X (H6a)
Scope of product-market domain				
Cost-control orientation				
Stability of product-market domain				
R&D Process				
R&D Market				
R&D Product		X (H6b)	X (H6b)	X (H6b)
R&D Costs				
Production Flexibility				
Production Productivity				
Formal administration				
Flexible administration			X (H6c)	X (H6c)

Hypothesis 7: The propensity to adopt a marketing innovation behavior is positively related to the degree of differentiation orientation (a), of scope of product-market domain (b), of search for process efficiency (c), of search for product (d) and market (e) novelty, of flexible administration (f)

Table 12 synthetizes the strategic posture-marketing innovation relationship and shows that there are consistent combinations of strategic posture characteristics in relation to the propensity to adopt a marketing innovation behavior. These combinations correspond to specific strategic postures namely Differentiated Defenders, Prospectors, and Analyzers.

Table 12: Hypothesis 7 (summary): Positive impact of strategic posture on the propensity to marketing innovation

Strategic Posture	Low-Cost Defender	Differentiated Defender	Prospector	Analyzer
Differentiation orientation		X (H7a)		X (H7a)
Scope of product-market domain			X (H7b)	X (H7b)
Cost-control orientation				
Stability of product-market domain				
R&D Process		X (H7c)		X (H7c)
R&D Market			X (H7e)	X (H7e)
R&D Product		X (H7d)	X (H7d)	X (H7d)
R&D Costs				
Production Flexibility				
Production Productivity				
Formal administration				
Flexible administration			X (H7f)	X (H7f)

Hypothesis 8: The propensity to adopt an organizational innovation behavior is positively related to the degree of production flexibility (a), of production productivity (b), of formal administration (c), of flexible administration (d)

Table 13 synthetizes the strategic posture-organizational innovation relationship and shows that there are consistent combinations of strategic posture characteristics in relation to the propensity to adopt an organizational innovation behavior. These consistent combinations correspond to specific strategic postures namely Prospectors and Analyzers.

Table 13: Hypothesis 8 (summary): Positive impact of strategic posture on the propensity to organizational innovation

Strategic Posture	Low-Cost Defender	Differentiated Defender	Prospector	Analyzer
Differentiation orientation				
Scope of product-market domain				
Cost-control orientation				
Stability of product-market domain				
R&D Process				
R&D Market				
R&D Product				
R&D Costs				
Production Flexibility			X (H8a)	X (H8a)
Production Productivity				X (H8b)
Formal administration				X (H8c)
Flexible administration			X (H8d)	X (H8d)

Table 14 synthesizes our hypotheses on the predictive relationship between strategic choices throughout the adaptive cycle (Miles and Snow, 1978, 2003) and the studied dimensions of innovation behavior namely the natures, the sources, and the activities of innovation. It shows the differentiated combinations of relationship between strategic posture characteristics and innovation behavior characteristics.

Table 14: Synthesis of hypotheses

Hypotheses Assumptions			Strategic Posture Characteristics			
			Low-Cost Defender (Costs control, Stability of product-market domain, Process R&D, Cost R&D, Production Productivity, Formal administration)	Differentiated Defender (Differentiation, Costs control, Stability of product-market domain, , Process R&D, Product R&D, Formal administration)	Prospector (Differentiation, Scope of product-market domain, Market R&D, Product R&D, Production Flexibility, Flexible administration)	Analyzers (Differentiation, , Scope of product-market-domain, Costs control, Stability of product-market domain, Process R&D, Market R&D, Product R&D, Production Flexibility & Productivity, Formal and Flexible administration)
Innovation Behavior Characteristics	Nature of Innovation	Sustained	X	X	X	X
		Disruptive			X	
	Source of Innovation	Technology-based	X	X	X	X
		Market-based			X	X
	Activity of innovation	Process	X	X		X
		Product		X	X	X
		Marketing		X	X	X
		Organizational			X	X

4.6. Methodology

4.6.1. Sample and data collection

Design of research sample

Considering the specificity of our exploratory research, the selection of our sample required a particular approach. We first selected independent SMEs, as a condition to investigate strategy-innovation alignments resulting from a firm's internal decision, independently from any corporate parent-company influences or considerations. Secondly, our focus on single firms necessitated an inter-industry sample large enough to ensure the conditions for a generalization of our results. Thirdly, for the classification of firms in terms of size and industry, we followed the "Guidelines for collecting and interpreting innovation data" of the

3rd edition of the Oslo Manual (OECD/European Communities, 2005). Manufacturing industries were classified according to their ISIC class, characterizing the principal activity or range of activities of the firm (ISIC Rev. 3.1, UN, 2002). We targeted firms above 10 employees and we fixed the upper limit of firm size to 250 employees with maximum revenue of 50 million Euros according to the definition of SMEs given by the European Union (European Commission, 2003). This upper limit for size seemed relevant considering the size structure of French manufacturing firms. Indeed, Bartelsman et al. (2003) study reports an average size of French manufacturing SMEs of 32 employees and firms with fewer than 20 employees accounting for 73,6%. Our sample included firms belonging to the manufacturing sectors as classified in the French classification edited by the INSEE, Institut National de la Statistique et des Etudes Economiques (French Institute for Statistics and Economic Studies). Data were collected through a structured on-line questionnaire completed by firms' CEO.

The questionnaires were e-mailed and completed by firms clearly identified and qualified in the database of the network of French Chambers of Commerce and Industry. French Chambers of Commerce and Industry have supported this investigation as they have highlightened the deployment of innovation management practices within SMEs as one of their strategic mission. In most regions, the CCIs have consequently joined the Regional Innovation Networks, focusing on SMEs development and management of innovation. Therefore, the Chambers of Commerce and Industry of Nice, Grenoble, Lyon, Toulouse, Marseille and Paris supported this research and contributed to this work by thoroughly qualifying the relevant manufacturing SMEs targeted for our works operating on their territory. The research was also supported by the network of local unions for Industries of Metallurgy (UIMM – Union des Industries et des Métiers de la Métallurgie).

We proceeded as follows for the collection of data. We first tested the a priori design of our research questionnaire during face-to-face interviews with CEOs from four manufacturing

SMEs. This was followed by pre-testing the validity of our constructs on 32 manufacturing SMEs. After this final test, we prepared a model of official letter to be e-mailed to the targeted SMEs. This letter explained the purpose of the research and the expected managerial outputs for SMEs development. This letter was e-mailed to the personal e-mail address of CEOs, assuring anonymity, in order for the respondents to directly fill-in the research questionnaire by clicking on a link included in the letter. This self-typing approach is a common practice in strategy research.

Econometric tools

Considering the objective of the research, we proceeded in a step-by-step process to investigate the relationship between strategic and innovation attributes. We first validated the existence of strategic constructs using Factor Analysis and Principal Component Analysis. The same process was conducted for the validation of innovation constructs. Then, we performed clustering of firms based on our strategic constructs. The clustering was completed with Analysis of Variance to assess differences in the means of strategic postures. We also investigated pairwise correlations between strategic constructs and conducted regressions between strategic posture constructs to investigate the adaptive cycle dynamics on our sample. We did the same with innovation constructs to similarly investigate the coactivation dynamics between innovation behavior attributes.

A second step consisted in testing our hypotheses by assessing the respective relationship between strategic attributes and innovation attributes using regression analysis. At each of these steps, we controlled for firm's size, firm's industry sector, firm's R&D intensity, firm's turnover, and firm's age (see 4.6.4. Controls). A third step consisted in conducting Analysis of Variance to validate the differentiated alignments between our empirically-derived strategic posture profiles and innovation behavior attributes.

Sample size

Considering the responding rate of 15% completed questionnaires on our 32 pre-test sample of 214 well qualified SMEs (i.e., with personal e-mail address of CEOs), using the same on-line questioning process, we sent a total of more than 3000 emails to be on the safe side of getting 200 targeted completed questionnaires. We conducted three e-mails campaigns in March 2011, with the support of local stakeholders of economic development and above-mentioned French Chambers of Commerce and Industry. We eventually collected 238 questionnaires of which 179 were complete. The reason for uncompleteness was measured to eliminate any source of bias within the sample. A random sample of 20 firms who had not completed the questionnaire was contacted by phone. This 75.2% rate of complete questionnaire can be explained by (a) the length of the questionnaire made of 97 questions, also including questions on the firm's environment, strategic capabilities and performance, and (b) the reluctance to divulge information. The length of the questionnaire was mainly due to the fact that we did not directed respondents to position themselves according to predefined strategic profiles. On the opposite, for the purpose of our investigation emphasizing relationship between strategic and innovation attributes of manufacturing SMEs, we enabled hybrid strategic profiles to emerge from empirical results as this empirically-derived strategic types tend to provide a more accurate representation of strategic behavior (Spanos et al., 2004; DeSarbo et al., 2005). For the purpose of this specific research, only data on strategic posture, innovation behavior and above mentioned control variables are considered. Tables 1.1 to 1.5, in appendix 1.1, describe the distribution of responding firms according to control variables.

4.6.2. Measurement of constructs

The research questionnaire was designed as a basis for collecting data regarding the attributes characterizing a firm's competitive strategic posture and the associated attributes characterizing the firm's innovation behavior.

The competitive strategic posture was measured using multiple-item 7-point Likert scales to assess the strategic orientation of the firm as defined in Miles and Snow (1978) typology. The items were inspired by Conant et al. (1990), Hornsby et al. (2002), as well as from our own transformation into descriptive sentences of Miles and Snow's Table (1994, p. 13) of "Business Strategies and Organizational Characteristics" defining the Entrepreneurial, Engineering and Administrative dimensions of their Adaptive Cycle. These items reflect the central distinction between Defenders, Prospectors and Analyzers strategic profiles. Items on the dimensions of the organizational characteristics of Porter's (1998, p. 41) low-cost leadership or differentiation orientations were included in each set of items measuring each dimension of the Adaptive Cycle. We thus expected to enable the emergence of stable forms of strategic profiles characterized as Low-Cost Defenders, Differentiated Defenders, Prospectors, and Analyzers (Miles and Snow, 1978; Walker and Ruekert, 1987).

We used a self-typing approach whereby firms' CEOs responded to survey items designed to describe the fundamental distinctions between strategic postures in terms of "product-market strategy", "research and development", "production", organizational structure", "control process", and "planning process". We chose this "step by step", continuum approach instead of a method consisting of each respondent CEO reading paragraphs describing each strategic posture and indicating the one that best describes their company (McKee, Varadarajan, and Pride, 1989). Indeed, limitations to this "profile description" process could be that respondents may respond to what would be their ideal description of the strategic posture rather than the authentic one. Studies have anyhow demonstrated the validity of this method by proving that CEOs classify themselves in a similar way whatever the method used (Shortel and Zajac, 1990; Vazquez et al., 2001).

The innovation construct was measured with items evaluating the natures (sustained or disruptive), the sources (market-based, i.e. based on opportunities arising from market inputs, or technology-based, i.e. opportunities arising from technological inputs), and the type of activities of innovation either technological (product or process), marketing or organizational, as described in the third version of the OSLO manual (OECD, 2005). Considering the market or technology basis of innovation, we sourced the measuring items in Zhou et al.'s approach (2005).

4.6.3. Validation of proposed constructs

Considering that we enabled in our model the emergence of hybrid strategic profiles derived from Miles and Snow (2003) and Porter (1998) frameworks, the validation of strategic posture constructs is particularly relevant and involved a two-step process. The first step was conducted to evaluate the *content validity* of our constructs. This required identifying groups of measurement items representative of strategic attributes characterizing both the strategic issues of Miles and Snow's adaptive cycle and Porter's competitive positioning choices. The second step, *construct reliability,* was conducted to validate to which extent the empirical indicators provide a reliable measure of the construct.

Content validity of constructs

As previously stated, the scales employed to measure strategic posture characteristics in this research have been adopted from existing and validated scales used in the literature (Conant et al., 1990; Hornsby et al., 2002), completed with our own transformation into descriptive sentences of Miles and Snow's Table (1994, p. 13) of business strategies and organizational characteristics defining the various dimensions of their adaptive cycle. The strategic orientation and organizational characteristics of Porter's (1998, p. 41) generic strategies were also included into each set of items measuring each dimension of Miles and Snow's adaptive cycle.

Following factor analysis, differentiated strategic constructs were identified, qualifying each dimension of the adaptive cycle. Our constructs were empirically characterized as follows: *Entrepreneurial dimensions*: Differentiation orientation, characterizing a strategic focus on product or service quality and novelty; Scope of product-market domain, characterizing a strategic orientation to take advantage of product and market opportunities; Cost-control orientation, characterizing a strategic focus on overall costs control; Stability of product-market domain, characterizing a strategic orientation to position the firm on a stable product-market domain. *Engineering dimensions*: Process-efficiency R&D, characterizing R&D efforts dedicated to increasing product or service quality and overall productivity; Market-novelty R&D, characterizing R&D efforts dedicated to opening new markets or finding new forms of reaching clients; Product-novelty R&D, characterizing R&D efforts dedicated to launching new or significantly improved products or find new uses of existing products; Costs-reduction R&D, characterizing R&D efforts dedicated to finding solutions for cost reductions; Production Flexibility, characterizing an organization of production dedicated to leverage firm's flexibility in manufacturing. Production Productivity, characterizing an organization of production dedicated to leverage manufacturing expertise and productivity. *Administrative dimensions*: Formal organization, characterizing a formalized and explicit configuration of firm's structure and processes; Flexible organization, characterizing a configuration of firm's structure and processes dedicated to support organizational agility and adaptability.

We measured firm's innovation behavior following requirements from the Oslo Manual (OECD, 2005) as well as mainstream research outputs on the sustaining or disruptive nature (Christensen, 1997) and technology or market-based source (Zhou et al., 2005) of innovation. The Oslo Manual characterizes four types of innovation at the level of the firm that encompass a wide range of changes in firms' activities: product innovations, process innovations, marketing innovations and organizational innovation. Factor analysis led to the emergence of four differentiated constructs. *Product innovations*, characterizing significant changes in the technological features or in the use of goods and services. *Process innovations,* characterizing significant changes in the firm's production and delivery methods. Our empirically-derived construct of process innovation also included a strong emphasis on working out new pricing methods, suggesting that a price-adaptation orientation was anchored in process innovation in our sample. *Marketing innovations*, characterizing the implementation of significantly new marketing methods, such as new product design and packaging and new sales and promotion methods. *Organizational innovation*, characterizing new business practices in the workplace organization or in the firm's external relations.

Reliability of constructs

Construct reliability was determined using Cronbach's Alpha and factor analysis. Regarding internal consistency, many constructs met Nunnally (1978) Cronbach's Alpha value of 0.7 and all our constructs met the cut-off level of 0.5 (Van de Ven and Ferry, 1980) - with the exception of the entrepreneurial dimension of scope of product-market domain (0.426), and of the entrepreneurial dimension of cost-control orientation (0.352). Nevertheless, we decided to include these constructs in our analysis as they presented strong internal theoretical relevance (see Table 2.1 in Appendix 1.2) and coherence with Conant et al.'s multi-item scale for measuring strategic types (1990). As above-mentioned, factor analysis was used to reveal the underlying common themes between strategic posture attributes and between innovation behavior attributes. The size of our sample (>200) suggest that factor loadings higher than 0.40 are significant (Hair et al., 1998). All our factors met this cut-off level, and most of them were higher than 0.60. Tables 2.1 and 2.2, in Appendix 1.2, show the respective factor loadings of strategic posture constructs as well as products, process, marketing, and organizational innovation constructs.

4.6.4. Controls

We controlled for firm size, firm's turnover, industry sectors, firm's R&D intensity, and the age (e.g. the longevity) of the firm. Indeed, many research works have emphasized the difference of strategic and innovation behaviors between small and larger organizations (Acs and Audretsch, 1987, 1988; Cohen and Klepper, 1996; Vaona and Pianta, 2008). Other streams of research suggest that industry specificities are key factors affecting firm's strategy (Chandler, 1962, Drucker, 1954, 1974; Porter, 1981, 1991) and innovative performance (Acs and Audretsch, 1988; Cohen, 1995; Malerba, 2004; Raymond and St-Pierre, 2010b). R&D intensity at the firm's level has also been investigated as a predictor of innovation performance also correlated to strategic posture (Langerak et al., 1999; Raymond and St-Pierre, 2010a). The longevity of activity of the firm was introduced as a sign of overall firm's operational effectiveness regarding implementation of practices of strategic and innovation management.

Firm's size was measured as the number of employees, ranked by size categories as specified by the Oslo Manual guidelines (OECD/European Communities, 2005). Firm's turnover was measured as the volume of sales in 2009, ranked by sales categories (less than 500 K€, 500 to 999 K€, 1000 to 4999 K€, 5000 to 14999 K€, 15000 to 50000 K€, more than 50000 K€). Industry sectors were classified according to their two-digit ISIC class, thus determining the principal activity or range of activities of the firm (ISIC Rev. 3.1, UN, 2002). However, for clarity purpose, we eventually controlled only for firms belonging or not to the sector of metallurgy and fabricated metal products. Indeed, this sector represented more than 20% of firms whereas none of other sectors accounted for more than 10% of firms. Firm's technological intensity was measured by firm's average expenses in research and development over sales for the past three years with a cut-off rate of 2.5% (OECD, 2008). Firm's age was measured on the basis of the firm's date of foundation. Firms were named as historic if founded before 1960, ancient before 1989, mature before 2006, and new after 2006.

We investigated whether there were correlations between the independent variables of our model, thus increasing the estimated R^2 of the model. To this aim, we calculated the variance inflation factor (VIF). No consensus seems to have emerged regarding the cut-off value that should be used to measure multicollinearity. Although Studenmund (1992) suggests a value of 5, other scholars (Hair et al. 1998) suggest that values up to 10 would be acceptable. No VIF-values of our model exceed a cut-off value of five (see Appendices 1.4, 1.5, 1.6), with mean VIF values not exceeding 1.39. Consequently, the estimates of our model do not seem to be affected by multicollinearity. Therefore, the predictive ability of the regression results of our model may not be misinterpreted.

4.7. Analysis and results

Sample characterization

Tables 1.1 to 1.5 in Appendix 1.1 summarize the descriptive statistics and provide an overall description of our sample regarding control variables of firm size, industry sector, turnover, R&D intensity, and age. A majority of responding SMEs (81%) belong to the less than 50 employees range which correlates previous results on the characterization of French manufacturing SMEs (Barstelman et al., 2005; European Commission; 2007). We focused on firms with 10 to 250 employees using the database of French Chambers of Commerce. However, 7.22% of responding firms reported staff below 10 employees. Considering the weight of such SMEs in the manufacturing sector (European Commission; 2007) and the emphasis of European authorities to foster innovation in very small firms, we kept them in our sample. Regarding industry sectors, responding SMEs reported activity in a wide scope of industries. However, SMEs in the Metals sector represented close to 20% of responding firms, the second largest sectors being Rubber and Plastics (10%), and Electricals and Electronics (10%). Consequently, we decided to control for industry sector as being active in the Metals sector or not. A majority of responding firms (51%) reported a turnover in the range of 1 to 5 million Euros. Regarding R&D activities, most of the sampled SMEs (63%) can be qualified as low R&D-intensive with R&D expenses accounting for less than 2.5% of turnover. The sample is balanced between ancient firms operating for more than 20 years (27%), mature firms, operating for more than 4 years (44%), and new firms operating for less than 4 years (25.5%). Historic firms operating for more than 50 years represent a small part of respondents.

Control variables

Results show that there is generally no significant (at $p < 0.1$) influence of control variables on the firms' strategic posture characteristics of our sample, except between firm size and firm's entrepreneurial focus on stability of product-market domain or administrative focus on formalization of organization; between industry sector and firm's engineering focus on productivity; between firm's R&D intensity and firm's entrepreneurial focus on costs or engineering focus on process or product R&D; between firm's turnover and firm's entrepreneurial focus on scope of product-market domain, engineering focus on productivity or administrative focus on formalization of organization; between age of the firm and firm's engineering focus on process R&D or administrative focus on formalization of organization.

Results also show that there is generally no significant (at $p < 0.1$) influence of control variables on firms' innovation behavior characteristics except between firm size and firm's focus on sustained innovation; between industry sector and marketing innovation; between firm's R&D intensity and most innovation characteristics; between firm's turnover and technology-based or product innovation. Tables 3.1 and 3.2, in Appendix 1.3 show the ANOVA results on correlations between control variables and the respective attributes of strategic posture and innovation behavior.

Clustering of strategic posture

The clustering of firms into internally similar and externally mutually exclusive groups was based on a combination of both hierarchical and non-hierarchical methods to gain the benefit of each method (Hair et al., 1998). First, based on Ward's method of hierarchal agglomeration using the squared Euclidian distance, we measured similarities among entities to determine how many groups really existed in our sample. Then, we partitioned the entities into clusters, before profiling each cluster based on the predefined constructs characterizing strategic posture. The remaining observations were clustered by a non-hierarchical method with the cluster centers from the hierarchical method. A five-group solution was considered the most appropriate classification. Table 15 shows the empirically-derived profiles of strategic postures. Results indicate that clusters of firms of our sample correspond to the major attributes of our model of Miles and Snow's and Porter's derived description of Prospectors, Low-Cost Defenders, Differentiated Defenders and Analyzers. A fifth group has been qualified as reactors based on its characteristics. However, some attributes emphasize the "hybridization" of the empirically-derived profiles. Indeed SMEs in cluster one emphasize differentiation and a broad product/market scope, thus characterizing the entrepreneurial choice of Prospectors. As Prospectors, these firms do not pay attention on costs control. However, they emphasize stability of product-market domain. This duality is strengthened at the level of their engineering choice by a strong product development and fair market development orientation, as well as emphasis on search for process effectiveness. They pay attention to both flexibility and efficiency of productivity and coordinate their activities through a flexible but formalized organization. These SMEs can then be labeled as "efficient" Prospectors. This qualification is coherent with Miles and Snow's (2003, p. 64) assumption that *"…the Prospector evaluates performance in effectiveness terms (doing the right things)."* The second cluster is made of firms with a low orientation on all attributes of Miles and Snow adaptive cycle except on an entrepreneurial orientation du differentiate themselves. We characterize this group of firms as Reactors who do not make trade-offs to shape the firm's structure and processes to fit the chosen strategy (Miles and Snow, 2003). The third group combines a costs orientation without any consideration for differentiation, looking for market opportunities that they defend thanks to an aggressive cost-orientation and search for cost-effectiveness, as well as low emphasis on market stability. This group puts also low emphasis on organizational flexibility together with low formalization of processes. We qualified these firms as "opportunistic" Low-Cost Defenders. The fourth group of SMEs combines a strong differentiation and costs orientation with quality and efficiency of processes and a formalized organization. These are the chief characteristics of the Differentiated Defenders of our model. The last cluster is characterized by the highest scores on all dimensions of the adaptive cycle, except on product development and formalized organization, which are still among the highest measures. These firms represent robust Analyzers combining at the same time the characteristics of the "pure" Prospectors and Defenders as defined by Miles and Snow (2003).

In total, our sample is constituted of 53 “efficient” Prospectors, 43 Reactors, 46 “opportunistic” Low-Cost Defenders, 45 Differentiated Defenders, and 35 Analyzers.

Table 15: Empirical profiles of strategic posture – Cluster results

Empirical profiles of Miles and Snow types of strategic posture: Cluster results

	Strategic Postures [a]						
	"Efficient" Prospector	*Reactor*	*"Opportunistic" Low-Cost Defender*	*Differentiated Defender*	*Analyzer*	*F*	
Strategic posture characteristics factors b	*(53)*	*(43)*	*(46)*	*(45)*	*(35)*		
Entrepreneurial - Differentiation orientation	0.34	0.23	-1.21	0.36	0.40	36.011	***
Entrepreneurial - broad product/market Scope	0.26	-0.25	0.24	-0.95	0.90	30.011	***
Entrepreneurial - Cost orientation	-0.38	-0.90	0.18	0.38	0.87	28.553	***
Entrepreneurial - product/market Stability	0.37	-0.50	-0.31	0.05	0.53	9.587	***
Engineering - R&D Process oriented	0.37	-0.01	-1.10	0.36	0.47	24.397	***
Engineering - R&D Market oriented	0.13	-0.30	0.13	-0.60	0.75	10.790	***
Engineering - R&D Product oriented	0.42	-0.24	-0.31	-0.26	0.38	5.567	***
Engineering - R&D Costs oriented	-0.41	-1.01	0.48	0.51	0.76	37.664	***
Engineering - Production Flexibility oriented	0.27	-0.35	-0.15	-0.49	0.80	12.231	***
Engineering - Production Productivity oriented	0.31	-0.73	-0.38	0.10	0.82	17.958	***
Administrative - Formal organization	0.44	-1.03	-0.41	0.44	0.40	23.613	***
Administrative - Flexible organization	0.54	-0.04	-0.28	-0.94	0.87	28.267	***

Notes: [a] numbers in parentheses indicate group size

[b] Factors based on factor analysis of strategy characteristics

* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Strategic posture and innovation behavior relationship

We empirically tested the relevance of using Miles and Snow’s perspective of a *“general physiology of organizational behavior where entrepreneurial (strategic orientation), engineering (technological choices) and administrative (structure-process) adaptive issues are intricately interwoven”* (2003, p. 27). Our results confirm Miles and Snow’s adaptive cycle perspective emphasizing differentiated alignments between firm’s entrepreneurial, engineering, and administrative choices. Tables 4.1, 4.2, 4.3, 4.4 and 4.5 in Appendix 1.4 show correlations and regressions between strategic posture attributes throughout the adaptive cycle. Results highlight the pairwise relationship between strategic posture attributes suggesting differentiated coactivation between attributes. Results show that this cycle seems to be triggered at any one of the adaptive choices. This characterizes the cycling, path-dependent process through which firms tend to reinforce their strategic posture as they are likely to engage in only limited alternatives (Ketchen, 2003; Miles and Snow, 2003) and that *"adaptive decisions made today tend to harden and become aspects of tomorrow's structure"* (Miles and Snow, 2003, p. 28). The same prevails for innovation attributes. Tables 5.1, 5.2, 5.3, and 5.4 in Appendix 1.5 show pairwise relationship between innovation behavior attributes. Such a relationship suggests path-dependence between the natures, the sources, and the activities of innovation as well as the cycling coactivation between innovation attributes (Christenssen, 1997; Ayerbe, 2006; Moss Kanter, 2010).

Table 16 on ANOVA results as regards innovation behavior and strategic profiles highlights clear differentiated innovation behaviors among empirically-derived strategic clusters with the exception of product innovation and marketing innovation.

Table 16: Differences in innovation behavior (Nature, Source, and Activity) by empirically-derived strategic posture profiles

Differentiated relationships between Innovation Behavior and Strategic Posture profiles: ANOVA results

	Strategic Postures [a]						
	"Efficient" Prospector	*Reactor*	*"Opportunistic" Low-cost Defender*	*Differentiated Defender*	*Analyzer*	*F*	
Innovation characteristics	*(53)*	*(43)*	*(46)*	*(45)*	*(35)*		
Nature [b]							
Sustained	6.174	4.711	4.974	5.872	6.188	12.890	***
Disruptive	4.522	3.632	4.105	3.846	5.094	5.148	***
Source [b]							
Technology-based	5.000	3.789	4.077	4.590	5.563	7.802	***
Market-based	5.565	5.237	5.184	4.949	6.281	5.792	***
Activity [c]							
Organizational	0.239	-0.560	-0.088	-0.164	0.344	4.153	***
Process	0.025	-0.313	-0.243	-0.272	0.823	7.258	***
Marketing	0.161	-0.058	-0.259	0.110	0.252	1.388	NS
Product	-0.050	0.039	-0.184	0.147	0.188	0.757	NS

Notes: [a] numbers in parentheses indicate group size
[b] 7-point scale (1: very low practice of this type of innovation behavior; 7: very high practice)
[c] Based on factor analysis of innovation activities
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

At the attributes level, the alignment between strategic posture attributes and innovation behavior attributes proposed in our hypotheses receives strong support as showed in Tables 6.1, 6.2, 6.3, and 6.4 in Appendix 1.6. As an introduction to our hypotheses, we proposed that the different strategic posture characteristics relative to the adaptive choices of Low-Cost Defenders, Differentiated Defenders, Prospectors and Analyzers correlate with differentiated characteristics of innovation behaviors. Factor analysis conducted, from the adaptive cycle perspective (Miles and Snow, 2003), on the Entrepreneurial, Engineering and Administrative attributes of firms strategic posture has clearly identified differentiated sets of attributes characterizing the adaptive choice of above mentioned strategic profiles (see Table 2.1, in Appendix 1.2). Factor analysis conducted on innovation activities has also determined clear differentiated constructs of innovation profiles (see Table 2.2, in Appendix 1.2).

More specifically, results emphasize clear distinctive relationships between the attributes of the different adaptive strategic choices and the different natures, sources and activities of firms' innovative behavior. Tables 17, 18, 19 and 20 summarize the results to our hypotheses.

Low-Cost Defenders: Regarding the natures of innovation, we stated in Hypothesis 1 that *the propensity to adopt a behavior of sustained innovation is positively related to the degree of the Entrepreneurial choice of Low-Cost Defenders namely of stability of product-market domain (H1a), of cost-control orientation (H1b), of their Engineering choice namely of search for process efficiency (H1e) and of search for cost reduction (H1f), of production productivity (H1i), and of their Administrative choice namely of formal administration (H1j).* Table 6.2 supports this hypothesis but shows that the sustained innovation orientation of Low-Cost Defenders is mainly influence by their continuous efforts in process R&D (H1.1e). Table 6.2 also highlights that a cost-leadership orientation significantly favors disruptive innovation.

Regarding the sources of innovation, we stated in Hypothesis 3 *that the propensity to adopt a behavior of technology-based innovation is positively related to the degree of the Entrepreneurial choice of Low-Cost Defenders namely of stability of product-market domain (H3a), of cost-control orientation (H3b), of their Engineering choice namely of search for process efficiency (H3e) and cost reduction (H3f), of production productivity (H3i), and of their Administrative choice namely of formal administration (H3k).* Results in Table 6.3 support this hypothesis with a significant relationship between technology-based innovation and Low-Cost Defenders efforts towards search for cost reduction (H3f), process efficiency R&D (H3e), supported by a formalized organization (H3k). Results of Table 6.3 also highlight the positive relationship between a cost-control orientation and market-based innovation.

Regarding the activities of innovation, in Hypothesis 5, we stated that *the propensity to adopt a behavior of process innovation is positively related to the degree of the Entrepreneurial choice of Low-Cost Defenders namely of their cost-control orientation (H5a), of their Engineering choice namely of search for process efficiency (H5c), of search for cost reduction (H5d), of production productivity (H5e), and of their Administrative choice namely of formal administration (e).* Results in Table 6.4 show that the process innovation orientation of Low-Cost Defenders is mainly influenced by their strong Engineering focus on process R&D (H5c).

Table 17: Results to hypotheses of strategic posture and innovation behavior relationships: Low-Costs Defenders attributes

Strategic posture - Innovation behavior relationships - Hypotheses and Results

		Innovation behavior characteristics															
		Sustained		Disruptive		Technology-based		Market-based		Process		Product		Marketing		Organizational	
Miles & Snow profile	Strategic posture characteristics	H	R	H	R	H	R	H	R	H	R	H	R	H	R	H	R
Low-Cost Defender	Entrepreneurial - Differentiation																
	Entrepreneurial - Scope																
	Entrepreneurial - Costs	+ (H1b)	NS			+ (H3b)	NS			+ (H5a)	NS						
	Entrepreneurial - Stability	+ (H1a)	NS			+ (H3a)	NS										
	Engineering - R&D Process	+ (H1e)	+			+ (H3e)	+			+ (H5c)	+						
	Engineering - R&D Market																
	Engineering - R&D Product																
	Engineering - R&D Costs	+ (H1f)	NS			+ (H3f)	+			+ (H5d)	NS						
	Engineering - Production Flexibility																
	Engineering - Production Productivity	+ (H1i)	NS			+ (H3i)	NS			+ (H5e)	NS						
	Administrative - Formal organization	+ (H1j)	NS			+ (H3k)	+			+ (H5f)	NS						
	Administrative - Flexible organization																

Note: (+) is a significant positive relationship, meaning that the hypothesis is supported;
(-) is a significant negative relationship, meaning that the hypothesis is not supported
NS is a non significant relationship, meaning that the relationship is not supported

Differentiated Defenders**:** regarding the natures of innovation, in Hypothesis 1, we stated that *the propensity to adopt a behavior of sustained innovation is positively related to the degree of the Entrepreneurial choice of Differentiated Defenders namely of stability of product-market domain (H1a), of cost-control orientation (H1b), of differentiation orientation (H1d), of their Engineering choice namely of search for process efficiency (H1e), of search for product novelty (H1g), and of their Administrative choice namely of formal administration (H1j)*. Table 6.2 confirm our hypothesis on the influence of Entrepreneurial and Engineering dimensions with a significant impact of the differentiation orientation (H1d) and the efforts dedicated by Differentiated Defenders on Process R&D (H1e) and product R&D (H1g).

Regarding the sources of innovation, we stated in Hypothesis 3 that *the propensity to adopt a behavior of technology-based innovation is positively related to the degree of the Entrepreneurial choice of Differentiated Defenders namely of stability of product-market* *domain (H3a), of cost-control orientation (H3b) of differentiation orientation (H3d), of their Engineering choice namely of search for process efficiency (H3e), of search for product novelty (H3g), and of their Administrative choice namely of formal administration (H3k).* Results in Table 6.3 support our hypothesis but shows that the technology-based innovation emphasized by Differentiated Defenders is mainly anchored in their Engineering (H3e, H3g) and Administrative choices with a major influence of a formalized organization (H3k).

Regarding the activities of innovation, in Hypothesis 5, we stated that *the propensity to adopt a behavior of process innovation is positively related to the degree of the Entrepreneurial choice of Differentiated Defenders namely of differentiation orientation (H5b), of their Engineering choice namely of search for process efficiency (H5c), and of their Administrative choice namely of formal administration (H5f).* Results in Table 6.4, suggest that the Engineering choice for efforts in process R&D (H5c) is the main significant determinant for the process orientation of Differentiated Defenders. In Hypothesis 6, we stated that *the propensity to adopt a behavior of product innovation is positively related to the degree of the Entrepreneurial choice of Differentiated Defenders namely of differentiation orientation (H6a) and of their Engineering choice namely of search for product novelty (H6b).* Results in Table 6.4 significantly support H6a and H6b. We also stated in Hypothesis 7 that *the propensity to adopt a behavior of product innovation is positively related to the degree of the Entrepreneurial choice of Differentiated Defenders namely of differentiation orientation (H7a) and of their Engineering choice namely of search for process efficiency (H7c) and for product novelty (H7d).* Results in Table 6.4 significantly support our hypothesis but shows that the marketing innovation orientation of Differentiated Defenders is mainly influenced by their engineering choices for searching qualitative (H7c) and novel (H7d) solutions to generate mainstream clients' loyalty.

Table 18: Results to hypotheses of strategic posture and innovation behavior relationships: Differentiated Defenders attributes

Strategic posture - Innovation behavior relationships - Hypotheses and Results

		Innovation behavior characteristics															
		Sustained		Disruptive		Technology-based		Market-based		Process		Product		Marketing		Organizational	
Miles & Snow profile	Strategic posture characteristics	H	R	H	R	H	R	H	R	H	R	H	R	H	R	H	R
Differentiated Defender	Entrepreneurial - Differentiation	+ (H1d)	+			+ (H3d)	NS			+ (H5b)	NS	+ (H6a)	+	+ (H7a)	NS		
	Entrepreneurial - Scope																
	Entrepreneurial - Costs	+ (H1b)	NS			+ (H3b)	NS										
	Entrepreneurial - Stability	+ (H1a)	NS			+ (H3a)	NS										
	Engineering - R&D Process	+ (H1e)	+			+ (H3e)	+			+ (H5c)	+			+ (H7c)	+		
	Engineering - R&D Market																
	Engineering - R&D Product	+ (H1g)	+			+ (H3g)	+					+ (H6b)	+	+ (H7d)	+		
	Engineering - R&D Costs																
	Engineering - Production Flexibility																
	Engineering - Production Productivity																
	Administrative - Formal organization	+ (H1j)	NS			+ (H3k)	+			+ (H5f)	NS						
	Administrative - Flexible organization																

Note: (+) is a significant positive relationship, meaning that the hypothesis is supported
(-) is a significant negative relationship, meaning that the hypothesis is not supported
NS is a non significant relationship, meaning that the relationship is not supported

***Prospectors*:** Regarding the natures of innovation, in Hypothesis 1, we stated that *the propensity to adopt a behavior of sustained innovation is positively related to the degree of the Entrepreneurial choice of Prospectors namely of scope of product-market domain (H1c), of differentiation orientation (H1d), and of their Engineering choice namely of search for product (H1g) and market novelty (H1h).* Results in Table 6.2 support our hypothesis on the differentiation Entrepreneurial choice of prospectors (H1d), but give no significant influence on the scope of product-market domain (H1c). The hypothesis on their Engineering choice towards continuous R&D efforts on new products (H1g) and new markets (H1h) is also confirmed. We also stated in Hypothesis 2 that *the propensity to adopt a behavior of disruptive innovation is positively related to the degree of the Entrepreneurial choice of Prospectors namely of their differentiation orientation (H2a), of scope of product-market domain (H2b), of their Engineering choice namely search for product (H2c) and market* *novelty (H2d), and of their administrative choice namely of flexible administration (H2e).* Results in Table 6.2 confirm the significant positive influence of the Engineering efforts of Prospectors on product (H2c) and market (H2d) R&D on disruptive innovation, whereas there is no significant influence of their Entrepreneurial and Administrative choices.

Regarding the sources of innovation, in Hypothesis 3, we stated that *the propensity to adopt a behavior of technology-based innovation is positively related to the degree of the Entrepreneurial choice of Prospectors namely of scope of product-market domain (H3c), of differentiation orientation (H3d), of their Engineering choice namely of search for product (H3g) and market (H3h) novelty, of production flexibility (H3j) and of their Administrative choice namely of flexible administration (H3l).* Results in Table 6.3 emphasize the main significant influence of prospectors' Engineering efforts regarding product R&D (H3g) on technology-based innovation whereas there is no significant influence from market R&D. However, there is neither significant influence of their search for production flexibility, nor of their Entrepreneurial or Administrative choice. In Hypothesis 4, we also stated that *the propensity to adopt a behavior of market-based innovation is positively related to the degree of the Entrepreneurial choice of Prospectors namely of scope of product-market domain (H4a), of differentiation orientation (H4b), of their Engineering choice namely of search for product (H4d) and market (H4e) novelty, of production flexibility (H4f) and of their Administrative choice namely of flexible administration (H4g).* Results in Table 6.3, confirm the significant influence of the product R&D (H4d) efforts of Prospectors as well as the significant influence of a flexible organization (H4g) on marked-based innovation but no significant influence of other Engineering or Entrepreneurial choice.

Regarding innovation activities, in Hypothesis 6, we stated that *the propensity to adopt a behavior of product innovation is positively related to the degree of the Entrepreneurial choice of Prospectors namely of their differentiation orientation (H6a), of their Engineering* *choice namely of search for product novelty (H6b) and of their administrative choice namely of flexible administration (H6c).* Table 6.4 supports our hypothesis on the significant influence of the Entrepreneurial differentiation orientation (H6a) and the Engineering choice for efforts regarding product R&D (H6b) on product innovation. However, the Administrative choice of prospectors for a flexible organization has no significant influence on product innovation. In Hypothesis 7, we stated that *the propensity to adopt a behavior of marketing innovation is positively related to the degree of the Entrepreneurial choice of Prospectors namely of scope of product-market domain (H7b), of their Engineering choice namely of search for product (H7d) and market (H7e) novelty and of their administrative choice namely of flexible administration (H7f).* Results in Table 6.4 show that hypothesis H7b is not supported and suggest that, with regard to our studied sample of manufacturing SMEs, a large scope of product-market domain, has a significant negative impact on marketing innovation. Nevertheless, H7d and H7e are strongly supported suggesting that permanent search for product and market opportunities strongly influence marketing innovation. Our results do not show significant influence of a flexible administration (H7f) on marketing innovation. We also stated in Hypothesis 8 that *the propensity to adopt a behavior of organizational innovation is positively related to the degree of the Engineering choice of Prospectors namely of production flexibility (H8a) and of their Administrative choice namely of flexible administration (H8d).* Results in Table 6.4 support H8d regarding the influence of their flexible organization on Prospectors' ability to develop organizational innovation. However, the need for production flexibility has no significant influence on the propensity of Prospectors to develop organizational innovation (H8a).

Table 19: Results to hypotheses of strategic posture and innovation behavior relationships: Prospectors attributes

Strategic posture - Innovation behavior relationships - Hypotheses and Results

		Innovation behavior characteristics															
		Sustained		Disruptive		Technology-based		Market-based		Process		Product		Marketing		Organizational	
Miles & Snow profile	Strategic posture characteristics	H	R	H	R	H	R	H	R	H	R	H	R	H	R	H	R
Prospector	Entrepreneurial - Differentiation	+ (H1d)	+	+ (H2a)	NS	+ (H3d)	NS	+ (H4b)	NS			+ (H6a)	+				
	Entrepreneurial - Scope	+ (H1c)	NS	+ (H2b)	NS	+ (H3c)	NS	+ (H4a)	NS					+ (H7b)	-		
	Entrepreneurial - Costs																
	Entrepreneurial - Stability																
	Engineering - R&D Process																
	Engineering - R&D Market	+ (H1h)	+	+ (H2d)	+	+ (H3h)	NS	+ (H4e)	NS					+ (H7e)	+		
	Engineering - R&D Product	+ (H1g)	+	+ (H2c)	+	+ (H3g)	+	+ (H4d)	+			+ (H6b)	+	+ (H7d)	+		
	Engineering - R&D Costs																
	Engineering - Production Flexibility					+ (H3j)	NS	+ (H4f)	NS							+ (H8a)	NS
	Engineering - Production Productivity																
	Administrative - Formal organization																
	Administrative - Flexible organization			+ (H2e)	NS	+ (H3l)	NS	+ (H4g)	+			+ (H6c)	NS	+ (H7f)	NS	+ (H8d)	+

Note: (+) is a significant positive relationship, meaning that the hypothesis is supported
(-) is a significant negative relationship, meaning that the hypothesis is not supported
NS is a non significant relationship, meaning that the relationship is not supported

***Analyzers*:** Regarding the natures of innovation, in Hypothesis 1, we stated that *the propensity to adopt a behavior of sustained innovation is positively related to the degree of the Entrepreneurial choice of Analyzers namely of stability (H1a) and scope (H1c) of product-market domain, of cost-control orientation (H1b), of differentiation orientation (H1d), of their Engineering choice namely of search for process efficiency (H1e), of search for product (H1g) and market (H1h) novelty, of production productivity (H1i), and of their Administrative choice namely of formal administration (H1j).* Results in Table 6.2 support H1d suggesting a significant influence of the differentiation positioning of Analyzers, but no other significant Entrepreneurial choice on sustained innovation. H1e, H1g and H1h are also supported suggesting a major influence of the Engineering posture of Analyzers on sustained innovation. Emphasis on production productivity as well as on a formalized organization has no significant influence.

Regarding the sources of innovation, we stated in Hypothesis 3 that *the propensity to adopt a behavior of technology-based innovation is positively related to the degree of the Entrepreneurial choice of Analyzers namely of stability (H3a) of product-market domain, of cost-control orientation (H3b), of their engineering choice namely of search for process efficiency (H3e), of production productivity (H3i), and of their Administrative choice namely of formal administration (H3k).* Results in Table 6.3 support H3e and H3k, emphasizing the significant positive influence of Analyzers' search for process efficiency supported by a formalized organization to generate technology-based innovation. No other influence was proven significant. In Hypothesis 4, we also stated that *the propensity to adopt a behavior of market-based innovation is positively related to the degree of the Entrepreneurial choice of Analyzers namely of scope of product-market domain (H4a), of differentiation orientation (H4b), of their Engineering choice namely of search for process efficiency (H4c), of search for product (H4d) and market (H4e) novelty, of production flexibility (H4f), and of their Administrative choice namely of flexible administration (H4g).* Results in Table 6.3 support H4d on the fast-follower product R&D orientation of Analyzers to improve proven-successful product or service from Prospectors. H4g on Analyzer's capacity for organizational flexibility to generate market-based innovation is also supported. No other attribute of Analyzers' adaptive choices is found significant. One should also note in Table 6.3 that an orientation for production productivity has significant negative influence on market-based innovation. This contributes to strengthen our generic proposition that the different strategic posture attributes characterizing the adaptive choices of Low-Cost Defenders, Differentiated Defenders, Prospectors and Analyzers correlate with differentiated attributes of innovation behaviors. Thus, the search for productivity anchored in the "defender" dimension of Analyzers might hamper their ability to benefit from market opportunities.

Regarding activities of innovation, we stated in Hypothesis 5 that *the propensity to adopt a behavior of process innovation is positively related to the degree of the Entrepreneurial choice of Analyzers namely of cost-control orientation (H5a), of their Engineering choice namely of search for process efficiency (H5c), of production productivity (H5e), and of their Administrative choice namely of formal administration (H5f).* Results in Table 6.4 support H5c suggesting that efforts in process R&D are the major significant determinant of process innovation generated by Analyzers. No other attribute of Analyzers' adaptive choice is found significant. In Hypothesis 6, we stated that *the propensity to adopt a behavior of product innovation is positively related to the degree of the Entrepreneurial choice of Analyzers namely of differentiation orientation (H6a), of their Engineering choice namely of search for product novelty (H6b), and of their Administrative choice - flexible administration (H6c).* Results in Table 6.4 support H6a on the differentiation orientation of Analyzers likely to influence their product innovation behavior. H6b is also supported suggesting that the product-R&D activities of Analyzers, through improvement of proven-successful product or service developed by Prospectors, influence their product innovation behavior. The flexible organization capacity of Analyzers (H6c) is not found significant for product innovation. We stated in Hypothesis 7 that *the propensity to adopt a behavior of marketing innovation is positively related to the degree of the Entrepreneurial choice of Analyzers namely of their differentiation orientation (H7a), of scope of product-market domain (H7b), of their Engineering choice namely of search for process efficiency (H7c), search for product (H7d) and market (H7e) novelty, and of their Administrative choice namely of flexible administration (H7f).* Results in Table 6.4 do not support H7b. As previously mentioned, this suggests that a large scope of product-market domain seems to have significant negative influence on marketing innovation in French manufacturing SMEs. Differentiation positioning (H7a) has no significant influence. However, H7c and H7d on the influence of the fast-follower process and product R&D orientation of Analyzers on marketing innovation are supported as well as H7e on efforts to identify market opportunities. As for product innovation, the flexible organization capacity of Analyzers (H7f) is not found significant for marketing innovation. We also stated in Hypothesis 8 that *the propensity to adopt a behavior of organizational innovation is positively related to the degree of the Engineering choice of Analyzers namely of production flexibility (H8a) as well as production productivity (H8b), and of their Administrative choice namely of formal administration (H8c) and of flexible administration (H8d).* Results in Table 6.4 support both H8c and H8d suggesting that a flexible, but also formalized organization leverage organizational innovation. This is coherent with the need for Analyzers to cope with stability and efficiency as well as flexibility and effectiveness (Miles and Snow, 2003). However, results also show that Analyzers' attempt to encompass both production flexibility (H8a) and productivity (H8b) does not significantly influence their organizational innovation behavior.

Table 20: Results to hypotheses of strategic posture and innovation behavior relationships: Analyzers attributes

Strategic posture - Innovation behavior relationships - Hypotheses and Results

		Innovation behavior characteristics															
		Sustained		Disruptive		Technology-based		Market-based		Process		Product		Marketing		Organizational	
Miles & Snow profile	Strategic posture characteristics	H	R	H	R	H	R	H	R	H	R	H	R	H	R	H	R
Analyzer	Entrepreneurial - Differentiation	+ (H1d)	+					+ (H4b)	NS			+ (H6a)	+	+ (H7a)	NS		
	Entrepreneurial - Scope	+ (H1c)	NS					+ (H4a)	NS					+ (H7b)	-		
	Entrepreneurial - Costs	+ (H1b)	NS			+ (H3b)	NS			+ (H5a)	NS						
	Entrepreneurial - Stability	+ (H1a)	NS			+ (H3a)	NS										
	Engineering - R&D Process	+ (H1e)	+			+ (H3e)	+	+ (H4c)	NS	+ (H5c)	+			+ (H7c)	+		
	Engineering - R&D Market	+ (H1h)	+					+ (H4e)	NS					+ (H7e)	+		
	Engineering - R&D Product	+ (H1g)	+					+ (H4d)	+			+ (H6b)	+	+ (H7d)	+		
	Engineering - R&D Costs																
	Engineering - Production Flexibility							+ (H4f)	NS							+ (H8a)	NS
	Engineering - Production Productivity	+ (H1i)	NS			+ (H3i)	NS			+ (H5e)	NS					+ (H8b)	NS
	Administrative - Formal organization	+ (H1j)	NS			+ (H3k)	+			+ (H5f)	NS					+ (H8c)	+
	Administrative - Flexible organization							+ (H4g)	+			+ (H6c)	NS	+ (H7f)	NS	+ (H8d)	+

Note: (+) is a significant positive relationship, meaning that the hypothesis is supported;
(-) is a significant negative relationship, meaning that the hypothesis is not supported
NS is a non significant relationship, meaning that the relationship is not supported

Overall, our results suggest a significant relationship between strategic posture and innovation behavior attributes. Most results are significant at the five per cent level and emphasize clearly differentiated alignments between the attributes of Entrepreneurial, Engineering and Administrative adaptive choices of Miles and Snows' profiles and innovation behavior attributes. Results on control variables in Tables 6.2, 6.3, and 6.4 show the limited influence of firm's and industry's typology on strategy-innovation relationship thus providing a potential generalization of findings to French manufacturing SMEs.

4.8. Discussion

4.8.1. Theoretical implications

An important issue of our investigation consisted in supporting the differentiated alignments between our empirically-derived strategic posture profiles and innovation behavior attributes. Table 16 indicates that group means are significantly different ($p < 0.01$) for the sustained or disruptive nature of innovation, for the technology-based or market-based source of innovation, and for organizational and process innovation. However, there is no significant difference for marketing and product innovation. Results to hypotheses provide insights of these specific alignments at each empirically-derived profile's level.

Our "Efficient" Prospectors emphasize both sustained and disruptive innovation (Table 16), thus giving support to hypotheses H2.1 and H2.2. Regarding sustained innovation, this is mainly anchored in their strong differentiation orientation and their efforts dedicated to product R&D as well as their process R&D focus on efficiency (Table 15). Their search for disruptive innovation is mainly supported by their efforts on product R&D. "Efficient" Prospectors also emphasize both technology-based and market-based innovation (Table 16), giving support to H2.3 and H2.4. Technology-based innovation is rooted is their product R&D intensity as well as their focus on efficiency through process R&D and formalized organization (Table 15). They conduct market-based innovation stimulated by their focus on product R&D and supported by their also flexible organization (Table 15). Table 16 shows that “Efficient” Prospectors tend to mainly conduct marketing and organizational innovation (H2.6 and H2.7). Marketing innovation might then be predicted by their efforts to develop new design or usage of products. This is consistent with their focus on efficiency instead of emphasizing product innovation with the related development costs attached to new product launching. As a flexible, although formalized, organization, “Efficient” Prospectors also conduct organizational innovation (Table 15).

Table 16 shows that “Opportunistic” Low-Cost Defenders mainly conduct sustained innovation, mostly due to their permanent search for market opportunities, but are also likely to develop disruptive innovation fostered by their search for overall cost-reduction (Table 15). This is consistent with results of Table 6.2 in Appendix 1.6 on sustained and disruptive innovation. The innovation behavior of “Opportunistic” Low-Cost Defenders is mainly market-based (Table 16) and relies on their ability to take advantage of low-cost market opportunities (see Table 6.3 in Appendix 1.6). Due to their endogenous characteristic, “opportunistic” Low-Cost Defenders do not emphasize any specific innovation activity (Table 16).

The empirically-derived Differentiated Defenders of our sample focus on sustained innovation (Table 16) due to their strong differentiation orientation and focus on process efficiency (Table 15) thus supporting H1.3. These Differentiated Defenders SMEs conduct both market-based and technology-based (H1.4) innovation (Table 16). However, their market-based innovation is supported by their cost-efficiency orientation (see Table 6.3 in Appendix 1.6), aiming at targeting mainstream clients (Table 15). Their technology-based innovation is anchored in their focus on product quality thanks to process R&D as well as their search for overall cost efficiency supported by a formalized organization (see Table 6.3

in Appendix 1.6). Our derived profiles of Differentiated Defenders mainly pursue marketing and product innovation (Table 16) through differentiated ways of marketing high quality products or services (Tables 15; Table 6.4 in Appendix 1.6).

Results of Table 16 on empirically-derived Analyzers support all hypotheses on pure Analyzers profiles, thus suggesting that such SMEs have combined all different attributes of the generic Entrepreneurial, Engineering and Administrative adaptive choices of pure Prospectors, Low-Cost and Differentiated Defenders. It is therefore consistent that such profiles represent the smallest group of firms (35 SMEs). These SMEs put a stronger emphasis on disruptive, market-based, process, organizational and marketing innovation than other firms. This emphasis is also predicted by a set of strategic attributes significantly differentiated from other strategic posture profiles (Table 15).

The results of this study support our proposal for the existence of differentiated alignments between the Entrepreneurial, Engineering and Administrative characteristics of Miles and Snow's strategic postures and the characteristics of their respective innovation behavior. Thus, the study provides support to other research works on the validity of competitive strategy as a predictor of innovation behavior (Kotabe, 1990; Zahra and Covin, 1994; Becheikh et al., 2006b). This research also confirms other works suggesting that the equifinality position proposed by Miles and Snow (1978) with regard to strategy-performance relationship does not apply to strategy-innovation relationship (Blumentritt and Danis, 2006). The use of a conceptual model combining Miles and Snow's framework and Porter's typology has enabled to fine-tune the analysis of this predictive validity to the level of firm's organizational strategy, structure and processes. This has also fine-tuned and enhanced the level of analysis to a systemic approach of innovation behavior taking into account the attributes of the natures (sustained or disruptive), sources (technology-based or market-based), and activities (process, product, marketing and organizational) of innovation. This approach provides an extensive understanding of the predictive innovation strategy of a firm based on the determinants of its strategic configuration. This research is one of the few studies having empirically explored the influence of strategic management variables on an enhanced scope of firm's innovation dimensions (Becheikh et al., 2006a; Becheikh et al., 2006b; Vaona and Pianta, 2008, Raymond and St-Pierre, 2010b). Moreover, considering the predictive validity of innovation behavior on the achievement of firm's strategic goals (Hambrick et al., 1983; Kotabe, 1990), this work also contributes to the understanding of strategic maneuvering through a widened and fine-tuned approach of firm's innovation behavior.

Furthermore, working on the adaptive attributes of our empirically-derived strategic types provides a more accurate representation of SMEs' strategic behavior for the manufacturing sector (DeSarbo et al.; 2005) while understanding the strategy-innovation dynamics at each step of the adaptive cycle. This research also provides support to Miles and Snow strategic typology as a powerful model of SMEs' strategy and innovation behavior in the manufacturing sector. Indeed, within our empirically-derived groups of firms, the core generic attributes qualifying the adaptive choices of Miles and Snow's initial strategic profiles (1978) have also been identified as clear determinants of the firms' innovation behavior. Besides, the combination of Miles and Snow's framework with Porter's typology provides a new dual internal-external perspective of this level of strategy-innovation relationship.

4.8.2. Methodological implications

In this research, we revisit the approach of Miles and Snow (1978) strategic choices through the adaptive cycle also from a methodological perspective. Indeed, contrary to the paragraph approach, which cannot address the complexity of strategic configurations (Conant et al., 1990), our multiple-item Likert scale approach enables taking into account the differentiated propensity of firms to emphasize or not dimensions pertaining to each strategic choice of

Miles and Snow adaptive cycle as well as Porter's (1980) generic typology. Doing so, we allow flexibility and parsimony in the association of adaptive strategic choice dimensions in accordance with empirically and statistically established framework (Hambrick, 1983; Segev, 1989; Shortel and Zajac, 1990; DeSarbo et al., 2005). We provide a new methodological approach that enables the emergence of strategic constructs qualifying the differentiated organizational characteristics that fit Miles and Snow's and Porter's respective different strategic orientations. Consequently, this methodology enables, at each step of the adaptive cycle, the emergence of distinctive constructs of the dimensions qualifying Miles and Snow's internal perspective of competitive advantage as well as Porter's external perspective. The empirically-derived constructs clearly qualify product-market strategy as well as strategic positioning, research and development objectives, production behavior, and type of organizational structure and control. Thus, this methodological approach encompasses the dimensions of competitive strategy as well as operational strategy. This is a valuable input for research on strategic management, especially for scholars aiming at exploring the influence of variables related to strategic management examined as determinants of firm's capacity to innovate (Becheikh et al. 2006b).

At the innovation behavior level, we provide guidance for the emergence of distinct constructs qualifying innovation activities according to the OSLO Manual guidelines for collecting and interpreting innovation data (OECD, 2005). A methodology complying with this framework of reference will facilitate comparative research on overall innovation management. By designing innovation variables that express the propensity to adopt certain natures, sources and activities of innovation, the methodology allows a dynamic approach of overall innovation behavior. Similarly to strategic posture attributes, it also enables the understanding of co-activation between innovation attributes. Our methodology, based on derived strategic and innovation types, is also likely to capture the context-specific conditions that shape decisions on strategic posture and innovation behavior. Therefore, this methodology is well-adapted to support further research on context-specific exploration of strategy-innovation-performance relationships (Zahra and Covin, 1994; Zahra, 1996, DeSarbo et al., 2005).

4.8.3. Managerial implications

This research also provides important contribution to managerial issues faced by SMEs when trying to align strategic management with innovation management. Indeed, many works have emphasized the crucial role of innovation as a source of competitive advantage (Lefebvre and Lefebvre, 1993; Porter, 1996; Teece et al. 1997; Eisenhardt and Martin, 2000), while also suggesting that the type of organization should be a primary contingency variable of innovation behavior (Damanpour, 1987, 1991, 1996; Zahra and Covin, 1994; Damanpour and Gopalakrishnan, 1998). Still, SMEs executive are continuously facing extensive challenges with respect to the complexity of choices for strategy-innovation alignment and implementation (European Commission 2007). This situation has been emphasized by scholars as a source of failure for successful implementation of competitive strategy (Walker and Ruekert, 1987; Porter, 1996; Smith et al. 2008). Walker and Ruekert suggest that the differences between "intended" strategies and "realized" strategies may be due to ineffective implementation of the intended strategy. Porter posits that a successful implementation of competitive strategy relies on firm's management ability to define a strategic orientation, to make trade-offs in what the firm offers, and to forge fit among the firm's activities. In their meta-analysis of factors influencing an organization's ability to manage innovation Smith et al. (2008, pp. 666) point out that "*if an organization wants to be more effective at developing innovations, this needs to be reflected somewhere within the strategy, otherwise employees will not see how innovation directly impacts on their day-to-day tasks* ".

As regards the assumption that competitive strategy predicts innovation as a tool to achieve strategic objectives (Hambrick et al., 1983; Kotabe, 1990), our research suggests that, when choosing and implementing their competitive strategy, SMEs executive should consider the natures, the sources and the activities of innovation that would more likely match their strategic posture. However, investigation on the effectiveness of local innovation systems has highlighted a lack of guidance for SMEs with respect to how encompass the whole scope of strategic and innovation management from entrepreneurial choice to operational innovation strategy (European Commission, ERMIS project, 2009-2012; Méditerranée Technologies, 2009). Field practice has also shown clear discrepancies between highly-innovative and low-innovative SMEs namely a lack of alignment between strategic choice, organizational structure and processes, a lack of coherence between types of nature, source and activity of innovation, and a tendency to focus on a specific type of innovation activity thus hampering the co-activation benefit between innovation behavior attributes. Results of the CIS 6 survey (European Commission, 2008) confirm SMEs' limited scope of innovation behavior with 40% of French SMEs focusing on one single type of innovation activity.

This research attempts to bridge the gap between theory and field practice with regard to strategic and innovation management. Indeed, we provide a set of predictive alignments between the characteristics of SMEs' strategic posture and innovation behavior throughout Miles and Snow's adaptive cycle of Entrepreneurial, Engineering and Administrative choices. Doing so, we expect to contribute to the development of innovative SMEs by providing explicit guidance on the effective relationship between strategic and innovation management. This managerial input on strategy-innovation fit is likely to contribute to the effective implementation of competitive strategy, hence to superior performance in SMEs (Lefebvre and Lefebvre, 1993; Zahra and Covin, 1994; Miles and Snow, 1978, 1994, 2003; Thornhill, 2006; Raymond and St-Pierre, 2010a).

4.9. Limitations and directions for future research

Although our model and the methodology used in this research seems well-adapted to capture the context-specific conditions that shape decisions on strategic posture and innovation behavior, we did not control for market-forces and firm-specific effects that may influence strategy innovation alignments (Damanpour, 1996; Zhou et al., 2005; Thornhill, 2006; Vaona and Pianta, 2008). Still, firms of all types adopt innovations to respond to changes in their external or internal environments, and organizational factors may have unequal influence on innovation depending on the organizational structure of the firm as well as external environment factors may influence firm's innovativeness (Van de Ven, 1986; Tidd, 2001).

Further research could complement this one by exploring the direct and indirect influence of industry effects and firm effects used as external and internal contingencies on strategy-innovation relationship. Similarly to the "outside-in" and "inside-out" perspective of market structure and firm capabilities effects on competitive strategy and performance, complementary work could investigate this dual perspective on the direct and indirect influence of market and firm contingencies on competitive strategy and innovation.

Finally, this study focuses on strategy-innovation alignment without investigating the output of such fit from a performance perspective. Still, the design and the scope of our conceptual model provide challenging prospects for such an investigation. Indeed, as emphasized by Evangelista and Vezzani (2010, p. 1262) *"enlarging the analysis of innovation beyond the technological domain provides a much richer and complex picture of firm's innovation strategies and performances"*. Consequently, another direction for further research could possibly explore the specific alignments of strategic posture and innovation behavior in SMEs associated to superior performance. As many scholars posit that firms' superior performance should be thought as achieving both internal and external fit between strategy and innovation, this new direction of research should be completed by investigating to which extent such a strategy-innovation-performance relationship is contingency-dependent.

V - 2nd essay

“Strategic posture and innovation behavior in SMEs: The impact of industry and firm contingencies on type and relationship”

V – 2nd essay: "Strategic posture and innovation behavior in SMEs: The impact of industry and firm contingencies on type and relationship"

5.1. Abstract

This empirical research, conducted on French manufacturing SMEs, investigates the relationship between competitive strategy and innovation, under the influence of industry and firm-specific factors. More specifically, our work attempts to understand whether industry and firm-specific effects, used as contingencies, generate specific patterns of alignment between strategic posture and innovation behavior, or to which extent this alignment is embedded in a kind of contingency-independent universalism. The scope of analysis of this relationship is enhanced to the technical, marketing and organizational dimensions of innovation but also to the source (market or technology-based) and nature (sustained or disruptive) of innovation behavior. In order to encompass the various attributes of strategic posture and innovation behavior, we use a hybrid model that synthesizes both the internal focus of competitive strategy provided by the rationale of Miles & Snow's adaptive cycle and Porter's external approach, thus leaving possibilities for the emergence of contingency-specific combinations of different strategic posture attributes with differentiated innovation behavior attributes. Results support first, the existence of differentiated strategy-innovation alignments, thus, supporting the predictive validity of competitive strategy on firms' innovation behavior. Second, results highlight the influence of distinct but complementary industry-specific and firm-specific effects on strategy-innovation relationship, depending on innovation dimensions. Third, from a managerial standpoint, we provide contingency-dependent guidance for effective strategic management of innovation in SMEs.

5.2. Keywords

Strategic posture, innovation behavior, fit, contingencies, industry effects, firm effects, SMEs

5.3. Introduction

Research on competitive strategy has largely emphasized the differentiated influence of industry and firm-level contingencies (Rumelt, 1991; McGahan and Porter, 1997; Spanos and Lioukas, 2001; Kaniovski and Peneder, 2002; Spanos et al., 2004). The innovation literature has also approached this industry vs. firm-level perspective focusing on the varying degree of permeation of technologies into industries as well as into firms (Kirchner et al. 2009; Peneder, 2010). Innovation is considered mandatory to develop and maintain sustainable competitive advantage as long as firms emphasize innovation and strategic profiles that fit, and design such profiles according to firms' internal and external contexts (Miles and Snow, 1978, 1994, 2003; Zahra and Covin, 1993, 1994; Zahra, 1996; Damanpour and Gopalakrishnan, 1998; Becheikh et al., 2006a). As change accelerates and market turbulences increase, innovation has become a key determinant of firm effectiveness (Brown and Eisenhardt, 1997). Today's challenge for developing competitive advantage is to permanently adapting strategic posture to environment contingencies in a non-linear innovation process (Hamel, 1998; D'Aveni, 1999). The critical issue is therefore to design and implement adaptive business strategies where innovation plays a central role combining diversity with coherence.

In a comparative study on the determinants of large and small-firm innovation, Van Dijk et al. (1997) posit that market structure characteristics impact innovation in large and small firms differently. Profitability and market growth only affect large-firm R&D, whereas firm size, capital intensity (measured as a proxy for the barrier to new firms), and skilled labor only determine small-firm R&D. Although there is a volume of research on the relationship between business strategies and innovation, there is less evidence on the dynamics of this relationship. Indeed, the causal logic of the influence of environmental and organizational determinants linking strategic posture - here defined as the alignment of the firm organization's design components with strategy and with each other (Porter, 1996) - and innovation behavior have been partially explored. There is a necessity to bridge this gap, especially concerning SMEs, where contingencies strongly influence strategic and innovation policies and where most researches have mainly focused on the limited scope of technological innovation (Koberg et al., 2003; Becheikh et al. 2006a, 2006b).

From both academic and managerial perspectives, the issue of industry and firm contingencies on the relationship between strategic posture and innovation behavior need further exploration that we attempt to address by answering to the research question of the second essay: What is the relative impact of industry and firm-specific effects on strategy-innovation relationship? By answering to this question, we intend to explore the dynamics of industry and firm contingencies on the relationship between attributes of strategic posture and innovation behavior. Furthermore, we also investigate the impact of contingencies on the predictive logic as regards the strategy-innovation relationship.

This essay presents a model that interrelates strategic posture, innovation behavior, and industry contingencies (here identified as market forces) and firm-specific contingencies (here identified as strategic capabilities, i.e. *'complex bundles of skills and accumulated knowledge that enable firms to coordinate activities and make use of their assets'* (Day, 1990, pp. 38). The research aims at understanding the differentiated impact of external and internal contingencies on strategy and innovation management as well as on strategy-innovation coalignment. Working on SMEs from manufacturing sectors, we investigate on a typology of firms usually highly impacted by market forces, and strongly dependent on their idiosyncratic resources and organizational behavior to built-up sustainable competitive advantage. We have constructed our model to contribute to strategic and innovation management research in several ways.

First, in order to explore the alignment between strategic and innovation profiles, we have built a conceptual model enabling the emergence of contingency-specific strategic and innovation profiles at the firm's level. This model combines Miles and Snow's (1978) internal and Porter's (1980) external focus of competitive strategy, thus leaving possibilities for combinations of derived hybrid strategic profiles depending on firm and industry-specific contingencies. The model also enables contingency-dependent combinations of innovation profiles regarding the nature, source and activity attributes of innovation. Doing so, we investigate strategy-innovation relationship while also studying the interrelations of strategic and innovation attributes from a contingency perspective. Second, we enhance the scope of analysis of this relationship, usually focused on technical innovation (Becheikh et al. 2006), to the marketing and organizational dimensions of innovation (Ayerbe, 2006). Therefore, this research also intends to bring a new methodological contribution to the constructs of strategy and innovation in SMEs. Indeed, our work re-investigates the industry-independent nature of Miles and Snow's strategic type framework (Hambrick, 2003; DeSarbo et al., 2005, 2006) while enhancing this investigation to innovation profiles. Third, we investigate, through this systemic approach of strategic posture and innovation behavior, the causal logic of strategy-innovation relationship under the influence of industry and firm-specific effects. In so doing, we intend to provide managerial guidelines to SME executives for an effective management of innovation that would best match their strategic posture with regard to their internal and external environmental context.

This paper is organized as follows. Having outlined the focus and the expected contributions of the research above, the following sections review the literature on the relationship between strategic posture and innovation behavior from a contingency perspective and explore the influence of industry-specific and firm-specific contingencies on strategy-innovation relationship. We then develop our conceptual model and research hypotheses, and present the empirical background of the research giving details of data and methods. Empirical results and findings are introduced followed by a discussion. We finally provide insights on theoretical, methodological and managerial implications of this second essay, while considering the limitations of this investigation and directions for further research.

5.4. Literature review on strategic posture and innovation behavior from a contingency perspective

5.4.1. Strategic posture and innovation behavior: industry and firm level perspectives

A configuration theory approach of contingencies

For the purpose of this research conducted in French manufacturing SMEs, we approach competitive strategy from both industry and firm perspectives. Thus, we consider industry effects (market forces) and firm effects (firm's idiosyncratic capabilities) as possible factors of influence of firm's strategy-innovation relationship. Indeed, one of the most studied and investigated topic in strategy and organizational adaptation concerns whether it is managerially or environmentally derived or, in analogous terms, whether it is driven by strategic choice (Child, 1972; Weick, 1969, 1977) or environmental determinism (Chandler, 1962; Drucker, 1954, 1974; Porter, 1980). Although initial prevailing assumption was that strategic choice and determinism represented mutually exclusive, competing explanations of organizational adaptation, subsequent studies have demonstrated that organizational adaptation is a dynamic process that is both organizationally and environmentally inspired

(Hrebiniak and Joyce, 1985; Miles and Snow, 1978, 1994; Porter, 1996; Spanos and Lioukas, 2001, Spanos et al., 2004). Moreover, scholars emphasize the necessity to "think in circles" (Weick, 1979; Miles and Snow, 1978; Grant, 1991; Barney; 1991), to investigate the reciprocity of relationships between organization and environment, and to study their mutual causality. In this perspective, Spanos and Lioukas (2001) suggest that industry and firm effects are both important but explain different dimensions of firm's competitive strategy, and consequently, of firm's performance. Studying Greek manufacturing firms, Spanos et al. (2004) also show that, even though both industry and firm effects contribute to firm profitability, firm-specific factors explain more than twice as much profit variability as industry factors. Audretsch (2001) also raises this new dynamic approach of industrial organization with a focus on small firms and innovation. Whereas in the static, traditional approach, new knowledge plays no role, and scale economics dictates growth, the new industrial organization stream emphasizes the role of knowledge as inherently uncertain, asymmetric and associated with high transaction costs. This puts to the fore small and new firms as vehicle of innovation because economic agents have an incentive to commercialize the perceived differentiated value of their new knowledge as a leveraging effect of competitive advantage.

Investigating the complex influences of both industry and firm's effects on strategic posture requires understanding how organizational elements such as firm's activities, policies, structure, processes, resources interact together and with external environment. In today's global knowledge-based economy, this is a central challenge for SMEs of the manufacturing sectors, as they have to address diverse and complex market forces raising issues of productivity, flexibility, quality of products and services, information intelligence, and more specifically, innovation management strategic capabilities (Hamel, 1998; Thornhill, 2006). Strategic capabilities have been defined as '*complex bundles of skills and accumulated* *knowledge that enable firms to coordinate activities and make use of their assets to create economic value and sustain competitive advantage*' (DeSarbo et al., 2005, p. 49). From this perspective, scholars have tended to put to the fore a universalistic approach of best practices in terms of acquisition and development of strategic capabilities likely to foster technological innovation (Roper and Love, 2002; Becheikh et al., 2006a).

However, other scholars suggest that the multidimensional nature of competitive strategy requires a configurational approach that seems best suited than this universalistic approach to the understanding of the relationship between strategic and innovation management (Delery and Doty, 1996; DeSarbo et al., 2005; Becheikh et al., 2006b; Raymond et al, 2010). Configuration theorists have a systemic and holistic view of organizations where patterns of profiles rather than individual independent variables are related to an outcome such as performance (Fiss, 2007). Configuration theorists have long posited that fit among strategy, technology, organizational structure and operating processes are key to overall effectiveness of a firm (Chandler, 1962; Miles and Snow, 1978, 2003; Porter, 1996). Additionally, empirical studies on configuration have consistently found evidence that fit, among not only strategic posture and organizational characteristics but also with environment is a good predictor of firm performance (Venkatraman, 1990; Slater and Narver, 1994, 1995; Ketchen et al., 1997). Therefore, the configurational approach is especially relevant to understanding the internal and external articulation of strategic attributes and innovation attributes from a contingency perspective. Configuration theories seem also particularly adapted for such investigations in SMEs for which selecting the appropriate strategic posture and innovation behavior with regard to external environment and internal capabilities is critical, given the constraints they face in today's complex business environment. Indeed, innovation has long been considered as a key determinant for achieving firm's strategic goals (Kotabe, 1990), especially in SMEs (Audretsch, 1995; Ussman et al., 2001) where effective innovation behavior enables SMEs compensate their inherent vulnerability by taking advantage of challenges raised by a knowledge-based economy (Hoffman et al., 1998; Amara et al., 2008)

Configuration theories emphasize the classification of organizations into typologies. The two dominant configuration typologies, developed by Miles and Snow's (1978) and Porter's (1980) provide two perspectives. The former is based on an internal focus on the firm's intended rate of product-market change, the latter, on generic strategies stemming from an external focus on customers and competitors. However, research has suggested a general congruence between Miles and Snow's typologies and Porter's leadership and differentiation categories (Segev, 1989). Miles and Snow have developed a systemic approach (the adaptive cycle) of how firms define and address their product-market domains (the entrepreneurial problem) and design processes and structures (the engineering and administrative problems) to develop and maintain competitive advantage in those domains (Figure 10).

Miles and Snow have accordingly defined four profiles of firms and the corresponding business strategies. The "Defenders" attempt to limit uncertainty by creating stable competitive positioning via specialization and look for the maximum efficiency on a specific product-market domain. The "Prospectors" permanently look for new products and market opportunities. The "Analyzers" apply a prospector-following strategy to develop new opportunities while securing a stable product-market domain. Miles and Snow qualify these three forms of organization as "stable", meaning that when a firm pursues one of these strategies, and designs the organization accordingly, then the firm may generate sustainable competitive advantage. The fourth profile, "Reactors" undergo market changes without consistent entrepreneurial response.

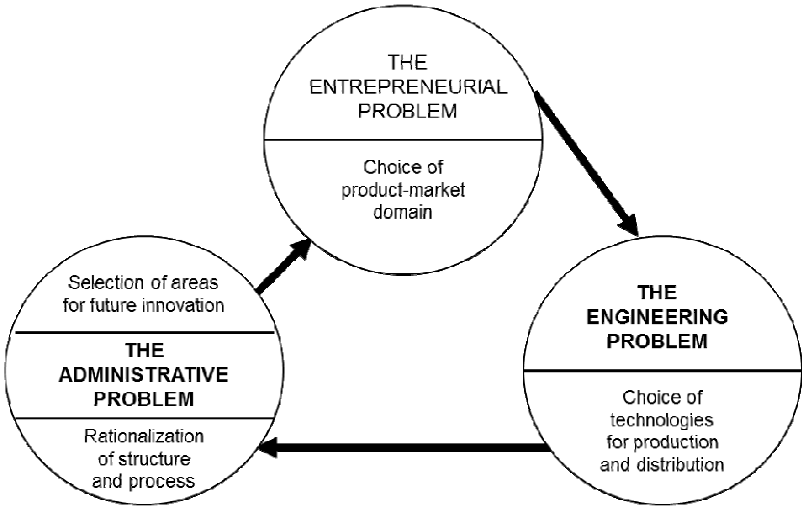


Figure 10 – The adaptive cycle
Source: Figure from R.E. Miles, C.C. Snow - Organizational Strategy, Structure, and Process – Stanford University Press, 2003, p. 24, Figure 2.1.

Porter's model (1980) of generic strategies is designed on the assumption that a firm's competitive positioning is mainly influenced by the industry in which the firm competes. From Porter's original point of view, industries consist of firms producing close substitutes, but the firms' competitive environment has a common structure made of market forces (bargaining power of buyers and suppliers, threat of new entrants, intensity of rivalry among incumbent firms, and pressure from substitute products) that jointly influence industry's overall competitiveness and profitability. In Porter's approach, through a proper understanding of these market forces, a firm can affect them by its own actions and position itself in a more favorable situation against competitive pressure. Porter (1980) proposes a set of generic strategies that firms should pursue in order to protect themselves against the pressure of market forces and achieve higher profitability than the industry's average. These generic strategies posit that competitive strategy should be considered as how a firm creates customer value compared with its competitors, via differentiation or low cost, and how it defines its scope of market coverage, focused or marketwide (Figure 11).

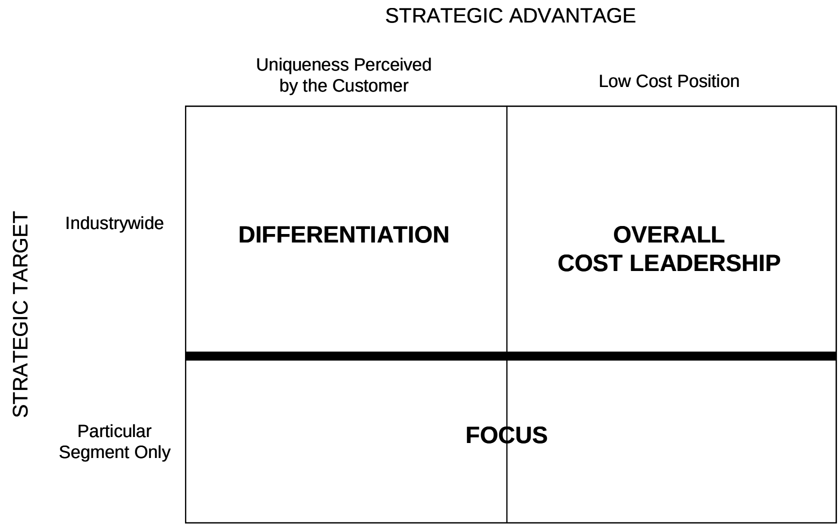


Figure 11: Porter's Generic Strategies
Source: Figure from M. Porter – Competitive Strategy – Free Press, 1998, p. 39, Figure 2.1.

Porter (1980, 1998) emphasizes that these generic strategies are mutually exclusive to achieve above average industry performance, and states that *"effectively implementing any of these generic strategies usually requires total commitment and supporting organizational arrangements that are diluted if there is more than one primary target"* (Porter, 1980, p. 35). Further to his works on fit among a firm's activities as a determinant of competitive positioning (Porter 1996), Porter highlights the importance of following only one of these generic strategies at a time: *"…being the lowest cost producer and being truly differentiated and commanding a price premium are rarely compatible. Successful strategies require choice or they can be easily imitated."* (Porter, 1998, p. xiv).

Although both approaches have their own strengths and limitations (Walker and Ruekert, 1987), Miles and Snow's (1978, 1994, 2003) works have largely helped to crystallize the concept of strategic equifinality and to develop today's "configurational view" of strategy. This configuration perspective suggests that, within a particular industry or environment, there is more than one way to prosper even though there are not an infinite ways to prosper. Consequently, firms should select among a few basic strategic postures to design their business according to their changing environment (Saïas and Metais, 2001).

On top of the industry impact on competitive strategy, Miles and Snow (1978) also include the firm's specific dimension as a key element of their schema. Indeed, as pointed out by Snow and Hrebiniak (1980, p. 317), *"a firm's distinctive competence is more than what an organization does especially well in comparison to its competitors; it is an aggregate of numerous specific activities that the organization tends to perform better than other organizations within a similar environment"*. Among these distinctive competences, they highlight organizational structure, managerial attitudes, technical capabilities, adequacy of product line, and patterns of growth.

Theorists of the resource-based view of competitive advantage (Barney, 1991, 2001; Grant, 1991) emphasized that the value of a firm's distinctive advantage stems from the strategic capabilities, namely the idiosyncratic resources and competences which, if properly managed, can generate competitive advantage, and that this competitive advantage is determined by the market context within which a firm is operating. This postulate implies that firm's strategic capabilities strongly impact strategy formulation. Indeed, the analysis of potential rent-generating capabilities puts to the fore those resources and capabilities which are durable, difficult to identify and understand, rare, not easily imitable and imperfectly replicable (Barney, 1991). Consequently, these distinctive capabilities play a key role in the competitive strategy pursued by the firm, which has to be designed in order to make the most effective use of these core resources and competences (Grant, 1991). Spanos and Lioukas (2001) have emphasized the direct and indict effects of firm's strategic capabilities on market and financial performance. They posit that the firm's available stock of resources and competences is critical to firstly, developing and strengthening its strategic posture and secondly, efficiently implementing the selected competitive strategy.

As a result, when formulating its strategy on the basis of its capabilities, the firm may limit its strategic scope to those activities where it possesses a clear competitive advantage. Essential, however, is the ability of the firm to generate and maintain a sustainable competitive advantage thanks to these core idiosyncratic assets in order to leverage the best out of it over a maximum period. If firm's strategic capabilities lack durability or are easily imitable or transferable, then the company must either adopt a strategic posture where it focuses on maximizing short-term competitive advantage in a process of continuous innovation or invest in developing disruptive, more durable competitive advantage (Grant, 1991; Kim and Mauborgne, 2005). This is a critical issue for SMEs, which cannot benefit from the cost-spreading return of innovation investment compared to large firms' investments (Cohen and Klepper, 1996). This may impact the strategic posture of SMEs operating in environments where the speed of technological change affects the durability of competitive advantage provided by technology-based innovation. Consequently, in industries where competitive advantages based upon differentiation and innovation can be imitated, firms should not work out their ability to sustaining their existing advantages but rather design an organizational configuration facilitating flexibility and responsiveness to take advantage of new technological or market opportunities (Grant, 1991).

Articulating strategy and innovation: the effect of contingencies

From the "strategic choice" perspective, strategy articulates company goals and appropriate means to generate competitive advantage. Among these means, innovation is recognized as particularly relevant (Hambrick et al., 1983; Kotabe, 1990). From this perspective, the firm's environment influences the selection of the strategy, which, in turn, determines firm's innovation behavior with the aim of creating a distinctive competence resulting in a competitive advantage. Innovation is therefore a way for the firm to generate competitive advantage through a process of effective internal change (Grant, 1991). Considering that strategy guides innovation decisions and is therefore a predictor of innovation behavior, without precluding the reverse relationship in the long run (Schroeder, 1990; Zahra and Covin, 1994), scholars also emphasize the moderating role of industry-specific (Zahra, 1996) and firm-specific (Raymond and Saint-Pierre, 2010a) contingencies on innovation. They posit that for an effective implementation of innovation strategies, firms should make sure that such strategies match the firm's environment and that they have identified the relevant strategic capabilities in this environment. Comparing product innovation strategies in conservative and entrepreneurial firms, Miller and Friesen (1982), also found strong evidences that the determinants of product innovation in firms are largely a function of the strategy that is being pursued. The influence of distinctive capabilities, structure, decision-making, and environment factors, appears to be more a function of whether firms have adopted a conservative (Miles and Snow's Defender profile) or an entrepreneurial (Miles and Snow's Prospector profile) strategic posture. Miller and Friesen suggest that research on strategy-innovation relationship should consider Child's (1997) approach to view organizations in a less deterministic light and pay more attention to the role of strategic choice. As a consequence, and an example of this approach, they recommend looking at strategy as a mediator in the relationship between innovation and its context.

We have considered so far firm's resources and capabilities as predetermined. However, a firm's strategy deals not only with the deployment of existing resources, but also with the development and upgrading of the firm's resource base required to generate new competitive advantage. This upgrading of firm's resources and capabilities requires solid strategic directions from top management with regard to the strategic capabilities that need to be developed and the type of technology and organization to support these capabilities. This requires the definition and the communication of an unambiguous strategic vision and strategic posture in order to generate a sense of urgency at all levels of the organization, thus resulting in continuous stretching and leveraging of firm's resources. Such a strategic intent (Hamel and Prahalad, 1989) must be supported by the appropriate structure and processes required for its effective implementation (Miles and Snow, 1978, 1994, 2003). This is particularly valid in today's changing environment, where smart competitors must be innovative enough to create tomorrow's competitive advantages faster than competitors will imitate the ones they possess today. The goal is no longer competitive imitation of incumbents, but competitive innovation (Hamel and Prahalad, 1989). Consequently, identifying the interactions among attributes of strategic posture and innovation behavior as a condition to organizational effectiveness and growth seems more appropriate than identifying individual determinants of this effectiveness (Raymond et al., 2010).

Exploring the influence of firm's strategic capabilities on strategy-innovation relationship is central to our research. Indeed, as pointed out by Hamel and Prahalad (1989), strategic intent implies a sizable stretch for an organization. This forces the organization to enhance the scope of innovation behavior beyond technological innovation to make the most of limited resources in order to create new competitive advantages. As Hamel quotes (1998, p. 20): *"the fundamental competitive challenge is not achieving operating efficiency in capital-intensive industries. The challenge is unleashing innovation in imagination-intensive industries. And every industry is becoming an imagination-intensive industry"*. Hamel stresses that innovation must be considered at a large scale and encompass more than product line extensions and incremental efficiency gains. The unit of analysis of innovation is the entire business system. As strategy life cycles are getting shorter, pursuing a critical size is no longer a strategy nor is getting better. In order to cope efficiently with market turbulences in non-linear industries, getting different with non-linear strategies will create new competitive advantage (D'Aveni, 1999). Hence, firm's strategic intent from the innovativeness perspective will be to implement non-linear-innovation strategies embracing innovation at the business design level as well as at the level of the individual product or service (Hamel, 1998). The critical issue is to develop adaptive competitive strategy models where innovation plays a central role combining diversity with coherence.

The issue of firm's specific capabilities and adaptive competitive strategy is critical for SMEs. Indeed, these organizations cannot count on a large-based set of resources to implement this type of non-linear competitive innovation. Moreover, when considering the existence of technological trajectories that may lock firms into sectoral patterns (Pavitt, 1984) and consequently hide certain innovation opportunities, one can question the ability of SMEs to set up and develop the appropriate structure and resources to "unlock" their pattern and change market boundaries. In an attempt to differentiate the inputs generating innovative performance in small and large manufacturing firms, Vaona and Pianta (2008) demonstrated that small and large businesses pursued different strategies when introducing product and process innovations. While product innovation is rooted in growth-oriented strategy in search for opening new markets, process innovation is rooted in market-expansion strategy and production flexibility. Opening new markets thanks to product innovation seem easier and more widely spread in large firms. As regards process innovation, however, small firms tend to focus on production flexibility whereas large firms emphasize market expansion.

Synthesis

The relationship between strategy and organizational adaptation is a complex, dynamic issue that is both and reciprocally managerially and environmentally influenced (Miles and Snow, 1978, 1994; Porter, 1996; Barney, 1991; Grant, 1991; Spanos and Lioukas, 2001). Nevertheless, the core of this relationship lies in the fit among strategy, organizational characteristics and environment as a predictor of firm's effectiveness (Venkatraman, 1990; Slater and Narver, 1994, 1995; Ketchen et al., 1997). Configuration theories encompass this multidimensional aspect of competitive strategy suggesting different typologies of organizations with reference to different environmental and managerial configurations. The two dominant configuration strategies, Miles and Snow's (1978) and Porter's (1980) provide two perspectives based, for the former, on a typology relying on an internal focus on the firm's intended rate of product-market change, and for the latter, on generic strategies stemming from an external focus on customers and competitors. Firm's competitive strategy seems a strong predictor of innovation behavior. However, industry-specific (Zahra, 1996) and firm-specific (Raymond et al., 2010) contingencies tend to moderate strategy-innovation relationship. Consequently, in the search for an effective implementation of innovation strategy, firms should align their innovation behavior with regard to the influence of external environment and develop the relevant environment-specific capabilities supporting the predictive strategy-innovation relationship.

5.4.2. Strategic posture and innovation in context: environment, organization, and fit

The effects of contingencies on competitive strategy and innovation

Firms of all types adopt innovations to respond to changes in their external or internal environments. Consequently, innovation behavior reflects a firm's entrepreneurial orientation (Naman and Slevin, 1993; Lumpkin and Dess, 1996). However, organizational factors may have unequal influence on innovation depending on the organizational structure of the firm as well as external environment factors may influence firm's innovativeness (Van de Ven, 1986). Many scholars have observed that industries differ in the amount of firm resources devoted to innovation and in the degree of innovativeness as well as the source of innovation (Pavitt, 1984; Breschi et al., 2000; Vaona and Pianta, 2008). Such differences are commonly associated with different market structures, firm strategies, and organizational configurations, i.e., organizational elements such as firm's activities, policies, structural elements, and resources, forming a firm-specific system. Thornhill (2006) suggests that both industry characteristics and firm-level resources and capabilities are associated with firm-level innovation. Moreover, according to Thornhill, there exists a direct relationship between industry dynamism and firm-level innovation and a direct relationship between innovation and firm performance. Still, two contingencies seem to have a significant influence on the organizational management of innovation: uncertainty and complexity (Damanpour, 1996; Tidd, 2001). In a review of 21 research papers, Damanpour (1996) concludes that environmental uncertainty influences both the magnitude and the nature of innovation. Environmental conditions such as turbulence, complexity, and competitiveness do not affect organizational change and innovation equally. Thornhill (2006) provides inputs showing that in dynamic, high-technology manufacturing sectors, the number of innovations with high degree of novelty is substantially superior to low-technology sectors. These findings suggest that future research on the organization and the management of innovation should develop environmental sensitive theories of innovation within organizations by explicitly controlling for the degree and the nature of environmental uncertainty. Indeed, perceptions of environment uncertainty appear to affect strategic posture (Miles and Snow, 1978; Porter, 1980), and consequently the management and the organization of innovation. Complexity is a function of the number of technologies and their interactions. Recent research assumes that the management and the organization of innovation of complex product and systems are significantly different from other types (Hobday et al. 2000). Uncertainty, from an innovation perspective, is a function of the rate of change of technologies and product-market domains, whereas complexity is a function of technological and organizational interdependencies (Miles and Snow, 1978; Damanpour, 1996; Tidd, 2001). The distinction between types of technology is an important factor involved in the development of knowledge-based organizations and the implementation of related strategic choices. For instance, in the manufacturing sectors, advanced information technology serves production flexibility and efficiency, thus supporting cost-competitive orientation dedicated to market expansion (Vaona and Pianta, 2008). According to Damanpour (1996), technological intensity might be an even more effective factor than industrial sector class in determining structure-innovation relations in organizations and thus, it deserves attention in research projects.

Studying innovation attributes is an important topic when investigating the relationship between strategic posture and innovation behavior, and the contingency factors affecting this relationship. Indeed, some attributes can be seen as industry-specific and others as more firm-specific. Damanpour (1996) also demonstrates that technological and administrative innovation refers to different firm's organizational commitment. Product innovations seem to be more easily observable and appropriable by firms whereas administrative innovations seem to be less tangible and easy to implement (Damanpour and Evan, 1984). This raises the issue of the transferability and imitability of innovations whose initial purpose is to provide competitive advantage through internal change (Barney, 1986, 2001; Grant, 1991). Technological innovations seem to be more industry-specific while administrative innovations are more firm-specific and cannot be imitated without the adopting firm considerably adapting them to its strategic posture.

Not all types of innovation are equally suited to all environmental conditions (Damanpour and Gopalakrishnan, 1998). For instance, administrative innovations seem particularly suited to firms evolving in unstable environments because continuous environmental change requires frequent changes in structure and processes of these firms to facilitate organizational adaptation accordingly, and consequently support appropriate technological innovation (Ayerbe, 2006). Similarly, innovation novelty is higher and developed internally in firms evolving in unstable environments, and aiming at taking advantage of any market or technological opportunity (Miles and Snow, 1978, 2003;

Damanpour and Gopalakrishnan, 1998). Innovation novelty is also higher, but acquired from an external source by firms evolving in unpredictable environments and willing to adopt innovation quickly in response to unexpected changes in market demand (Miles and Snow, 1978, 2003; Damanpour and Gopalakrishnan, 1998).

The degree of novelty of innovation and its corresponding organizational configuration are also impacted by external environment and industry factors (Tushman and Romanelli, 1985; Damanpour, 1996; Zhou et al., 2005). Tushman and Romanelli, suggest that radical innovations occur during periods of discontinuous change, and incremental innovations occur during periods of adaptation. Zhou et al. posit that market forces are significant contributors to radical innovation and investigate this influence from a technology or market-based perspective. Demand uncertainty positively affects both types of innovations. Technology turbulence leads to more tech-based innovations suggesting that adopting new technology is not sufficient to innovatively meet market needs, whereas competitive intensity leverages more market-based innovations, signifying that, in this perspective, some firms do not accept the constraining factors of competition – limited market space and the need to beat rivals in order to succeed – and tend to explore new uncontested market spaces to escape intense competition (Kim and Mauborgne, 2005).

In fact, the sustaining – i.e. aiming at continuously, step by step, improving existing offering characteristics for existing customers and markets - or disruptive – i.e. aiming at providing brand new, radically different offering characteristics to address new markets or users - nature of innovation seem to be impacted by different environmental, organizational, process, and managerial factors. Studying innovation factors in firms operating in three industries (aerospace, electronic components, and telecommunications), Koberg et al. (2003) suggest that the strategy-structure causal sequence for radical innovations is significantly different from the strategy-structure sequence for incremental innovations. Indeed, different factors in the environment and in the organization limit or favor different innovation strategy efforts. Factors such as environmental dynamism, age and size of the firm, intrafirm linkages, and the age of the CEO, favor incremental innovation. Factors such as environmental dynamism, intrafirm linkages, experimentation, and transitioning from one project or product to another, favor radical innovations.

Contingencies and strategy-innovation relationship

Many research projects have been conducted on the environment-strategy and strategy-structure relationship. However, few studies have investigated the specific issue of this relationship with innovation from the configurational perspective of linkages between environment, strategy, and innovation attributes (Dess et al., 1993; Miller, 1996; Tidd, 2001). A configuration is an internally consistent combination of strategy, organization and technology that provides superior performance in a given environment (Tidd, 2001). Many scholars have emphasized the importance of the right configuration in order to allow consistency in operations as a determinant factor of firm performance (Lefebvre and Lefebvre, 1993; Dean et al., 1998; Slater and Olson, 2000; Ebben and Johnson, 2005). Focusing on small firms, Lefebvre and Lefebvre (1993) highlight the need for a firm to be permanently preoccupied by market signals in order to align its innovation strategy to its market strategy to be able to derive the full benefits expected from innovation. To do so and to maintain a distinctive strategic posture, Lefebvre and Lefebvre posit that the firm has to leverage differentiated innovative efforts - measured as intensity of product and process innovation - closely aligned to the chosen strategy. These findings bring inputs to the belief that competitive strategic positioning, as a response to market forces, guides innovation practices. Moreover, a consistent strategic posture adapted to the level of turbulence of the environment is a qualifying factor for the consistency of the organizational configuration

(D'Aveni, 1999). Distinguishing between flexibility and efficiency strategies in small manufacturing firms, as responses to environment uncertainty, Ebben and Johnson (2005) suggest that equifinality of performance of both strategic types is respected as long as there is no strategy and configuration mixing. Indeed, an efficiency strategy requires specific innovative practices focused on process innovation and the search for productivity and price-competitiveness, when a flexibility strategy emphasizes market-based product innovation supported by technology-competitiveness (Vaona and Pianta, 2008). Small and large firms are significantly different in their responses to industry environments in terms of strategic postures and organizational characteristics (Dean et al., 1998). Small businesses are more likely than large ones to pursuing strategies built upon the strengths of speed, flexibility and niche-filling capabilities. Therefore, unstable environments seem more favorable to small firms as, when environment become unstable, large firm performance is reduced and small firms can better take advantage and capitalize on new technological and market opportunities. Besides, differentiated industries, i.e. industries providing niche-filling opportunities for product innovation, appear to create special opportunities for small firms, which can make a better use of their unique resources and capabilities.

This puts to the fore that a firm's distinctive resources and capabilities, as well as environmental factors, interrelate with strategic posture, and influence firm performance (DeSarbo et al., 2005). Understanding how these interactions take place, and under which causality framework, is a key issue for managers in order to permanently aligning organizational configuration and strategic posture with regard to the level of environmental uncertainty and complexity. When investigating the mechanisms through which industry factors (measured as industry forces, i.e., barriers to entry, bargaining power of customers, power of suppliers, threat of substitutes, and competitive rivalry) and firm distinctive capabilities (measured as organizational capabilities, marketing capabilities, and technical capabilities) influence firm performance, Spanos and Lioukas (2001) empirically demonstrated some of these interactions. They posit that strategic posture significantly influences firm performance due to the coherence of strategic positioning with regard to the influence of industry forces. Strategic posture is itself influenced by firm's distinctive capabilities, which provide the ability to generate sustainable competitive advantage. Complementary to the specific effect of internal capabilities on strategy, the efficiency of the firm's organizational configuration is also a direct determinant of organizational performance. The same prevails for firm's strategic capabilities and innovation performance. Indeed, differentiated strategic attributes generate differentiated innovation behaviors indicating that strategy is a determinant of innovation activities (Zahra and Covin, 1994). Therefore, selecting the proper type of strategic posture and consequently, the adapted, context-specific innovation behavior related to the source, the nature and the type of innovation activities seems a good predictor of firm‘s effectiveness in achieving strategic goals (Zahra, 1996). Moreover, as regards manufacturing SMEs, distinctive profiles of strategic capabilities seem to have differentiated predictive validity of a successful implementation of innovation strategy, hence of competitive strategy (Raymond and Saint-Pierre, 2010a). This highlights the need for SMEs to emphasize the development of strategic capabilities likely to support the adoption of innovation behaviors that match with their strategic objectives.

Synthesis

Strategic choices in terms of product-market domain of operation, type of innovative activities as well as nature (sustained or disruptive) and source (technology or market-based) of innovation interrelate and are influenced by external contingencies such as environment uncertainty and complexity as well as internal organizational factors (Van de Ven, 1986; Damanpour, 1996; Tidd, 2001; Vaona and Pianta, 2008). Moreover, the internal causal logic of the strategy-structure sequence for innovation behavior stems from different environmental and organizational factors (Koberg et al., 2003). Strategic posture and innovation behavior are influenced differently by external and internal contingencies and strategic and innovation profiles are not all equally efficient depending on the possessed capabilities and the environmental context (Damanpour and Gopalakrishnan, 1998; DeSarbo et al. 2005; Vaona and Pianta, 2008). Firms should select the innovation behavior that match the best their strategic posture in their specific external and internal context.

5.4.3. The influence of contingencies on strategy-innovation fit

According to contingency theory, there is no single combination of alignment between strategy, structure, process and environment that is effective in all circumstances (Miles and Snow, 1978; Drazin and Van de Ven, 1985; Donaldson, 1996). However, there is an optimal organizational structure that best fits a given contingency or context (characteristics of the organization's culture, environment, technology, size, or task). Consequently, organizational performance depends on the fit between organization's context and structure and process. The higher the fit between an associated organizational configuration, considering a given contingency, the higher the organizational performance (Miles and Snow, 1978, 1994; Drazin and Van de Ven, 1985). Central to this approach is the notion of fit, which can be seen in terms of consistency across multiple dimensions of organizational design and context (Drazin and Van de Ven, 1985) or, to put it differently, the degree to which a firm's strategy, structure and the elements of the organizational system complement one another (Miller; 1996; Siggelkow, 2002). Miles and Snow (1994) posit that firm's superior performance should be thought as achieving the two dimensions of fit; external fit between the firm and its environment, that is, the relevance of the firm's strategic posture in a given environment, and internal fit, that is, the coherence of organization's structure, processes and managerial ideology supporting this strategic posture.

Structural fit can then be seen as a major source of competitive advantage independent of industry and strategy content, i.e., organizational factors can act as sources of competitive advantage independent of traditional industry variables. Indeed, the core of distinctive competence and competitive advantage may not stem from the possession of specific organizational resources or skills that can be imitated or purchased by others (Barney, 1991). Rather, competitive advantage may lie in the way a firm aligns its strategic posture with the complexity of its structural components – skills, resources, routines, technologies - and processes, and its environment. Indeed, a firm can be viewed as a system of interdependency among above-mentioned elements that need to be adequately coordinated to compete in the market place. It is the understanding of the complexity and ambiguity of these interrelations in the formulation of strategy that provides unique capabilities, mostly impossible to copy, to some firms (Grant, 1991; Miller, 1996; Barney, 2001).

When investigating the various dimensions of fit from a firm's innovation policy and strategic posture perspective, scholars have emphasized the need to align technology policy decisions in terms of their collective fit with strategic posture rather than as independent decisions especially in the resource-constrained context of the SMEs (Thornhill, 2006). Indeed, strategic posture seems to moderate the relationship between technology policy and firm performance whereas technology policy's fit with strategic posture is a significant predictor of firm performance. Then, the technology policies that should fit a particular strategic posture can be identified as those that significantly correlate with performance among firms with strategies guiding the use of their context-specific technology resources and skills (Zahra and Covin, 1993; Zahra, 1996). Complementary to these findings, scholars have provided evidence that observation of market insights also leverages the benefits provided by technological innovations (Lefebvre and Lefebvre, 1993), suggesting that innovative efforts should be aligned with product-market strategy and that distinctive competitive strategies may require differentiated innovative efforts. Although little research has been conducted to extend these investigations to marketing and organizational innovations (Becheikh et al., 2006b), there are significant inputs to further investigate in this direction if according to Porter (1996, p. 73) *"strategic fit among many activities is fundamental not only to competitive advantage but also to the sustainability of that advantage. It is harder for a rival to match an array of interlocked activities than it is merely to imitate a particular sales-force approach, match a process technology, or replicate a set of product features"*.

Competitive strategy has been empirically depicted as a predictor of innovation (Hambrick et al., 1983; Kotabe, 1990), which itself is considered as a means for achieving the goals of competitive strategy and generate sustained competitive advantage (Kotabe, 1990). More specifically, fit between strategic posture and innovation behavior is posited as a predictor of firm performance (Zahra and Covin, 1993; 1994). The effect of external and internal contingencies on firm's competitive strategy is widely acknowledged in the literature (Boyd et al., 1993; Barney, 2001; Spanos and Lioukas, 2001; Spanos et al., 2004). The moderating role of environment on strategy-innovation and innovation-performance relationship has also been emphasized (Zahra, 1996; Koberg et al., 2003). Referring to Miles and Snow's adaptive cycle (1978), a firm's environment contingencies, on top of affecting managers' "entrepreneurial choice" of product-market domains, also affect managers' "engineering choice", i.e., the choice of the firm's technology strategy to be able to deliver its offering on the selected product-market domains. Birnbaum (1984) views a firm's technology strategy as the firm's choices and activities to deploying its technological resources to seize market opportunities and counteract uncertainty. According to Zahra (1996, p. 192), *"uncertainty reflects the dynamism, heterogeneity, and hostility of the company's environment. Even within an industry, companies vary in their environmental perceptions because of their different risk orientations, relative capacities, and past performance* *histories"*. Accordingly, the principles of configurational equifinality suggest that, within a particular industry or environment, there is more than one way to prosper, as long as some basic patterns of strategic posture are respected (Miles and Snow, 1978, 2003; Gresov and Drazin, 1997; Hambrick, 2003). Consequently, firms in different environments, i.e. likely to adopt different context-specific strategic postures, should pursue different innovation strategies that best match the firm's perception of strategic context.

Moreover, it is also suggested that external and internal contingencies influence strategic posture attributes differently when pursuing disruptive or sustained innovation (Koberg et al., 2003). As a result, contingencies may also influence strategy-innovation fit, thus moderating the predicting role of strategic posture on innovation behavior and hence, on the generation of competitive advantage. For instance, environmental hostility, when perceived by firm's management, seems to magnify the exploitation of new product and market opportunities or the focus on more stable niche market segment with emphasis on quality of product and service to secure clients' loyalty (Calantone et al., 1997). Strategic posture, then, requires a proper alignment between the strategic choices of product-market domains where the firm wants to develop, technology capabilities to produce and distribute these products or services on these markets, and processes to effectively implementing these capabilities (Miles and Snow, 1978, 2003). Scholars have identified certain strategic capabilities, as determinants of innovation performance in SMEs (Becheikh et al. 2006b; Raymond and St-Pierre, 2010a). Exploring the moderating role of strategic capabilities on product innovation in manufacturing SMEs, Raymond and St-Pierre have put to the fore that different patterns of strategic capabilities could be leveraged for differentiated purposes of innovation to the extent that these capabilities are in strategic co-alignment. This suggests that strategic capabilities influence SMEs' competitive practices and innovation behaviors and that *"given their limited resources, most SMEs cannot implement business practices or adopt* *[innovation] behaviors that are not aligned with their strategic objectives"* (Raymond and St-Pierre, 2010a, p. 216). Jimenez-Jimenez and Sanz-Valle also suggest that organizational learning facilitates innovation, where organizational learning is defined as *"the process by which the firm develops new knowledge and insights from the common experiences of people in the organization, and has the potential to influence behaviors and improve the firm's [strategic] capabilities"* (Jimenez-Jimenez and Sanz-Valle, 2011, p. 409). From this standpoint, firms with different strategic postures, should emphasize differentiated organizational learning, hence develop differentiated strategic capabilities, to support at the same time their strategic orientation (Spanos and Lioukas, 2001, 2004) and their innovation behavior accordingly (Becheikh et al. 2006a; Raymond and St-Pierre, 2010a).

Synthesis

To achieve organizational effectiveness, firms with different strategic postures should leverage different innovative efforts, closely aligned to the chosen strategy and organizational configuration, in response to different market forces (Lefebvre and Lefebvre, 1993; Slater and Olson, 2000; Ebben and Johnson, 2005). Assuming that the higher the fit between organization context, structure and process (Siggelkow, 2002) the higher the organizational performance (Miles and Snow, 1978, 1994), firms need to align their innovation behavior in terms of fit with strategic posture (Zahra and Covin, 1993; Lefebvre and Lefebvre, 1993; Thornhill, 2006; Vaona and Pianta, 2008). This suggests that distinctive strategic postures may require differentiated innovative profiles that best match the firm's intended, context-specific, competitive setting. Moreover, in selecting and aligning their strategic posture and innovation behavior, firms should carefully take into account the external contingencies as well as the internal contingencies likely to influence this alignment.

5.5. Model development and hypotheses

5.5.1. Model development

A dual "outside-in" and "inside-out" perspective of strategy and innovation.

Above discussions, emphasize the existence of differentiated relationships between firm's strategic posture and innovation behavior, given existing strategic capabilities and business environment. However, the nature and the causal logic of the relationships between these variables need to be further explored (Koberg et al. 2003; Becheikh et al. 2006a; Raymond and St-Pierre, 2010a). Damanpour (1991, p. 556) views innovation as *"a means of changing an organization, whether as a response to changes in its internal or external environment or as a preemptive action taken to influence an environment"*. In the specific context of SMEs, with regard to the predictive power of competitive strategy on innovation (Kotabe, 1990), understanding these relationships is a critical issue that might lead to a more effective situation-specific alternative to the "one-size-fits-all" approach to public policy (Raymond et al. 2010a). Damanpour (1991) suggests that the type of strategic posture should be a primary contingency variable of innovation from an organizational effectiveness perspective. A clear distinction of strategic types is therefore a key element in studies on strategy-innovation relationships, as the differences in environmental opportunities and threats for organizations of different types can influence their innovation behavior. In the same prospect, multidimensional innovation studies are needed for a better understanding of the combined effects of different contingencies on innovation behavior. Scholars therefore suggests that, to capture the nature of strategy-innovation relationships, empirical studies should encompass a comprehensive list of innovation attributes related to all part of an organization (Damanpour, 1991; Raymond and St-Pierre, 2010b).

Consequently, this investigation on the strategy-innovation relationship requires a clear distinction among strategy typologies for a better understanding of innovation behaviors.

Configuration theories provide largely developed literature on the interrelations between business-level strategy and organization, assuming that for each strategic posture, there exist an ideal set of organizational characteristics. As previously mentioned, the configuration typologies mostly used by scholars are Porter's framework (1980) of generic strategies consisting in "overall cost leadership", "differentiation" and "focus" using either a cost leadership or differentiation positioning, and Miles and Snow's typology (1978) of "Defenders", "Prospectors", "Analyzers" and "Reactors". Porter posits that the critical issue to generate competitive advantage is the appropriate fit between these generic strategies and market forces driving industry competition. However, although Porter's framework emphasizes firm's strategic positioning with an external-internal contingency perspective, it provides little inputs regarding the strategic capabilities as regards organizational attributes and processes required for an effective implementation of each generic strategy. Walker and Ruekert (1987) see a major limitation in relying on the sole Porter's approach when investigating factors related to successful implementation of strategies. They posit that *"differences between "intended" strategies and "realized" strategies are sometimes due to ineffective implementation of the intended strategy"* (Walker and Ruekert, 1987, pp. 16).

According to Walker and Ruekert (1987, p. 16), Miles and Snow's typology overcome at least some of these limitations as their framework of strategy typology *"classifies businesses according to management's strategic intentions and suggests several propositions about how various aspects of structure, processes, and management style should fit together under each type of strategy"*. Miles and Snow's framework therefore encapsulates central elements of the strategic choice process, and the resource-based view and dynamic capabilities perspectives developed in the strategic intent approach (Hamel and Prahalad, 1989). They suggest (Ketchen, 2003) that first, organizations are continually trying to adapt to their environment – the adaptive cycle. Second, there are various basic ways to adapt – the organizational typology. Third, in adapting, the firm must seek fit – between strategy and the environment, and between strategy and structure. Raymond and St-Pierre (2010b) suggest that Miles and Snow's (1978, 2003) adaptive cycle approach of entrepreneurial, engineering, and administrative choices provides a strategic perspective of innovation in manufacturing SMEs (see Figure 12). The entrepreneurial choice consists in selecting product or services to markets or market segments where the firm wants to operate. The engineering choice consists in selecting the appropriate technology to produce and distribute product or services and in implementing the appropriate information, communication and control mechanisms to support the effective use of the selected technology. The administrative choice consists in finding solutions dedicated to both reducing uncertainty within the organizational system and adapting to environment changes. This is made possible through adapted structure and processes required to rationalization and to evolution. Therefore, innovation behavior can be viewed as a central element of the adaptive cycle from a strategic fit perspective, where "*product innovation is viewed as the key to solve the entrepreneurial problem, process innovation as the key to solve the engineering problem, and organizational innovation as the key to the administrative problem*" (Raymond and St-Pierre, 2010b, p. 50).

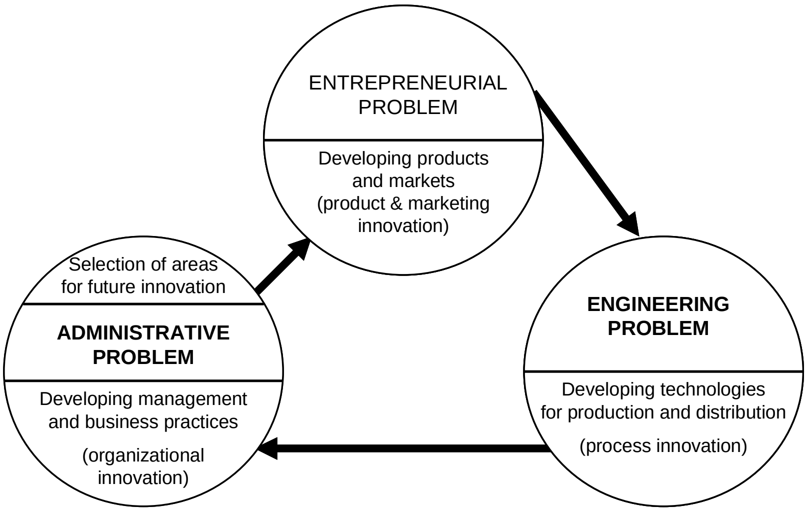


Figure 12: The adaptive cycle of innovation. Adapted from L. Raymond, J. Saint-Pierre (2010), and Miles and Snow (1978)

Not only Miles and Snow typology has been validated through extensive theoretical and empirical examination (Hambrick, 1983; Segev, 1987; Shortell and Zajac, 1990) but it has also been used in a wide scope of areas of business administration and organizational science (Hambrick, 2003). Indeed, in consistency with the strategic choice approach and the resource-based view of competitive advantage, Miles and Snow typology (1978) views the organization as a cohesive system in dynamic interaction with its environment and provides guidance to re-align organizational structure and processes when strategic orientation changes. Segev (1987) also emphasizes the interest of Miles and Snow's model of adaptive cycle in the way that it liaises strategy types and strategy-making. In other words, in line with today's configurational view of strategy, a higher performance will be achieved if, depending on the contingencies of the product-market domain in which the firm has decided to be active, it is able to mobilize the appropriate resources, and design them to efficiently implementing the relevant strategic choices related to above-mentioned contingencies. Hambrick (2003) suggests that another interesting characteristic of Miles and Snow's typology is its practical descriptive and prescriptive nature on how mapping a firm's bundle of "activities" such as functional, staffing or structural policies with strategic positioning as a necessary condition to sustainable competitive advantage (Porter, 1996). To this prospect, Miles and Snow's adaptive cycle of entrepreneurial, engineering and administrative choices could *"provide a solid foundation for specifying the types of activities that scholars should consider in constructing such maps or in assessing the overall degree of internal alignment of a business"* (Miles and Snow, 2003, pp. xi).

Although Miles and Snow's framework emphasizes the internal relationships between strategic orientation, structure and processes, its generic character ignores industry and environment peculiarities, and no systematic evidence has been given with regard to how a firm's strategic posture may differ under the impact of different environment contingencies (Hambrick, 1983). Miles and Snow (1978, 1994) stress that the various strategic profiles would perform equally well as long as strategic orientation, structure and processes are properly aligned. This "universalistic" approach seems inconsistent with the more commonly accepted view that certain contingencies favor certain types of strategy (DeSarbo et al., 2005). In order to encompass both Miles and Snow's internal and Porter's (1980) external focus of competitive strategy, scholars have proposed a hybrid model synthesizing the two foci in a typology consisting of Low-Costs Defenders, Differentiated Defenders, Prospectors, Analyzers, and Reactors. General congruence between Miles and Snow's typologies and Porter's cost leadership and differentiation categories has been validated (Segev, 1989). Moreover, this approach has been frequently cited in the management literature and supported in empirical studies (Walker and Ruekert, 1987; Slater and Olson 2000, 2001). Walker and Ruekert (1987, p. 17) posit that *"this hybrid typology defines business strategies in terms of two major dimensions: firstly, the unit's desired rate of new product-market development (consistent with the prospector, Analyzer, and defender categories of Miles and Snow) and second, the unit's intended method of competing in its core business or established product* *markets (either through maintaining a low cost position or by differentiating itself by offering higher quality or better service, as suggested by Porter)".*

These strategic postures are described as follows (based on Slater and Olson, 2000; Olson et al. 2005): Low-Cost Defenders attempt to maintain a relatively stable domain by aggressively protecting their product-market position. They rarely are at the forefront of product or service development; instead, they focus on producing goods or services as efficiently as possible. In general, these firms focus on increasing share in existing markets by providing products at the best prices. Differentiated Defenders attempt to maintain a relatively stable domain by aggressively protecting their product-market position. They rarely are at the forefront of product or service development; instead, they focus on providing superior service and/or product quality. Their prices are typically higher than the industry average. Prospectors are frequently the first-to-market with new product or service concepts. They do not hesitate to entre new market segments in which there appears to be an opportunity. These firms concentrate on offering products that push performance boundaries. Their proposition is an offer of the most innovative product, whether it is based on substantial performance improvement or cost reduction. Analyzers are seldom first-in with new products or services or first to enter emerging market segments. However, by monitoring market activity, they can be early followers with a better targeting strategy, increased customer benefits or lower total costs. Reactors do not seem to have a consistent product-market strategy. They primarily act in response to competitive or market pressures in the short term.

With regard to attributes of innovation and strategic posture, Damanpour (1996) suggests that Miles and Snow's typology provides an interesting approach that distinguishes among different organizational types, each type exemplifying a certain combination of innovation attributes and other contingency factors. Thus, "Prospectors" probably would tend to emphasize product innovations because they grow through product and market development based on their proactive scanning of market opportunities, while “Defenders” probably would emphasize process innovations because they continually improve their technology to maintain efficiency. Prospectors would also probably tend to emphasize disruptive over continuous innovations because they operate in an unstable environment, while Defenders would probably emphasize continuous over disruptive innovations because they operate in a stable environment. Consequently, according to Damanpour, “Analyzers” would probably behave within a mix of Defenders and Prospectors because they operate in a hybrid product-market domain even though they tend to be more second-in adopters or fast followers of product innovations than Prospectors. They would also probably emphasize administrative innovations because they should operate and maintain a more complex administrative structure. Miles and Snow posit that by dealing with organizational behavior as a whole, the adaptive cycle *“provides a means of conceptualizing the major elements of adaptation and of visualizing the relationships among them”* (2003, p. 27). The adaptive cycle can thus be used as a dynamic framework to investigate strategy-innovation relationship from a contingency perspective where innovation acts as a central adaptation mechanism to achieve strategic goals (Kotabe, 1990; Damanpour and Gopalakrishnan, 1998; Meeus and Oerlemans, 2000; Raymond and St-Pierre, 2010a).

The need for situation-specific configurational profiles

This study contributes to extend research on the Miles and Snow (1978) and Porter (1980) strategic frameworks to the predictive validity of their typology as regards innovation behavior from a contingency perspective. Such a perspective puts to the fore the issue of the path dependence of Miles and Snow adaptive cycle. Indeed, Miles and Snow (2003) posit that the essence of the adaptive cycle lies in the predictive relation between a given strategic choice and the associated choice of a particular combination of technologies and capabilities demanded by this strategic choice. They also posit that this association, in turn, influences the design of organizational structure and administrative processes to fit technology. Ultimately, *"the adaptive cycle shows how the choice of structure and process to fit technology constrained future strategic decisions"* (Miles and Snow, 2003, p. xvi). The adaptive cycle, thus, emphasizes the stability of firms' strategic posture, in a path-dependence logic of entrepreneurial, engineering and administrative choices, which tends to ignore industry and environment peculiarities (Hambrick, 1983; DeSarbo et al., 2005). In their comprehensive assessment of the reliability and validity of Miles and Snow's strategic types, Shortell and Zajac (1990, p. 829) had already drawn attention to the need to further explore this issue, raising questions such as *"What behavior should we expect of prospectors, Analyzers, defenders, and reactors? Are prospectors and Analyzers likely to adopt an innovation earlier than defenders? Does this timing depend on the type of innovation?"* Similarly, Hambrick (1983) findings had suggested that Miles and Snow's differentiated strategic posture effectiveness conditioning on industry-specific and firm-specific attributes should be further investigated. DeSarbo et al. (2005) show that field groupings of firms tend to be highly context-dependent and do not precisely match Miles and Snow typology. Their empirically-derived strategic types are characterized by strategic attributes that *"capture the context-specific conditions that shape strategic decisions within a given set of industries…"* (DeSarbo et al., 2005, p. 64) and suggest that in different context, differentiated qualifying attributes should be expected.

From these insights, it is clear that a contingency-related investigation of strategy-innovation relationship requires the use of a model enabling the emergence of situation-specific derived strategic and innovation profiles. Therefore, our conceptual model, even though built on the a priori strategic and organizational characteristics of Miles and Snow's (1978) and Porter's (1980) predefined typologies, enables the emergence of combinations of derived hybrid strategic profiles. Doing so, the model leaves possibilities to consider firms likely to select a strategic posture based on their idiosyncratic capabilities and on their competitive positioning relative to environmental contingencies, that may not completely fit one of Miles and Snow's and Porter's generic types. Works revisiting Miles and Snow's (DeSarbo et al., 2005) and Porter's (Spanos et al., 2004) generic frameworks have shown that such derived hybrid types clearly dominate the traditional typology in terms of firm performance. Moreover, DeSarbo et al. (2005) have demonstrated that empirically "field" derivatives from Miles and Snow's profiles are highly context-dependent and provide a more accurate representation of strategic behavior of the industries under consideration. Such derived strategic postures are then likely to provide a better understanding of firms' innovation behavior to cope with environmental uncertainty, given their strategic capabilities.

Consequently, we allow the selection of optimal interrelations between strategic posture and innovation behavior attributes to be objectively and empirically determined by the structure in the data and the statistical fit of the model (DeSarbo et al., 2005). With regard to here above literature review and discussion, we can depict our overall approach of strategy-innovation relationship under the impact of industry and firm contingencies, in a composite model as illustrated in the conceptual framework described in Figure 13.

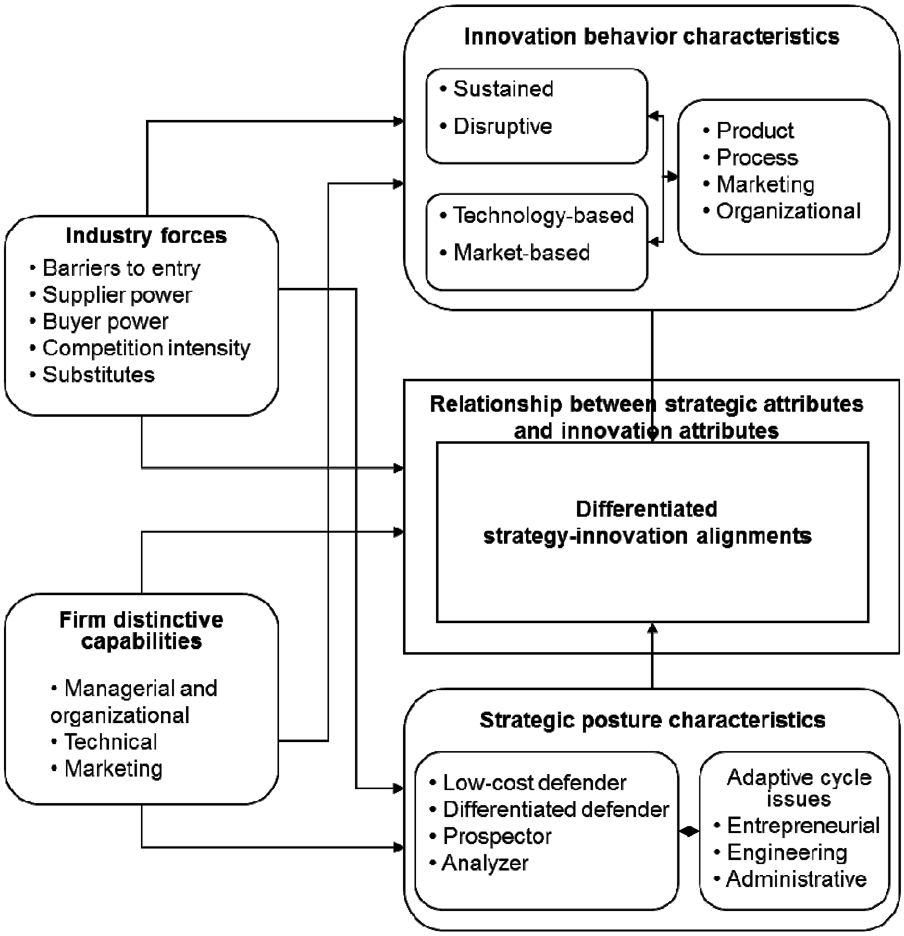


Figure 13: Strategy- innovation relationship, considering industry and firm effects

5.5.2. Hypotheses

The innovation behavior of Defenders, Prospectors and Analyzers, as defined by Miles and Snow (1994), is characterized by the permanent search for and maintenance of fit as a source of sustainable competitive advantage - external fit between the organization and its environment and internal fit among strategy, structure, and management processes. The adaptive cycle process emphasizes that firms should perpetually cycling through sets of decisions to achieve this fit on the three dimensions of the cycle. Accordingly, a firm that makes decisions in the entrepreneurial domain in the direction of being a Prospector will make Prospector-oriented decisions in the engineering domain, and then in the administrative domain, then even more so again in the entrepreneurial domain, and so on. With enough cycles and permanently increased external and internal fit, a given firm will become a good, comprehensively aligned and stable, Prospector, Analyzers, or Defender. If the firm fails in the fit between strategic posture and innovation behavior in this perpetual adaptive process, it will be an incongruent, unstable and poor performing Reactor (Hambrick, 2003). Through this adaptive cycle approach, Miles and Snow (2003) posit that a given entrepreneurial choice requires the choice of a specific combination of technologies and capabilities, which in turn influences the design of aligned organizational structure and administrative processes. Eventually, the choice of structure and process to fit technology influences future entrepreneurial posture. The adaptive cycle, through the intended rate of change of a firm's strategic posture, supports the strategic choice perspective of strategy as a predictor of innovation activities (Hambrick, 1983; Kotabe, 1990). Zahra and Covin (1994) suggest that different competitive strategies predict differentiated innovation behaviors in a sense that they are positively associated with differentiated sources and activities of innovations. Schroeder (1990) also suggests the reverse relationship where an innovation adopted by a firm impacts the competitive positioning of the firm in a sense that the firm is able or not to adopt and implement the relevant technological and structural choices required by the adoption of the innovation. Ayerbe (2006) emphasizes this co-activation within and between attributes of strategic posture and innovation behavior. Organizational innovation initially occurs following a new strategic choice, and supports technological, product or process innovations, which in turn require an organizational adaptation of firm's structure and processes.

The relationship between a firm's strategic posture and its innovation behavior, then, seems to follow a path-dependent process of co-activation between strategy and innovation choices. Miles and Snow (2003) put to the fore that the entrepreneurial, engineering and administrative adaptive choices are intricately interwoven and that today's adaptive choices tend to constrain tomorrow's structure and entrepreneurial choices. Complementarily, scholars of entrepreneurial orientation and innovation (Rausch et al., 2009; Perez-Luno, 2011) suggest that both entrepreneurial orientation and innovation practices are stable and enduring characteristics of a firm. Strategic posture can then be considered a relevant predictor of innovation behavior with regard to the nature (sustained or disruptive), the source (technology or market-based) and the activities (process, product, marketing or organizational) of innovation.

Scholars emphasize the essential role of entrepreneurial orientation as a predictive factor of the nature and source of innovation (Zhou et al., 2005; Wiklund and Shepherd, 2005; Perez-Luno et al., 2011). Similarly, Miles and Snow (2003) posit that no two organizational strategies will be the same, as every organization will chose the type of its own product-market domain when facing environmental change, and develop its own innovation behavior accordingly. Thus, innovation behavior is generally viewed as a way for firms of supporting new strategic posture to achieve strategic goals when facing new and changing competitive realities (Kotabe, 1990; Damanpour, 1996; Zahra, 1996). External strategic fit with environment and internal fit between strategic choice and firm's organizational configuration raises the issue of interrelations between firm's strategic posture, innovation behavior, strategic capabilities, and environmental factors. Indeed, different characteristics of firms' environment tend have a differentiated influence on firm's strategic posture and innovation behavior hence on strategy-innovation relationship (Tidd, 2001). Thus, Teece and Pisano (1998) suggest that, in changing environmental conditions, firms with rapid and flexible product innovation behavior supported by entrepreneurial orientation to benefit from market opportunities and related structure and processes dedicated to effectively redeploy and coordinate internal and external strategic capabilities outperform others. Damanpour and

Gopalakrishnan (1998) also emphasize differences in innovation behavior in terms of nature, source and activities of innovation depending on different environmental contingencies. Meeus and Oerlemans (2000) posit that external fit between firms' strategic positioning and dynamic environment seem beneficial for innovative performance, as firms in search for adapting to environmental change tend to emphasize technological and organizational innovation. Zhou et al. (2005) find that market forces significantly influence product innovation behavior in terms of source – market-based or technology-based – and nature – sustained or disruptive - of innovation.

On the other hand, from a resource-based perspective, firm's strategic capabilities also constrain firm's strategic choice as they condition a firm's ability to enhance or develop its activities to pursue a more complex and advantageous strategy (Grant, 1991; Spanos and Lioukas, 2001, 2004). Firm's capabilities also influence innovation behavior depending on their co-alignment with strategic orientation (Miles and Snow, 1994; 2003). Thus, differentiated patterns of strategic capabilities in manufacturing SMEs tend to lead to significantly different outcomes in terms of product innovation (Raymond and St-Pierre, 2010a). Similarly, Zhou et al, (2005) raise that technological capabilities are direct significant determinants of technology-based product or process innovation but have no effect on market-based innovation.

In fact, scholars have demonstrated that different market forces as well as different strategic capabilities have differentiated effects on firms' innovation behavior (Vega-Jurado et al., 2008). This is because innovation is considered an adaptive mechanism to the environment used by firms in order to survive as well as an activity that stems from firms managerial choice and capabilities (Manu and Sriram, 1996). Research works have highlighted the differentiated influence of firm strategic capabilities and market forces on firm's strategic posture (Spanos and Lioukas, 2001; DeSarbo et al., 2005). Spanos and

Lioukas highlight the direct and indirect effects of external and internal contingencies on strategy-performance relationship, and emphasize the mediating effect of strategy on contingency-performance relationship. Considering innovation behavior as a mediator in the strategy-performance relationship (Zahra and Covin, 1994), we suggest to follow Spanos and Lioukas logic of rent generation. From this perspective, strategic posture is a predictor of innovation behavior, which in turn enables the achievement of strategic goals, hence rent generation. On the basis of Spanos and Lioukas's approach of strategy-performance relationship (2001), we can envisage the direct and indirect effects of industry-specific and firm-specific contingencies on strategy-innovation relationship.

Thus, building on the adaptive cycle of innovation in relation with Miles and Snow (1978) framework of adaptive strategic choices, we suggest testing the following proposition:

The differentiated relationship between a firm's innovation behavior and entrepreneurial, engineering, and administrative adaptive choices is influenced by direct and indirect, industry-specific and firm-specific effects, where direct effects concern direct effects of industry-specific or firm-specific contingencies on strategic posture attributes or innovation behavior attributes, and where indirect effects concern indirect effects of industry-specific or firm-specific contingencies on innovation attributes through strategic posture attributes.

Building on this proposition, we will propose a line of arguments on the predictive relationship between strategic posture and innovation behavior with regard to industry and firm contingencies. We will structure this hypothesis development according to the three studied dimensions of innovation behavior namely the natures, the sources, and the activities of innovation.

At the industry level, Miles and Snow characterize the entrepreneurial problem of Defenders as the permanent search to "*create stability through a series of decisions and* *actions which lessen the organization's vulnerability to environmental change and uncertainty"(*Miles and Snow, 2003, p. 37). To this aim, Defenders tend to *"seal off" a portion of the total market to create a stable set of products and customers"* (2003, p. 48). Therefore, the most favorable feature of a Defender's product-market domain is its stability, narrowness and homogeneity. The targeted market segment is generally the safest of the industry. Defenders tend to protect this target segment by offering mainstream customers the full range of products or services they desire through a strategic positioning of competitive pricing (Low-Cost Defenders) and/or superior customer service (Differentiated Defenders). As their product-market domain is stable and the scope limited, Defenders have a tendency to focus on new product development only related to current goods or services, while ignoring developments outside domain. Defenders favor a cautious and incremental growth through market penetration and continuous improvements in technology to maintain overall efficiency (Miles and Snow, 2003). Zahra and Covin (1993) suggest that a price competitiveness or a superior customer service-brand loyalty orientation is positively associated with a strong technological orientation. The R&D attributes of this orientation have been investigated by Langerak et al. (1999, p. 215) showing that *"R&D departments of Defenders ignore industry changes that have no direct influence on their operations and appear to emphasize R&D capabilities that are focused on achieving cost reductions"*. In so doing, Defenders tend to emphasize improvement of technological processes for new product development. Moreover, Lüthje and Herstatt (2004) report that when there is low heterogeneity of clients' needs on a market, innovations tend to be driven by the willingness of manufacturers to spread their technological development costs to a mainstream of users sharing the same needs. Similarly, Zahra (1996) posits that a broad process portfolio is negatively associated with firm effectiveness in stable and homogenous environments. This suggests that considering the targeted stability and narrowness of their market segment, Defenders should focus on dedicated, firm-centered, technology-based process efficiency. Zahra also (1996) raises that external, market-based, technology sources tend to hamper firm's effectiveness in stable and homogenous environments. Consequently, Defenders should tend to develop technology-based innovations that do not require a high understanding of heterogenous needs from various typologies of clients but do require a high understanding of technologies needed to serve efficiently homogeneous needs of a known typology of users. Concerning firm's innovativeness, scholars (Tushman and Romanelli, 1985; Koberg et al., 2003) suggest that the degree of novelty of innovation is increased by the degree of uncertainty of the environment. Other works (Amara and Landry; 2005) show that the existence of "strong ties" such as the ones linking a firm only to the clients or suppliers of its specific product-market domain hamper the firm's ability to take advantage of new market opportunities, as would Prospectors do. Defenders' entrepreneurial orientation for product-market domain's stability and homogeneity is supported by strong, controlled, vertical and formalized management systems with a production and finance-oriented dominant coalition focused on maximum efficiency and technological specialization (Miles and Snow, 1978, 1994). Olson et al. (2005) suggest that this formal organization and cost-control orientation is associated to both Low-Cost and Differentiated Defenders.

Miles and Snow (1978) define the entrepreneurial problem of Prospectors as the permanent search for locating and exploiting new product and market opportunities in broad and continuously developing domains. They are characterized by continuous intelligence of wide range of environmental conditions and events, and a growth supported by product and market development that can occur in spurts and may create change in the industry. Prospectors rely on flexibility of technological processes, multiple technologies, R&D activities emphasizing product design and market research, and low degree of routinization supported by decentralized control and horizontal information systems favoring a product

R&D and marketing dominant coalition (Miles and Snow, 1978, 1994, 2003). Prospectors also tend to emphasize R&D capabilities of scanning and networking with users to identify customer needs, monitoring market developments and interfunctional collaboration. Zahra (1996) highlights that this pioneering orientation is positively associated with firm's effectiveness, primarily in dynamic and heterogenous environments. The market orientation of Prospectors' R&D team is therefore primarily externally, rather than internally motivated, and based on strong capabilities of scanning customer needs and market developments, and interfunctional collaboration (Langerak et al., 1999). In so doing, Prospectors generate innovations that substantially differ from existing market offers (Lüthje and Herstatt, 2004). External, market-based, technology sources, according to Zahra (1996), can significantly improve firm's technological capabilities and leverage rapid response to changing market needs. Technological forecasting is positively associated with firm's effectiveness in both dynamic and heterogenous environment. In such environments, firms can *"benefit from forcasting technological forces that promote heterogeneity and create new market segments"* (Zahra, 1996, p. 213). Demand uncertainty also positively affects breakthrough, technology-based and market-based innovation. Indeed, rapid-changing consumer needs will stimulate firms to introduce more creative products to lead rather follow the market. Technological turbulence also tends to stimulate technology-based innovation. Competition rivalry stimulates market-based innovation behavior that enables firms to explore new competitive spaces (Zhou et al., 2005; Kim and Mauborgne, 2005). Consequently, the high uncertainty of their product-market domain, should lead Prospectors to emphasize both technology and market-based innovation. Indeed such a dual orientation will lead to new products that will perform better and which the firm will market easier (Gatignon and Xuereb, 1997). According to Miles and Snow, (2003, p. 59) *"The variability in the Prospector's product-market mix is reflected in the organization's technology which must be flexible enough to accommodate* *changing domains"*. Their organizational configuration therefore facilitates the development of "weak ties" linking the firm to the many different categories of sources of technology and market information likely to enable Prospectors introducing innovations with a high degree of novelty (Amara and Landry, 2005). As suggested by works on complexity theory (Tushman and Romanelli, 1985; Koberg et al., 2003), the broad and continuously developing product-market domains chosen by Prospectors stimulate this high level of innovativeness.

From a product-market domain perspective, Analyzers pursue both stability-narrowness and dynamism-wideness objectives. Indeed, the key to success for Analyzers is to quickly bringing out either improved or less expensive versions of products that Prospectors introduced while defending core markets and products (Olson et al., 2005). This dual demand is made possible with well-structured marketing activities required to perform complex tasks while minimizing resources commitments (Vorhies and Morgan, 2003). Zahra posits (1996) that in environments characterized by both high hostility and homogeneity, a followership behavior should be preferred than pioneering. Consequently, as effective protectors of their stable part of business as well as creative imitators, Analyzers should emphasize the importance of R&D strategic capabilities regarding market sensing, customer linking through close interfunctional coordination and technology monitoring (Day, 1994). Doing so, Analyzers grow through continuous market penetration as well as permanent search for differentiation through improved products or services and market development, emphasizing both efficiency on core stable product-market domains as well as flexibility to be fast followers of Prospectors (Miles and Snow, 2003). *"Consequently, Analyzers must maintain a continuous dialogue with customers to assess the shortcomings of pioneer offerings and thus identify opportunities for themselves. Furthermore, they must monitor constantly the activities of their competitors to ascertain their competitors' success and failures"* (Langerak et al., 1999, p. 215). Such firms emphasize operational excellence with continuous inputs of new ideas and improvements from inside or outside the organization that can be implemented immediately to serve as a basis for bigger potential ideas (Moss Kanter, 2010).

Thus, we propose the following:

Hypotheses 1 & 2: The propensity to adopt a sustained (1) or disruptive (2) innovation behavior (which is differentiated by strategic posture) is influenced by direct industry-specific effects on strategic (H1a; H2a) and innovation (H1b; H2b) attributes and direct firm-specific effects on strategic (H1c; H2c) and innovation (H1d; H2d) attributes as well as indirect industry-specific (H1e; H2e) and firm-specific (H1f; H2f) effects on innovation attributes.

Hypotheses 3 & 4: The propensity to adopt a technology-based (3) or market-based (4) innovation behavior (which is differentiated by strategic posture) is influenced by direct industry-specific effects on strategic (H3a; H4a) and innovation (H3b; H4b) attributes and direct firm-specific effects on strategic (H3c; H4c) and innovation (H3d; H4d) attributes as well as indirect industry-specific (H3e; H4e) and firm-specific (H3f; H4f) effects on innovation attributes.

Zahra (1996) emphasizes that a broad, changing, product portfolio is negatively associated with firm's effectiveness in a homogenous environment. Conversely, Zahra posits that technological innovation is highly associated with firm's effectiveness in a stable and homogenous environment. This suggests that Defenders may reach their strategic objective of effectively serve their targeted clients by mainly maximizing the quality-cost ratio of their existing products. A low-Costs orientation, as posited by Porter (1998), emphasizes the pursuit of productivity through cost reductions, from experience, tight cost and overhead control, and cost minimizations in areas like R&D, service, sales force, and advertising. Zahra and Covin (1993) also suggest that a cost-leadership orientation is, from a financial performance perspective, positively associated with new process development and automation. Studying the innovation orientation of best performers among Low-Cost

Defenders, Olson et al. (2005) suggest that efforts at process innovation should be specifically supported. Differentiated Defenders differ from their Low-Cost counterparts by their focus on retaining customers through attention to superior service, product quality and novelty, or image (Olson et al., 2005). This behavior is emphasized in hostile environments where firm performance positively relates to firm's propensity to focus on a niche segment in which quality is more important than low-cost (Calantone et al., 1997). Consequently, Differentiated Defenders place a continuous emphasis on customer-oriented innovative behaviors directed to mainstream clients (high product quality, product and service engineering, selective distribution, superior customer service and relationships) likely to develop corporate reputation for quality or technological leadership and increase brand loyalty as a barrier to entry (Porter, 1980, 1985, 1991, 1998) without neglecting cost-related issues (Slater and Olson, 2001). Zahra and Covin (1994) also strengthen that Defenders should generally develop process innovation behaviors. Cho and Pucik (2005) provide support in this direction suggesting that a quality orientation leverages the overall innovativeness of a firm and fosters market penetration through innovativeness.

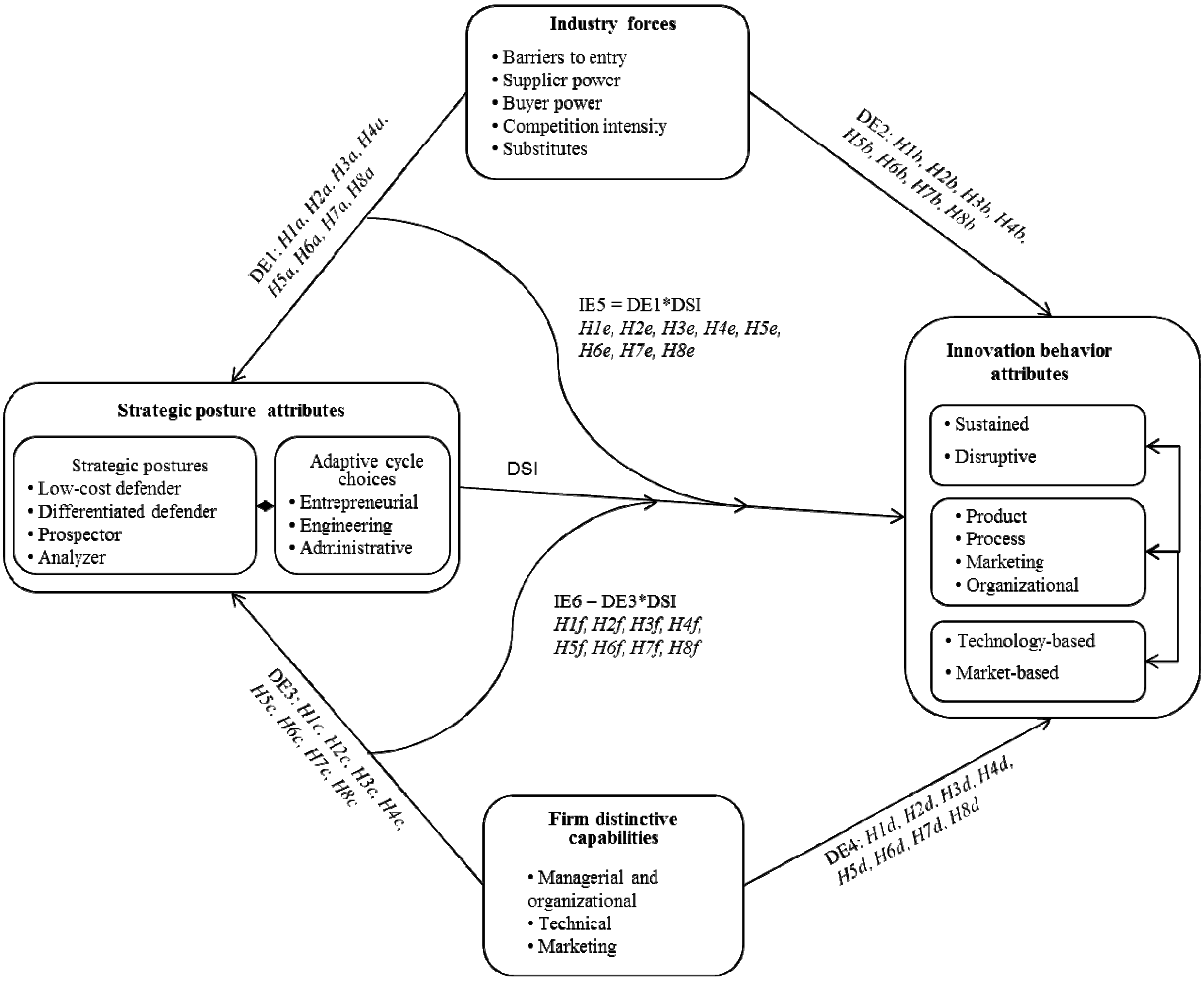
Environment hostility due to competitive and technological factors tends to stimulate Prospectors strategy with intense and fast product and marketing innovation to permit the firm to exploit product and market opportunities (Calantone et al., 1997). Moreover, due to the high uncertainty of their product-market domains, Prospectors have to identify users searching for innovative technological and marketing solutions to their unmet needs as a source of market related knowledge (Lettl, 2007). In so doing, Prospectors tend to develop product and marketing innovations to serve the needs of these lead-users, i.e. early-adopter clients, before these needs are shared by the majority of the customers in the market segment (von Hippel, 1986, 1988; Lüthje and Herstatt, 2004). As above mentioned, due to the wide scope of their product-market domain orientation, Prospectors need to develop strategic capabilities to leverage R&D collaborations with other organizational functions in order to effectively exploit new product or market opportunities (Miles and Snow, 1978; Langerak et al., 1999). Miller and Friesen (1982) have also assumed that an “entrepreneurial” profile will naturally develop product innovation unless the firm sets up structural integration, strict analytical and strategic planning, centralized decision-making and information processing, as would Defenders do. Other researches also support the idea that an organization innovativeness and creativity is facilitated by interactions across work-groups, departments, and other discrete subgroups (Kanter, 1988; Perry-Smith and Shalley, 2003).

The pursuit of organizational effectiveness to cope with both stability-narrowness and dynamism-wideness leads Analyzers to be fast followers of Prospectors (Miles and Snow, 1978, 2003). Thus, Analyzers operate with a base of established products to which they add carefully chosen new products. Depending on external environment, the selection of new products is a key issue for Analyzers. Indeed, in stable and homogenous environments, too large a product portfolio tends to hamper firm’s effectiveness. Conversely, in dynamic and heterogenous environments, product variety is positively associated with effectiveness (Zahra, 1996). Zahra also emphasizes that a broad process portfolio is more conducive to firm’s performance than product innovation as process innovation short-term payoff tends to be faster in more varied environmental conditions. Consequently, Analyzers typically do not originate their new products but use their process engineering and manufacturing skills to make a proven-successful new product even better adapted to market needs, and deploy their well-structured marketing skills to sell it (Miles and Snow, 1994; Vorhies and Morgan, 2003). Porter (1985) and Zahra (1996) posit that in environments combining homogeneity and hostility this followership strategy is a better option than pioneering. Analyzers also tend to leverage their process and product R&D capabilities by forming or participating in strategic alliances (Langerak et al., 1999). As they must operate and maintain a more complex administrative structure based on productivity and efficiency as well as flexibility and effectiveness (Miles and Snow, 2003), Analyzers also develop new organizational configurations able to support structural conflict. In such configurations, the critical issue is *"…formulating procedures for a new product's timely introduction by minimizing costs and by handling any adverse consequences that may arise as a result of incorporating the new product into the system"* (Miles and Snow, 2003, pp. 77). Therefore, Analyzers need to develop R&D and marketing capabilities with regard to market sensing, customer oriented networking and technology monitoring *"… to assess the shortcomings of pioneer offerings and thus identify [safest] opportunities for themselves"* (Langerak et al., 1999, p. 215).

Thus, we predict the following:

Hypotheses 5, 6, 7 & 8: The propensity to adopt a process (5), product (6), marketing (7) or organizational (8) innovation behavior (which is differentiated by strategic posture) is influenced by direct industry-specific effects on strategic (H5a; H6a; H7a; H8a) and innovation (H5b; H6b; H7b; H8b) attributes and direct firm-specific effects on strategic (H5c; H6c; H7c; H8c) and innovation (H5d; H6d; H7d; H8d) attributes as well as indirect industry-specific (H5e; H6e; H7e; H8e) and firm-specific (H5f; H6f; H7f; H8f) effects on innovation attributes.

Figure 14 synthesizes our hypotheses through the direct and indirect effects of industry-specific and firm-specific contingencies on the differentiated relationship between adaptive strategic choices (Miles and Snow, 1978, 2003) and the studied dimensions of innovation behavior namely the natures, the sources, and the activities of innovation.



Note: DE = Direct Effects; IE = Indirect Effects; DSI = Direct Strategy-Innovation relationship

Figure 14 – Synthesis of hypotheses: Direct and indirect effects of contingencies on strategy-innovation relationship

5.6. Methodology

5.6.1. Sample and data collection

Design of research sample

With regard to the context of our research and the expected central influence of firm's strategic posture on strategy-innovation relationship, we first selected independent SMEs, as a condition to investigate strategy-innovation alignments resulting from a firm's internal decision, independently from any corporate parent-company influences or considerations.

Secondly, our focus on single firms necessitated an inter-industry sample large enough to ensure the conditions for a generalization of our results. Thirdly, for the classification of firms in terms of size and industry, we followed the "Guidelines for collecting and interpreting innovation data" of the 3^{rd} edition of the Oslo Manual (OECD/European Communities, 2005). Manufacturing industries were classified according to their 2-digit ISIC class, characterizing the principal activity or range of activities of the firm. We targeted firms above 10 employees and we fixed the upper limit of firm size to 250 employees with maximum revenue of 50 million Euros according to the definition of SMEs given by the European Union (European Commission, 2007). This upper limit for size seemed relevant considering the size structure of French manufacturing firms. Indeed, Bartelsman et al. (2003) report an average size of French manufacturing SMEs of 32 employees and firms with fewer than 20 employees accounting for 73.6%. Our sample included firms belonging to the manufacturing sectors as classified in the French classification edited by the INSEE, Institut National de la Statistique et des Etudes Economiques (French Institute for Statistics and Economic Studies). Data were collected through a structured, on-line questionnaire, completed by firms' CEO.

The questionnaires were e-mailed and completed by firms clearly identified and qualified in the database of the network of French Chambers of Commerce and Industry. French Chambers of Commerce and Industry have supported this investigation as they have highlightened the deployment of innovation management practices within SMEs as one of their strategic mission. In most regions, the CCIs have consequently joined the Regional Innovation Networks, focusing on SMEs development and management of innovation. Therefore, the Chambers of Commerce and Industry of Nice, Grenoble, Lyon, Toulouse, Marseille and Paris supported this research and contributed to this work by thoroughly qualifying the relevant manufacturing SMEs targeted for our works operating on their territory. The research was also supported by the network of local unions for Industries of Metallurgy (UIMM – Union des Industries et des Métiers de la Métallurgie).

We proceeded as follows for the collection of data. We first tested the a priori design of our research questionnaire during face-to-face interviews with CEOs from four manufacturing SMEs. This was followed by pre-testing the validity of our constructs on 32 manufacturing SMEs. After this final test, we prepared a model of official letter to be e-mailed to the targeted SMEs. This letter explained the purpose of the research and the expected managerial outputs for SMEs development. This letter was e-mailed to the personal e-mail address of CEOs, assuring anonymity, in order for the respondents to directly fill-in the research questionnaire by clicking on a link included in the letter. This self-typing approach is a common practice in strategy research.

Econometric tools

Considering the objective of the research, we proceeded in a step-by-step process to investigate the relationship between strategic and innovation attributes. We first validated the existence of strategic constructs using Factor Analysis and Principal Component Analysis. The same process was conducted for the validation of innovation constructs. Industry-specific and firm-specific contingencies were also identified using Factor Analysis and Principal Component Analysis to validate the existence constructs characterizing market forces and firm capabilities. Then, we performed clustering of firms based on our strategic constructs. The clustering was completed with Analysis of Variance to assess differences in the means of strategic postures. We also conducted Analysis of Variance to validate the differentiated alignments between our empirically-derived clusters of strategic posture profiles and innovation behavior attributes as well as contingencies attributes. This first step was completed by assessing the relationship between strategy, innovation and contingencies attributes using correlations and regressions. A third step consisted in assessing the relationship between strategic posture attributes and innovation behavior attributes while controlling for the effects of industry and firm contingencies using regression analysis. At each of these steps, we controlled for firm's size, firm's industry sector, firm's R&D intensity, firm's turnover, and firm's age (see 5.6.4. Controls). These second and third steps were preliminary phases providing guidance to identify significant relationship between strategy, innovation, and contingencies constructs, before using path analysis to explore the causal logic of strategy-innovation relationship under the effects of industry and firm-specific contingencies.

The last step of our process, central to this research, focused on investigating direct and indirect effects of market forces and firm capabilities on the relationship between strategic and innovation attributes. To this aim, we used Structural Equation Modelling, as it is the most appropriate technique that allows separate relationships for each of a set of dependent variables (Hair et al., 1998). Structural Equation Modelling is characterized by two basic models. It enables, on one hand, thanks to the structural model - the "path" model - to relate independent to dependent variables, providing that theory or prior experience allows distinguishing which independent variables predict each dependent variable. On the other hand, the measurement model allows using several variables for a single independent or dependent variable, as it is the case in our conceptual framework. Other techniques such as multiple regression, factor analysis, multivariate analysis of variance, or discriminant analysis and other techniques can only examine a single relationship between the dependent and independent variables at a time whereas, in our research, we enable one dependent variable becomes an independent variable in subsequent dependence relationships. Structural Equation Modelling has been used in a large scope of fields of investigation in management sciences including marketing, organizational behavior, innovation management, strategic management

(Spanos and Lioukas, 2001; Cho and Pucik, 2005; Edelman et al., 2005; Zhou et al, 2005; DeSarbo et al, 2006). The reason for this attractiveness is dual: Firstly, SEM enables dealing with multiple relationships simultaneously while providing statistical efficiency, and secondly, SEM provides a transition from exploratory to confirmatory analysis, thus facilitating a more systematic and holistic understanding of problems (Hair et al., 1998). In addition, scholars (Baron and Kenny, 1986; Kline, 1998) have recommended that SEM be considered for assessing mediation *"because it offers a reasonable way to control for measurement error as well as some interesting alternative ways to explore the mediation effects"* (Preacher and Hayes, 2004, pp. 722). This is of particular interest for the present research investigating direct and indirect effects of contingencies on strategy-innovation relationship where strategic posture attributes might represent multiple potential mediators of industry and firm contingencies on innovation behavior. A specific issue, however, in using SEM, is the assessment of the significance of indirect effects (Preacher and Hayes, 2004). Dealing with this issue, there are extensive simulation results supporting the use of bootstrapping – in particular – bias corrected (BC) bootstrapping to assess indirect effects significance as *" [BC] bootstrapping provides the most powerful and reasonable method of obtaining confidence limits for specific indirect effects under most conditions"* (Preacher and Hayes, 2008, pp. 886). The current version of AMOS implements a bootstrapping approach to assess indirect effects but it requires a database without any missing values to perform the bootstrapping process (Arbuckle, 2006). Consequently, in order to enable the assessment of indirect effect significance, using BC bootstrapping, we have replaced the missing values of our sample by the mean value of observed variables.

Sample size

In order to follow recommendations for an appropriate sample size for Structural Equation Modeling using Maximum Likelihood Estimation procedure – the most common estimation procedure – we targeted an average of 200 respondent firms (Hair et al., 1998). Indeed, even though sample sizes of 100 to 150 are generally accepted to ensure appropriate use of Maximum Likelihood Estimation, large samples increase the sensitivity of MLE to detect differences among data. On the other hand, as the sample size becomes too large (over 400), MLE becomes too sensitive, any difference being detected, and goodness-of-fit measures indicating poor fit. Thus 200 is proposed as being the critical sample size (Hair et al., 1998).

Considering the responding rate of 15% completed questionnaires on our 32 pre-test sample of 214 well qualified SMEs (i.e., with personal e-mail address of CEOs), using the same on-line questioning process, we sent a total of more than 3000 emails to be on the safe side of getting 200 targeted completed questionnaires. We conducted three e-mails campaigns in March 2011, with the support of local stakeholders of economic development and above-mentioned French Chambers of Commerce and Industry. We eventually collected 238 questionnaires of which 179 were complete. The reason for uncompleteness was measured to eliminate any source of bias within the sample. A random sample of 20 firms who had not completed the questionnaire was contacted by phone. This 75.2% rate of complete questionnaire can be explained by (a) the length of the questionnaire made of 97 questions, also including questions on the firm's performance on top of questions on strategic posture, innovation behavior, market forces, and strategic capabilities, and (b) the reluctance to divulge information. The length of the questionnaire was mainly due to the fact that we did not directed respondents to position themselves according to predefined strategic profiles. On the opposite, for the purpose of our investigation emphasizing the relationship between strategic and innovation attributes, we enabled hybrid strategic profiles to emerge from empirical results as this empirically-derived strategic types tend to provide a more accurate representation of strategic behavior (Spanos et al., 2004; DeSarbo et al., 2005). For the purpose of this specific research, only data on strategic posture, innovation behavior, market forces, firm capabilities and above-mentioned control variables are considered. Tables 1.1 to 1.5, in appendix 2.1, describe the distribution of responding firms according to control variables.

5.6.2. Measurement of constructs

The research questionnaire was designed as a basis for collecting data regarding the attributes characterizing a firm's competitive strategic posture and the associated attributes characterizing the firm's innovation behavior, as well as the characteristics of external and internal contingencies likely to impact firms competitive strategy (Spanos and Lioukas, 2001; Spanos et al., 2004). The competitive strategic posture was measured using multiple-item 7-point Likert scales to assess the strategic orientation of the firm as defined in Miles and Snow (1978) typology. The items were inspired by Conant et al. (1990), Hornsby et al. (2002), as well as from our own transformation into descriptive sentences of Miles and Snow's Table (1994, p. 13) of "Business Strategies and Organizational Characteristics" defining the Entrepreneurial, Engineering and Administrative dimensions of their Adaptive Cycle. These items reflect the central distinction between Defenders, Prospectors and Analyzers strategic profiles. Items on the dimensions of the organizational characteristics of Porter's (1998, p. 41) low-cost leadership or differentiation orientations were included in each set of items measuring each dimension of the Adaptive Cycle. We thus expected to enable the emergence of stable forms of strategic profiles characterized as Low-Cost Defenders, Differentiated Defenders, Prospectors, and Analyzers (Miles and Snow, 1978; Walker and Ruekert, 1987).

We used a self-typing approach whereby firms' CEOs responded to survey items designed to describe the fundamental distinctions between strategic postures in terms of "product-market strategy", "research and development", "production", organizational structure", "control process", and "planning process". We chose this "step by step", continuum approach instead of a method consisting of each respondent CEO reading paragraphs describing each strategic posture and indicating the one that best describes their company (McKee, Varadarajan, and Pride, 1989). Indeed, limitations to this "profile description" process could be that respondents may respond to what would be their ideal description of the strategic posture rather than the authentic one. Studies have anyhow demonstrated the validity of this method by proving that CEOs classify themselves in a similar way whatever the method used (Shortel and Zajac, 1990; Vazquez et al., 2001).

The innovation construct was measured with items evaluating the natures (sustained or disruptive), the sources (market-based, i.e. based on opportunities arising from market inputs, or technology-based, i.e. opportunities arising from technological inputs), and the type of activities of innovation either technological (product or process), marketing or organizational, as described in the third version of the OSLO manual (OECD, 2005). Considering the market or technology basis of innovation, we sourced the measuring items in Zhou et al.'s approach (2005).

Measures of the construct of firm's specific effects took into account three dimensions of firm's idiosyncratic resources and capabilities. (i) *Managerial and Organizational capabilities*, i.e. managerial competencies, knowledge and skills of employees, efficient monitoring of activities, strategic planning, ability to attract new profiles (Teece et al., 1997). (ii) *Technical capabilities* measured as technological experience and competences, technical infrastructures, structured and efficient production unit, search for economies of scales (Leonard-Barton, 1995). (iii) *Marketing capabilities*, measured as intensity of market scanning, customer and supplier relationship management, efficiency and control over distribution channels, structure of client portfolio (Lado et al., 1992). (iv) *Firm's awareness of intermediaries* in the Local Innovation System. Indeed, European authorities emphasize the role of Local Innovation Systems in leveraging innovation culture and practice in SMEs (EU, Interreg IVC program, ERMIS, 2010).

Measures of the constructs of industry forces were evaluated for each construct with several items measuring the perceived level of threat of new entrants (evaluated as the level of barriers to entry in the firm's major market, a low level of barriers to entry being the highest threat and ranking in our ranking system), the bargaining power of suppliers, the bargaining power of clients, the intensity of rivalry between competitors and the threat of substitute offerings. These items were designed in order to reflect any specific situation confronted by each firm in its major market served.

5.6.3. Validation of proposed constructs

Considering that we enabled in our model the emergence of empirically-derived strategic, innovation, and contingencies constructs, the validation of strategic posture, innovation behavior, market forces and firm capabilities constructs is particularly relevant. This validation involved a two-step process. The first step was conducted to evaluate the *content validity* of our constructs. Regarding strategic posture attributes, this required identifying groups of measurement items representative of strategic attributes characterizing both the strategic issues of Miles and Snow's adaptive cycle and Porter's competitive positioning choices. Regarding innovation behavior attributes, we identified groups of items characterizing process-oriented, product-oriented, marketing-oriented and organizational-oriented innovation activities. We identified firm capabilities constructs grouping attributes measuring above-mentioned characteristics of managerial and organizational capabilities, technical capabilities, marketing capabilities, and cooperation with intermediaries involved in firm's Local Innovation System. Market forces constructs were identified grouping attributes measuring the level of barriers to entry, the influence of suppliers, the influence of clients, the intensity of rivalry between competitors and the threat of substitute offerings on firm's strategic posture and innovation behavior. The second step, *construct reliability*, was conducted to validate to which extent the empirical indicators provide a reliable measure of the construct.

Content validity of constructs

As previously stated, the scales employed to measure strategic posture characteristics in this research have been adopted from existing and validated scales used in the literature (Conant et al., 1990; Hornsby et al., 2002), completed with our own transformation into descriptive sentences of Miles and Snow's Table (1994, p. 13) of business strategies and organizational characteristics defining the various dimensions of their adaptive cycle. The strategic orientation and organizational characteristics of Porter's (1998, p. 41) generic strategies were also included into each set of items measuring each dimension of Miles and Snow's adaptive cycle.

Following factor analysis, differentiated strategic constructs were identified, qualifying each dimension of the adaptive cycle. Our constructs were empirically characterized as follows: *Entrepreneurial dimensions*: Differentiation orientation, characterizing a strategic focus on product or service quality and novelty; Scope of product-market domain, characterizing a strategic orientation to take advantage of product and market opportunities; Cost-control orientation, characterizing a strategic focus on overall costs control; Stability of product-market domain, characterizing a strategic orientation to position the firm on a stable product-market domain. *Engineering dimensions*: Process-efficiency

R&D, characterizing R&D efforts dedicated to increasing product or service quality and overall productivity; Market-novelty R&D, characterizing R&D efforts dedicated to opening new markets or finding new forms of reaching clients; Product-novelty R&D, characterizing R&D efforts dedicated to launching new or significantly improved products or find new uses of existing products; Costs-reduction R&D, characterizing R&D efforts dedicated to finding solutions for cost reductions; Production Flexibility, characterizing an organization of production dedicated to leverage firm's flexibility in manufacturing. Production Productivity, characterizing an organization of production dedicated to leverage manufacturing expertise and productivity. *Administrative dimensions*: Formal organization, characterizing a formalized and explicit configuration of firm's structure and processes; Flexible organization, characterizing a configuration of firm's structure and processes dedicated to support organizational agility and adaptability.

We measured firm's innovation behavior following requirements from the Oslo Manual (OECD, 2005) as well as mainstream research outputs on the sustained or disruptive nature (Christensen, 1997) and technology or market-based source (Zhou et al., 2005) of innovation. The Oslo Manual characterizes four types of innovation at the level of the firm that encompass a wide range of changes in firms' activities: product innovations, process innovations, marketing innovations and organizational innovation. Factor analysis led to the emergence of four differentiated constructs. *Product innovations*, characterizing significant changes in the technological features or in the use of goods and services. *Process innovations*, characterizing significant changes in the firm's production and delivery methods. Our empirically-derived construct of process innovation also included a strong emphasis on working out new pricing methods, suggesting that a price-adaptation orientation was anchored in process innovation in our sample. *Marketing innovations*, characterizing the implementation of significantly new marketing methods, such as new product design and packaging and new sales and promotion methods. *Organizational innovation*, characterizing new business practices in the workplace organization or in the firm's external relations.

Factor analysis on firm capabilities enabled the emergence of clearly differentiated constructs characterized as follows: *Firm Management*, characterizing managerial competencies, knowledge and skills of employees, efficient monitoring of activities, strategic planning, and ability to attract new profiles. *Firm Sales*, characterizing firm's ability to efficiently marketing products or services through efficient management of commercial activities. *Firm CRM*, characterizing firm's ability to generate client's loyalty through efficient customer service and follow-up. *Firm Technical expertise*, characterizing firm's technical equipment assets as well as technical staff expertise and experience. *Firm Intermediaries*, characterizing firm's cooperation with innovation agencies, external R&D teams, and firm's awareness of financing support for innovation.

Factor analysis on industry contingencies led to distinct constructs characterizing market forces. *Industry Rivalry*, characterizing the intensity of rivalry between competitors on sales, promotion, pricing and new product launching. *Industry Barriers*, characterizing legal, technical or financial barriers for new entrants in the firm's major market. *Industry Clients*, characterizing the bargaining power of clients with regard to pricing, loyalty, and weight in the firm's portfolio. *Industry Suppliers*, characterizing the bargaining power of suppliers with regard to firm's dependence on quality of supplied material in the finished product, pricing policy from suppliers, and scarcity of suppliers. *Industry Substitutes*, characterizing the threat of substitute offerings with regard to product differentiation, service differentiation, and competitive pricing.

Reliability of constructs

Construct reliability was determined using Cronbach's Alpha and factor analysis. Regarding internal consistency, most constructs met Nunnally (1978) Cronbach's Alpha value of 0.7 and all our constructs met the cut-off level of 0.5 (Van de Ven and Ferry, 1980) - with the exception of the entrepreneurial dimension of scope of product-market domain (0.426), and of the entrepreneurial dimension of cost-control orientation (0.352). Nevertheless, we decided to include these constructs in our analysis as they presented strong internal theoretical relevance (see Table 2.1 in Appendix 2.2) and coherence with Conant et al.'s multi-item scale for measuring strategic types (1990). As above-mentioned, factor analysis was used to reveal the underlying common themes between the respective attributes of strategic posture, innovation behavior, industry contingencies, and firm contingencies. The size of our sample (>200) suggest that factor loadings higher than 0.40 are significant (Hair et al., 1998). All our factors met this cut-off level. Tables 2.1, 2.2, 2.3 and 2.4 in Appendix 2.2, show the respective factor loadings and Cronbach's Alpha of strategic posture, innovation activities, industry contingencies, and firm contingencies constructs.

5.6.4. Controls

We controlled for firm size, firm's turnover, industry sectors, firm's R&D intensity, and the age (e.g. the longevity) of the firm. Indeed, many research works have emphasized the difference of strategic and innovation behaviors between small and larger organizations (Acs and Audretsch, 1987, 1988; Cohen and Klepper, 1996; Vaona and Pianta, 2008). Other streams of research suggest that industry specificities are key factors affecting firm's strategy (Chandler, 1962, Drucker, 1954, 1974; Porter, 1981, 1991) and innovative performance (Acs and Audretsch, 1988; Cohen, 1995; Malerba, 2004; Raymond and St-Pierre, 2010b). R&D intensity at the firm's level has also been investigated as a predictor of innovation performance also correlated to strategic posture (Langerak et al., 1999; Raymond and St-Pierre, 2010a). The longevity of activity of the firm was introduced as a sign of overall firm's operational effectiveness regarding implementation of practices of strategic and innovation management.

Firm's size was measured as the number of employees, ranked by size categories as specified by the Oslo Manual guidelines (OECD/European Communities, 2005). Firm's turnover was measured as the volume of sales in 2009, ranked by sales categories (less than 500 K€, 500 to 999 K€, 1000 to 4999 K€, 5000 to 14999 K€, 15000 to 50000 K€, more than 50000 K€). Industry sectors were classified according to their two-digit ISIC class, thus determining the principal activity or range of activities of the firm (ISIC Rev. 3.1, UN, 2002). However, for clarity purpose, we eventually controlled only for firms belonging or not to the sector of metallurgy and fabricated metal products. Indeed, this sector represented more than 20% of firms whereas none of other sectors accounted for more than 10% of firms. Firm's technological intensity was measured by firm's average expenses in research and development over sales for the past three years with a cut-off rate of 2.5% (OECD, 2008). Firm's age was measured on the basis of the firm's date of foundation. We named firms as historic if founded before 1960, ancient before 1989, mature before 2006, and new after 2006.

We also investigated possible correlations between the independent variables of our model, thus increasing the estimated R^2 of the model. To this aim, we calculated the variance inflation factor (VIF). No consensus seems to have emerged regarding the cut-off value that should be used to measure multicollinearity. Studenmund (1992) suggests a value of 5 whereas other scholars (Hair et al. 1998) suggest that values up to 10 would be acceptable. No VIF-values of our model exceed a cut-off value of 5 (see Appendices 2.4, 2.5, 2.6), with mean VIF values not exceeding 1.49. Consequently, the estimates of our model do not seem to be affected by multicollinearity. Therefore, the predictive ability of the regression results used in the preliminary steps of our model may not be misinterpreted.

5.7. Analysis and results

Sample characterization

In Tables 1.1 to 1.5 of Appendix 2.1, descriptive statistics provide an overall description of our sample as regards control variables of firm size, industry sector, turnover, R&D intensity, and age. A majority of responding SMEs (81%) belong to the less than 50 employees range. This correlates previous results on characteristics of French manufacturing SMEs (Barstelman et al., 2005; European Commission; 2007). Although we focused on firms with 10 to 250 employees sourced from the database of French Chambers of Commerce, 7.22% of responding firms reported staff below 10 employees. We nevertheless decided to include these firms in our sample. Indeed, such SMEs represent a significant amount of firms in the manufacturing sector (European Commission; 2007), which has led European authorities to emphasize efforts to foster innovation in very small firms. Responding SMEs reported activity in a wide scope of industry sectors. However, SMEs in the Metals sector represented close to 20% of responding firms, the second largest sectors being Rubber and Plastics (10%), and Electricals and Electronics (10%). Therefore, we decided to control for industry sector as “being active in the Metals sector or not”. A majority of responding firms (51%) reported a turnover in the range of 1 to 5 million Euros. Most of the sampled SMEs (63%) can be qualified as low R&D-intensive with R&D expenses accounting for less than 2.5% of turnover. The sample is balanced between ancient firms operating for more than 20 years (27%), mature firms, operating for more than 4 years (44%), and new firms operating for less than 4 years (25.5%). Historic SMEs operating for more than 50 years represent a small part of responding firms.

Control variables

The influence of control variables on the firms' strategic posture characteristics of our sample is generally not significant (at $p < 0.1$) except between firm size and firm's entrepreneurial focus on product-market domain stability, or administrative focus on formalization or flexibility of organization; between industry sector and firm's engineering focus on production productivity; between firm's R&D intensity and firm's entrepreneurial focus on costs, or engineering focus on process or product R&D, and administrative focus on formalization of organization; between firm's turnover and firm's entrepreneurial focus on scope of product-market domain, engineering focus on production productivity or administrative focus on formalization of organization; between age of the firm and firm's engineering focus on process R&D. Results also show that there is generally no significant (at $p < 0.1$) influence of control variables on firms' innovation behavior characteristics except between firm size and firm's focus on sustained innovation; between industry sector and marketing innovation; between firm's R&D intensity and most innovation characteristics; between firm's turnover and technology-based innovation; between firm's age and product innovation.

With regard to industry contingencies, the only significant (at $p < 0.1$) influence of control variables concerns firm size or R&D intensity, and the bargaining power of clients. With regard to firm contingencies, results show generally no significant (at $p < 0.1$) influence of control variables except between firm size and sales capabilities; between R&D intensity and relations with intermediaries; between turnover and sales capabilities or technical expertise. Tables 3.1, 3.2, and 3.3 in Appendix 2.3 show the ANOVA results on correlations between control variables and the respective characteristics of strategic posture, innovation behavior, and industry and firm contingencies.

Clustering of strategic posture

We conducted the clustering of firms into internally similar and externally mutually exclusive groups combining both hierarchical and non-hierarchical methods to gain the benefit of each method (Hair et al., 1998). First, based on Ward's method of hierarchal agglomeration using the squared Euclidian distance, we measured similarities among entities to determine how many groups really existed in our sample. Then, entities were partitioned into clusters and each cluster was profiled based on the predefined constructs characterizing strategic posture. We clustered the remaining observations using a non-hierarchical method with the cluster centers from the hierarchical method. A five-group solution was considered the most appropriate classification. Table 20 shows the empirically-derived profiles of strategic postures. Results indicate that clusters of firms of our sample correspond to the major attributes of our model of Miles and Snow's and Porter's derived description of Prospectors, Low-Cost Defenders, Differentiated Defenders and Analyzers. A fifth group has been qualified as reactors based on its characteristics. However, some attributes emphasize the "hybridization" of the empirically-derived profiles. Indeed, the first cluster is characterized by the highest scores on all dimensions of the adaptive cycle, except on differentiation and costs orientation, scope of product-market domain, production flexibility and formalization of organization, which are still among the highest measures. These firms represent robust Analyzers combining at the same time the main characteristics of "pure" Prospectors and Defenders as defined by Miles and Snow (2003). The second group of SMEs combines a strong differentiation and costs orientation with quality and efficiency of processes and a formalized organization. These are the chief characteristics of the Differentiated Defenders of our model. SMEs of the third group focus on taking advantage of market opportunities that they obtain thanks to an aggressive search for cost-effectiveness. This group puts also low emphasis on production or organizational flexibility together with low formalization of organizational processes. We qualified these firms as “opportunistic” Low-Cost Defenders. The fourth cluster is made of firms with a focus on differentiation combined with product-market stability and process R&D orientation, but no specific emphasis on product novelty or cost efficiency matching the differentiation orientation, nor on other strategic posture attributes. We characterize this group of firms as Reactors who do not make trade-offs to shape the firm’s structure and processes to fit the chosen strategy (Miles and Snow, 2003). SMEs in cluster five emphasize a broad product/market scope, thus characterizing the entrepreneurial choice of Prospectors. As Prospectors, these firms pay little attention on costs control. They emphasize a strong market development orientation supported by production flexibility enabling them to take advantage of market opportunities as well as some concern for process effectiveness. They coordinate activities through a flexible organization. We label these firms as “efficient” Prospectors as they mainly focus on maintaining a configuration likely to benefit from market opportunities while being careful with investments related to brand new product development. In total, our sample is made of 80 Analyzers, 47 Differentiated Defenders, 39 “opportunistic Low-Cost Defenders”, 44 Reactors, and 23 “efficient Prospectors”.

Table 20: Empirical profiles of strategic posture – Cluster results

Empirical profiles of Miles and Snow types of strategic posture: Cluster results

	Strategic Postures [a]						
	Analyzer	*Differentiated Defender*	*"Opportunistic" Low-Cost Defender*	*Reactor*	*"Efficient" Prospector*	*F*	
Strategic posture characteristics factors b	(80)	(47)	(39)	(44)	(23)		
Entrepreneurial - Differentiation orientation	0.37	0.48	-1.35	0.13	-0.21	39.425	***
Entrepreneurial - broad product/market Scope	0.60	-0.83	0.02	-0.57	0.66	32.870	***
Entrepreneurial - Cost orientation	0.28	0.41	-0.07	-0.80	-0.18	13.025	***
Entrepreneurial - product/market Stability	0.45	-0.19	-0.17	0.38	-1.62	33.119	***
Engineering - R&D Process oriented	0.31	0.29	-1.32	0.31	-0.05	32.710	***
Engineering - R&D Market oriented	0.32	-0.40	-0.19	-0.09	0.19	4.908	***
Engineering - R&D Product oriented	0.48	0.00	-0.35	-0.50	-0.12	9.836	***
Engineering - R&D Costs oriented	0.24	0.44	0.37	-0.92	-0.60	21.949	***
Engineering - Production Flexibility oriented	0.50	-0.40	-0.55	-0.32	0.64	16.962	***
Engineering - Production Productivity oriented	0.56	0.18	-0.38	-0.49	-0.71	17.325	***
Administrative - Formal organization	0.41	0.43	-0.37	-0.44	-0.85	16.574	***
Administrative - Flexible organization	0.72	-0.84	-0.30	-0.27	0.22	31.390	***

Notes: [a] numbers in parentheses indicate group size
[b] Factors based on factor analysis of strategy characteristics
*** denotes $p < 0.01$

Differentiated relationship between strategic posture and innovation behavior

Factor analysis conducted, from the adaptive cycle perspective (Miles and Snow, 2003), on the Entrepreneurial, Engineering and Administrative attributes of firms strategic posture has clearly identified differentiated sets of attributes characterizing the adaptive choice of above mentioned strategic profiles (see Table 2.1, in Appendix 2.2). Factor analysis conducted on innovation activities has also determined clear differentiated constructs of innovation profiles (see Table 2.2, in Appendix 2.2). As an introduction to our hypotheses, we suggest that the different strategic postures relative to Low-Cost Defenders, Differentiated Defenders, Prospectors and Analyzers profiles correlate with differentiated attributes of innovation behavior. This is supported by results of Table 21, which highlight the significant differences in the natures, sources, and activities of innovation by empirically-derived strategic posture profiles.

Table 21: Differences in innovation behavior by empirically-derived strategic profiles

Differentiated relationships between innovation behavior and strategic posture profiles: ANOVA results

	Strategic Postures [a]						
	Analyzer	*Differentiated Defender*	*"Opportunistic" Low-Cost Defender*	*Reactor*	*"Efficient" Prospector*	*F*	
Innovation characteristics	(80)	(47)	(39)	(44)	(23)		
Nature [b]							
Sustained	6.13	5.87	4.92	5.44	4.70	12.501	***
Disruptive	4.74	4.00	4.05	3.61	4.24	5.264	***
Source [b]							
Technology-based	5.29	4.52	4.20	3.85	4.27	9.277	***
Market-based	5.92	5.24	5.07	5.02	5.52	6.186	***
Activity [c]							
Organizational	0.34	-0.07	-0.21	-0.43	0.12	5.301	***
Process	0.31	-0.06	-0.16	-0.31	-0.09	3.520	***
Marketing	0.16	-0.07	-0.27	0.06	-0.05	1.357	NS
Product	0.20	0.17	-0.22	-0.21	-0.25	2.526	**

Notes: [a] numbers in parentheses indicate group size
[b] 7-point scale (1: very low practice of this type of innovation; 7: very high practice)
[c] Based on factor analysis of innovation activities
* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Furthermore, we posited the existence of differentiated alignments between entrepreneurial, engineering and administrative strategic posture attributes, and innovation behavior attributes in our initial proposition and in our hypotheses. This receives also strong support, as shown in Table 22 and in regression 1 of Tables 5.1, 5.2, 5.3, and 5.4 of Appendix 2.5. More specifically, these results emphasize clear distinctive relationships between the attributes of the different adaptive strategic choices and the different natures, sources and activities of firms' innovative behavior.

Table 22: Correlations between strategic posture attributes and innovation behavior attributes

Intercorrelations among Strategic Posture and Innovation Behavior characteristics [a]

	Innovation behavior characteristics [b]							
Strategic posture characteristics [b]	Sustained	Disruptive	Techno-based	Market-based	Organizational	Process	Marketing	Product
Entrepreneurial - Differentiation orientation	0.340***	0.141**	0.124*	0.122*	0.111*		0.148**	0.208***
Entrepreneurial - broad product/market Scope			0.160***	0.125*	0.204***	0.154**		
Entrepreneurial - Cost orientation	0.123*	0.162***						
Entrepreneurial - product/market Stability	0.172***			0.169***				
Engineering - R&D Process oriented	0.377***		0.180***	0.130*		0.125*	0.128*	
Engineering - R&D Market oriented				0.128*	0.171***	0.260***	0.347***	-0.126*
Engineering - R&D Product oriented	0.226***	0.392***	0.251***	0.258***	0.134**		0.129**	0.479***
Engineering - R&D Costs oriented	0.166**		0.237***		0.134**			
Engineering - Production Flexibility oriented	0.138**		0.169***	0.225***		0.212***		
Engineering - Production Productivity oriented	0.230***	0.124*	0.273***		0.212***	0.199***	0.116*	
Administrative - Formal organization	0.335***	0.157**	0.346***	0.209***	0.415***			0.151**
Administrative - Flexible organization	0.130**	0.246***	0.244***	0.272***	0.206***	0.195***		

Notes [a] Only significant correlations at $p < 0.1$ are reported
[b] Based on factor analysis of strategy and innovation characteristics
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Path analysis: Model estimation and fit

We examined the structural relations among the strategic and contingencies constructs, and each innovation construct of our model with path analysis. To estimate each path analysis, we used the most common estimation procedure, maximum likelihood estimation (MLE), in AMOS statistical tool. MLE was particularly appropriate to our sample size as a sample size of 200 is viewed as the critical sample size (Hair et al. 1998). The most commonly used indexes in the Structural Equation Literature to test model fit are the CMIN/DF (minimum discrepancy divided by degrees of freedom) that has been completed by other fit indexes reflecting the improvement in fit of a specified model over the independent model such as Comparative Fit Index (CFI), and Root Mean Square Approximation (RMSEA) indexes (Arbuckle, 2006). There is no commonly agreed cut-off point for CMIN/DF, some scholars arguing that a cut-off value of 5 indicate a reasonable fit whereas other recommend values below 3 or even 2 (Arbuckle, 2006). From the CMIN/DF perspective, the path analyses conducted in this research show values below a 3 cut-off point, most of them being below a 2 cut-off value, indicating a good fit of the overall model. As regards CFI, which is truncated to fall between 0 and 1 with values close to 1 indicating a very good fit (Arbuckle, 2006), our path analyses results show CFI values ranging from 0.791 to 0.912 indicating a good fit of the overall model. Practical experience suggests that RMSEA values of about 0.05 or less would indicate a very good fit, with RMSEA values below 0.08 indicating a reasonable fit (Arbuckle, 2006). Regarding our overall model, RMSEA values range from 0.047 to 0.075 and reveal a good fit of the overall model.

Strategic posture, innovation behavior, and contingencies: Results to hypotheses

With regard to external and internal contingencies, we suggested in our introduction to hypotheses the differentiated influence of market forces and firm strategic capabilities on strategic posture and innovation behavior. Results in Table 23 highlight the significant differences in industry and firm contingencies by empirically-derived strategic posture profiles. Tables 4.1 to 4.9 in Appendix 2.4 show this differentiated influence of industry and firm contingencies respectively on strategic posture attributes, and innovation behavior attributes. Regressions 2 in Tables 5.1 to 5.4 in appendix 2.5 show the differentiated combined influence of strategic attributes and contingencies attributes on innovation natures, sources, and activities. Results suggest the existence of differentiated effects in the context of strategy-innovation relationship and provide preliminary insights to results to our hypotheses. Results to hypotheses are detailed in path analysis results presented in the following section.

Table 23: Differences in contingencies by empirically-derived strategic posture profiles

Differentiated contingencies and strategic posture profiles: ANOVA results

	Strategic Postures [a]						
Contingencies characteristics [b]	*Analyzer* (80)	*Differentiated Defender* (47)	*"Opportunistic " Low-Cost Defender* (39)	*Reactor* (44)	*"Efficient" Prospector* (23)	*F*	
Industry contingenies							
Rivalry	0.102	-0.140	0.217	-0.248	0.037	1.598	NS
Barriers	-0.183	0.306	0.001	0.051	-0.089	1.871	NS
Clients	0.096	0.198	0.037	-0.366	-0.101	2.239	*
Suppliers	0.001	-0.026	-0.089	0.029	0.147	0.215	NS
Substitutes	0.032	0.005	0.097	-0.326	0.337	1.969	*
Firm contingencies							
Management	0.220	0.120	-0.235	-0.246	-0.140	2.515	**
Sales	0.160	-0.039	-0.141	-0.020	-0.201	0.959	NS
CRM	0.070	0.184	-0.392	0.047	-0.044	2.068	*
Technical expertise	0.251	0.368	-0.404	-0.299	-0.370	6.847	***
Intermediaries	-0.052	0.107	0.010	-0.027	-0.006	0.195	NS

Notes:
[a] numbers in parentheses indicate group size
[b] Based on factor analysis of contingencies
* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01
NS: Non Significant

Nature of innovation: We proposed in hypotheses 1 and 2 that *the propensity to adopt sustained (H1) or disruptive (H2) innovation behavior (which is differentiated by strategic posture) is influenced by direct industry-specific effects on strategic (H1a, H2a) and innovation (H1b, H2b) attributes and direct firm-specific effects on strategic (H1c, H2c) and innovation (H1d, H2d) attributes as well as indirect industry-specific (H1e, H2e) and firm-specific (H1f, H2f) effects on innovation attributes*.

Sustained innovation (see Tables 24; 25) is predicted by an engineering focus on process R&D, supported by a formalized organization. *Regarding direct effects*, H1a is supported with positive influence of substitute products on firms' engineering focus on product R&D. H1b is also supported with negative influence of suppliers on sustained innovation. H1c is supported with positive influence of firms' technical capabilities on an engineering focus on product and process R&D, and on the need for a formalized organization. H1d is not supported, meaning limited direct effects of firm contingencies on sustained innovation. *Regarding indirect effects*, H1e is supported with negative influence of a low level of barriers to entry on the propensity to sustained innovation. H1f is supported with positive influence of firms' technical capabilities on sustained innovation.

Table 24: Contingencies on strategy-innovation relationship – Sustained innovation

Path analysis results : Direct effects of strategy and contingencies on sustained innovation

	Standardized estimates			
	Formal organization	R&D Product	R&D Process	Sustained innovation
Industry contingencies				
Industry - Barriers	-0.125	-0.130	-0.072	-0.010
Industry - Rivalry	0.019	0.074	0.039	0.104
Industry - Clients	0.060	-0.177	-0.173	-0.014
Industry - Suppliers	-0.067	-0.104	0.076	-0.121*
Industry - Substitutes	0.003	0,229***	0.013	0.041
Firm contingencies				
Firm - Technical expertise	0.225**	0.341***	0.295***	0.089
Strategic posture				
Administrative - Formal organization	0.000	0.000	0.000	0.272***
Engineering - R&D Product	0.000	0.000	0.000	0.129*
Engineering - R&D Process	0.000	0.000	0.000	0.322***

Path analysis results : Indirect effects of strategy and contingencies on sustained innovation

	Standardized estimates			
	Formal organization	R&D Product	R&D Process	Sustained innovation
Industry contingencies				
Industry - Barriers	0.000	0.000	0.000	-0,074*
Industry - Rivalry	0.000	0.000	0.000	0.027
Industry - Clients	0.000	0.000	0.000	-0.062
Industry - Suppliers	0.000	0.000	0.000	-0.007
Industry - Substitutes	0.000	0.000	0.000	0.035
Firm contingencies				
Firm - Technical expertise	0.000	0.000	0.000	0.200***

Model statistics: CMIN/DF = 1.956; p = 0.000; CFI = 0.831; RMSEA = 0.064

Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 25: Results to hypotheses - Contingencies on strategy-innovation relationship – Sustained innovation

Results to hypotheses [a]: Contingency effects on strategy-sustained innovation relationship

	Direct effects			Direct effects	Indirect effects
Effects of x on y	Formal organization	R&D Product	R&D Process	Sustained innovation	
Strategic posture attributes				Formal orga. (+)*** R&D Product (+)* R&D Process (+)***	
Industry contingencies		Substitutes H1a (+)***		Suppliers H1b (-)*	Barriers H1e (-)*
Firm contingencies	Tech. expert. H1c (+)**	Tech. expert. H1c (+)***	Tech. expert. H1c (+)***	H1d (NS)	Tech. expert. H1f (+)***

Notes: [a] Only significant results at $p < 0.1$ are reported
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Disruptive innovation (see Tables 26; 27) is predicted by an entrepreneurial orientation on costs control and an engineering focus on product R&D (whereas a negative influence of market R&D) supported by a flexible organization. *Regarding direct effects*, H2a is supported with positive influence of intensity of rivalry on market R&D, of substitute products on product R&D, and of clients bargaining power on efforts to control costs. H2b is supported with positive influence of low barriers to entry on the propensity to disruptive innovation, and negative influence of clients bargaining power. H2c is supported with positive influence of firms' capabilities to manage client relationship on market R&D, and of firms' managerial capabilities to support product R&D, whereas managerial capabilities negatively influence a costs control orientation. Firms' technical capabilities positively influence product R&D and costs control. H2d is also supported with negative influence of firms' technical capabilities on disruptive innovation. *Regarding indirect effects*, H2e is supported with positive influence of substitute products on the propensity to disruptive innovation. The same prevails for H2f with positive influence of firms' technical capabilities.

Table 26: Contingencies on strategy-innovation relationship – Disruptive innovation

Path analysis results : Direct effects of strategy and contingencies on disruptive innovation

	Standardized estimates				
	Flexible organization	R&D Market	R&D Product	Costs orientation	Disruptive innovation
Industry contingencies					
Industry - Rivalry	-0.034	0.207**	0.051	-0.077	0.048
Industry - Suppliers	0.142	-0.128	-0.158	0.047	-0.067
Industry - Substitutes	0.013	0.093	0.254***	0.086	-0.021
Industry - Clients	-0.017	-0.118	-0.119	0.435**	-0.281*
Industry - Barriers	0.000	0.117	-0.054	-0.088	0.176*
Firm contingencies					
Firm - Technical expertise	-0.063	-0.046	0.208**	0.190*	-0.247**
Firm - CRM	0.197	0.300***	0.127	0.191	-0.026
Firm - Management	0.077	0.113	0.235***	-0.250**	0.144
Strategic posture					
Administrative - Flexible organization	0.000	0.000	0.000	0.000	0.233**
Engineering - R&D Market	0.000	0.000	0.000	0.000	-0.166*
Engineering - R&D Product	0.000	0.000	0.000	0.000	0.491**
Entrepreneurial - Costs orientation	0.000	0.000	0.000	0.000	0.438***

Path analysis results : Indirect effects of strategy and contingencies on disruptive innovation

	Standardized estimates				
	Flexible organization	R&D Market	R&D Product	Costs orientation	Disruptive innovation
Industry contingencies					
Industry - Rivalry	0.000	0.000	0.000	0.000	-0.051
Industry - Suppliers	0.000	0.000	0.000	0.000	-0.003
Industry - Substitutes	0.000	0.000	0.000	0.000	0.150*
Industry - Clients	0.000	0.000	0.000	0.000	0.148
Industry - Barriers	0.000	0.000	0.000	0.000	-0.085
Firm contingencies					
Firm - Technical expertise	0.000	0.000	0.000	0.000	0.178*
Firm - CRM	0.000	0.000	0.000	0.000	0.142
Firm - Management	0.000	0.000	0.000	0.000	0.005

Model statistics: CMIN/DF = 2.048; $p = 0.000$; CFI = 0.791; RMSEA = 0.067

Notes: * denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 27: Results to hypotheses - Contingencies on strategy-innovation relationship – Disruptive innovation

Results to hypotheses [a]: Contingency effects on strategy-disruptive innovation relationship

	Direct effects				Direct effects	Indirect effects
Effects of x on y	Flexible organization	R&D Market	R&D Product	Costs orientation	Disruptive innovation	
Strategic posture attributes					Flexible orga. (+)** R&D Market (-)* R&D Product (+)** Costs orientation (+)***	
Industry contingencies		Rivalry H2a (+)**	Substitutes H2a (+)***	Clients H2a (+)**	Clients H2b (-)* Barriers H2b (+)*	Substitutes H2e (+)*
Firm contingencies		CRM H2c (+)***	Tech. expert. H2c (+)** Management H2c (+)***	Tech. expert. H2c (+)* Management H2c (-)**	Tech. expert. H2d (-)**	Tech. expert. H2f (+)*

Notes: a Only significant results at $p < 0.1$ are reported
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Sources of innovation: We proposed in hypotheses 3 and 4 that *The propensity to adopt a technology-based (H3) or market-based (H4) innovation behavior (which is differentiated by strategic posture) is influenced by direct industry-specific effects on strategic (H3a, H4a)) and innovation (H3b, H4b) attributes and direct firm-specific effects on strategic (H3c, H4c) and innovation (H3d, H4d) attributes as well as indirect industry-specific (H3e, H4e) and firm-specific (H3f, H4f) effects on innovation attributes.*

Technology-based innovation (see Tables 28; 29) is predicted by an engineering focus on costs reduction supported by a formalized, flexible organization. *Regarding direct effects,* H3a is supported with positive influence of the bargaining power of clients on firms' search for costs reduction. H3b is not supported meaning limited direct effects of industry contingencies on the propensity to technology-based innovation. H3c is supported with positive influence of firms' technical capabilities on the need to have a formalized organization. H3d is supported with positive influence of firms' technical capabilities on the propensity to develop technology-based innovation. *Regarding indirect effects,* H3e is supported with positive influence of clients' bargaining power on firms' propensity to adopt technology-based innovation. The same prevails for H3f with the positive influence of firms' technical capabilities.

Table 28: Contingencies on strategy-innovation relationship – Technology-based innovation

Path analysis results : Direct effects of strategy and contingencies on technology-based innovation

	Standardized estimates			
	Formal organization	Flexible organization	R&D Costs	Techno-based innovation
Industry contingencies				
Industry - Barriers	-0.084	-0.164	0.042	-0.057
Industry - Clients	0.135	0.010	0.257***	-0.130
Firm contingencies				
Firm - Technical expertise	0.206**	0.031	0.024	0.130*
Strategic posture				
Administrative - Formal organization	0.000	0.000	0.000	0.311***
Administrative - Flexible organization	0.000	0.000	0.000	0.260**
Engineering - R&D Costs	0.000	0.000	0.000	0.279***

Path analysis results : Indirect effects of strategy and contingencies on technology-based innovation

	Standardized estimates			
	Formal organization	Flexible organization	R&D Costs	Techno-based innovation
Industry contingencies				
Industry - Barriers	0.000	0.000	0.000	-0.057
Industry - Clients	0.000	0.000	0.000	0.116*
Firm contingencies				
Firm - Technical expertise	0.000	0.000	0.000	0.079*

Model statistics: CMIN/DF = 1.928; p = 0.000; CFI = 0.868; RMSEA = 0.063

Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 29: Results to hypotheses - Contingencies on strategy-innovation relationship – Technology-based innovation

Results to hypotheses [a]: Contingency effects on strategy-technology-based innovation relationship

Effects of x on y	Direct effects Formal organization	Direct effects Flexible organization	Direct effects R&D Costs	Direct effects Technology-based innovation	Indirect effects Technology-based innovation
Strategic posture attributes				Formal orga. (+)*** Flexible orga. (+)** R&D Costs (+)***	
Industry contingencies			Clients H3a (+)***	H3b (NS)	Clients H3e (+)*
Firm contingencies	Tech. expert. H3c (+)**			Tech. expert. H3d (+)*	Tech. expert. H3f (+)*

Notes: [a] Only significant results at $p < 0.1$ are reported
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Market-based innovation (see Tables 30; 31) is predicted by an entrepreneurial choice for stability of product-market domain, an engineering focus on product R&D, and a flexible organization. *Regarding direct effects,* H4a is supported with positive influence of substitute products and negative influence of the bargaining power of suppliers on an engineering focus on product R&D. H4b is not supported meaning limited direct effects of industry contingencies on the propensity to market-based innovation. H4c is supported with positive influence of firms' technical capabilities on an entrepreneurial orientation on costs reduction, and an engineering focus on product R&D and production flexibility. Results also suggest the negative influence of firms' relationships with intermediaries on costs reduction and production flexibility, and their positive influence on product R&D. H4d is not supported. *Regarding indirect effects*, H4e is supported with positive influence of substitute products on the propensity to develop market-based innovation. H4f is supported with positive influence of firms' technical capabilities on the propensity to adopt a market-based innovation behavior.

Table 30: Contingencies on strategy-innovation relationship – Market-based innovation

Path analysis results : Direct effects of strategy and contingencies on market-based innovation

	Standardized estimates					
	Flexible organization	Costs orientation	Stability	Production Flexibility	R&D Product	Market-based innovation
Industry contingencies						
Industry - Rivalry	-0.065	-0.058	-0.042	-0.142	-0.018	0.000
Industry - Suppliers	0.144	0.13	-0.013	-0.003	-0.227**	0.000
Industry - Substitutes	0.042	0.12	-0.076	0.011	0.227**	0.000
Firm contingencies						
Firm - Technical expertise	0.036	0.208**	0.123	0.205**	0.277***	0.000
Firm - Intermediaries	-0.063	-0.244***	-0.089	-0.269**	0.172**	0.000
Strategic posture						
Administrative - Flexible organization	0.000	0.000	0.000	0.000	0.000	0.243**
Entrepreneurial - Costs orientation	0.000	0.000	0.000	0.000	0.000	0.097
Entrepreneurial - Stability	0.000	0.000	0.000	0.000	0.000	0.144**
Engineering - Production Flexibility	0.000	0.000	0.000	0.000	0.000	0.111
Engineering - R&D Product	0.000	0.000	0.000	0.000	0.000	0.328***

Path analysis results : Indirect effects of strategy and contingencies on market-based innovation

	Standardized estimates					
	Flexible organization	Costs orientation	Stability	Production Flexibility	R&D Product	Market-based innovation
Industry contingencies						
Industry - Rivalry	0.000	0.000	0.000	0.000	0.000	-0.049
Industry - Suppliers	0.000	0.000	0.000	0.000	0.000	-0.029
Industry - Substitutes	0.000	0.000	0.000	0.000	0.000	0.087*
Firm contingencies						
Firm - Technical expertise	0.000	0.000	0.000	0.000	0.000	0.161***
Firm - Intermediaries	0.000	0.000	0.000	0.000	0.000	-0.025

Model statistics: CMIN/DF = 1.885; p = 0.000; CFI = 0.874; RMSEA = 0.062
Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 31: Results to hypotheses **-** Contingencies on strategy-innovation relationship – Market-based innovation

Results to hypotheses [a]: Contingency effects on strategy-market-based innovation relationship

	Direct effects					Direct effects	Indirect effects
Effects of x on y	Flexible organization	Costs orientation	Stability	Production Flexibility	R&D Product	Market-based innovation	
Strategic posture attributes						Flexible orga. (+)** Stability (+)** R&D Product (+)***	
Industry contingencies					Suppliers H4a (-)** Substitutes H4a(+)**	H4b (NS)	Substitutes H4e (+)*
Firm contingencies		Tech. expert. H4c (+)** Intermediaries H4c (-)***		Tech. expert. H4c (+)** Intermediaries H4c (-)**	Tech. expert. H4c (+)*** Intermediaries H4c (+)**	H4d (NS)	Tech. expert. H4f (+)***

Notes: [a] Only significant results at p < 0.1 are reported
* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Activities of innovation: We proposed in hypothesis 5, 6, 7 and 8 that *the propensity to adopt a process (H5), product (H6), marketing (H7) or organizational (H8) innovation behavior (which is differentiated by strategic posture) is influenced by direct industry-specific effects on strategic (H5a, H6a, H7a, H8a) and innovation (H5b, H6b, H7b, H8b) attributes and direct firm-specific effects on strategic (H5c, H6c, H7c, H8c) and innovation (H5d, H6d, H7d, H8d) attributes as well as indirect industry-specific (H5e, H6e, H7e, H8e) and firm-specific (H5f, H6f, H7f, H8f) effects on innovation attributes.*

Process innovation (see Tables 32; 33) is predicted by an engineering focus on market and process R&D. *Regarding direct effects*, H5a is supported with negative influence of the bargaining power of suppliers and positive influence of substitute products on a market R&D engineering choice. H5b is not supported meaning limited direct effects of industry contingencies on the propensity to process innovation. H5c is supported with positive influence of firms’ capabilities to manage client relationship on market and process R&D engineering choices. H5d is also supported with positive influence of firms’ technical capabilities on the propensity to develop process innovation. *Regarding indirect effects,* H5e is supported with negative influence of suppliers’ bargaining power on the propensity to process innovation. H5f is supported with positive influence of firms’ capabilities to manage client relationship on the propensity to adopt a process innovation behavior.

Table 32: Contingencies on strategy-innovation relationship – Process innovation

Path analysis results : Direct effects of strategy and contingencies on process innovation

		Standardized estimates		
		R&D Market	R&D Process	Process innovation
Industry contingencies				
	Industry - Rivalry	0.110	-0.050	-0.023
	Industry - Suppliers	-0.248***	0.054	0.087
	Industry - Substitutes	0.135*	-0.009	0.152
Firm contingencies				
	Firm - Technical expertise	-0.028	0.158	0.232***
	Firm - CRM	0.497**	0.414**	-0.020
Strategic posture				
	Engineering - R&D Market	0.000	0.000	0.385*
	Engineering - R&D Process	0.000	0.000	0.218*

Path analysis results : Indirect effects of strategy and contingencies on process innovation

		Standardized estimates		
		R&D Market	R&D Process	Process innovation
Industry contingencies				
	Industry - Rivalry	0.000	0.000	0.031
	Industry - Suppliers	0.000	0.000	-0.084*
	Industry - Substitutes	0.000	0.000	0.050
Firm contingencies				
	Firm - Technical expertise	0.000	0.000	0.024
	Firm - CRM	0.000	0.000	0.282**

Model statistics: CMIN/DF = 1.978; p = 0.000; CFI = 0.872; RMSEA = 0.065

*Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01*

Table 33: Results to hypotheses - Contingencies on strategy-innovation relationship – Process innovation

Results to hypotheses [a]: Contingency effects on strategy-process innovation relationship

	Direct effects		Direct effects	Indirect effects
Effects of x on y	R&D Market	R&D Process	Process innovation	
Strategic posture attributes			R&D Market (+)* R&D Process (+)*	
Industry contingencies	Suppliers H5a (-)*** Substitutes H5a (+)*		H5b (NS)	Suppliers H5e (-)*
Firm contingencies	CRM H5c (+)**	CRM H5c (+)**	Tech. expert. H5d (+)***	CRM H5f (+)**

Notes: a Only significant results at $p < 0.1$ are reported
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Product innovation (see Tables 34; 35) is predicted by an entrepreneurial orientation towards stability of product-market domain and differentiation, and by an engineering focus on product R&D. *Regarding direct effects*, H6a is supported on one hand by negative influence of the bargaining power of suppliers on a differentiation positioning, and product or market R&D engineering choices. On the other hand, substitute products positively influence product or market R&D. However, H6b is not supported meaning limited direct effects on industry contingencies on the propensity to product innovation. H6c is supported with positive influence of firms' technical capabilities on product R&D and positive influence on differentiation. Moreover, firms' capabilities to manage client relationship positively influence market R&D, and relationships with intermediaries positively influence product R&D and negatively influence market R&D. H6d is supported with negative influence of capabilities to manage client relationship on the propensity to adopt a product innovation behavior. *Regarding indirect effects,* H6e is supported with negative influence of suppliers' bargaining power and a positive influence of substitute products on the propensity to adopt a product innovation behavior. H6f is also supported with positive influence of firms' technical capabilities on the propensity to product innovation.

Table 34: Contingencies on strategy-innovation relationship – Product innovation

Path analysis results : Direct effects of strategy and contingencies on product innovation

	Standardized estimates				
	Differentiation	Stability	R&D Market	R&D Product	Product innovation
Industry contingencies					
Industry - Rivalry	0.109	-0.027	0.110	0.003	-0.006
Industry - Suppliers	-0.267**	-0.035	-0.291***	-0.294***	0.084
Industry - Substitutes	0.066	-0.076	0.183**	0.230**	0.050
Firm contingencies					
Firm - Technical expertise	0.211*	0.067	0.010	0.218**	0.061
Firm - CRM	0.094	0.088	0.204*	0.113	-0.268***
Firm - Sales	0.138	0.035	0.098	0.082	0.114
Firm - Intermediaries	0.036	-0.085	-0.149*	0.148*	0.125
Strategic posture					
Entrepreneurial - Differentiation	0.000	0.000	0.000	0.000	0.252*
Entrepreneurial - Stability	0.000	0.000	0.000	0.000	0.147**
Engineering - R&D Market	0.000	0.000	0.000	0.000	-0.103
Engineering - R&D Product	0.000	0.000	0.000	0.000	0.649***

Path analysis results : Indirect effects of strategy and contingencies on product innovation

	Standardized estimates				
	Differentiation	Stability	R&D Market	R&D Product	Product innovation
Industry contingencies					
Industry - Rivalry	0.000	0.000	0.000	0.000	0.014
Industry - Suppliers	0.000	0.000	0.000	0.000	-0.233***
Industry - Substitutes	0.000	0.000	0.000	0.000	0.136*
Firm contingencies					
Firm - Technical expertise	0.000	0.000	0.000	0.000	0.203**
Firm - CRM	0.000	0.000	0.000	0.000	0.089
Firm - Sales	0.000	0.000	0.000	0.000	0.083
Firm - Intermediaries	0.000	0.000	0.000	0.000	0.108

Model statistics: CMIN/DF = 2.304; p = 0.000; CFI = 0.826; RMSEA = 0.075
Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 35: Results to hypotheses - Contingencies on strategy-innovation relationship – Product innovation

Results to hypotheses [a]: Contingency effects on strategy-product innovation relationship

	Direct effects				Direct effects	Indirect effects
Effects of x on y	Differentiation	Stability	R&D Market	R&D Product	Product innovation	
Strategic posture attributes					Differentiation (+)* Stability (+)** R&D Product (+)***	
Industry contingencies	Suppliers H6a (-)**		Suppliers H6a (-)*** Substitutes H6a (+)**	Suppliers H6a (-)*** Substitutes H6a (+)**	H6b (NS)	Suppliers H6e (-)*** Substitutes H6e (+)*
Firm contingencies	Tech. expert. H6c (+)*		CRM H6c (+)* Intermediaries H6c (-)*	Tech. expert. H6c (+)** Intermediaries H6c (+)*	CRM H6d (-)***	Tech. expert. H6f (+)**

Notes: [a] Only significant results at $p < 0.1$ are reported
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Marketing innovation (see Tables 36; 37) is predicted by an engineering focus on market R&D. *Regarding direct effects*, H7a is supported with negative influence of low barriers to entry on an entrepreneurial choice for a wide scope of product-market domain, and negative influence of suppliers' bargaining power on product and market R&D, whereas substitute products positively influence product and market R&D. H7b is not supported meaning limited direct effects of industry contingencies on the propensity to marketing innovation. H7c is supported with negative influence of firms' relationships with intermediaries on market R&D, positive influence of firms' technical capabilities on product R&D, and positive influence of firms' capabilities to manage client relationship on market and process R&D. H7d is supported with positive influence of firms' sales capabilities and negative influence of firms' capabilities to manage client relationship on the propensity to adopt a marketing innovation behavior. *Regarding indirect effects*, H7e is supported with positive influence of substitute products and negative influence of suppliers' bargaining power on the propensity to marketing innovation. H7f is also supported with positive influence of firms' capabilities to manage client relationship on the propensity to adopt a marketing innovation behavior.

Table 36: Contingencies on strategy-innovation relationship – Marketing innovation

Path analysis results : Direct effects of strategy and contingencies on marketing innovation

	Standardized estimates				
	R&D Product	R&D Process	R&D Market	Scope	Marketing innovation
Industry contingencies					
Industry - Barriers	-0.070	-0.044	-0.001	-0.230**	0.090
Industry - Suppliers	-0.183*	0.082	-0.237***	-0.044	0.035
Industry - Substitutes	0.250***	-0.001	0.180**	0.131	0.004
Industry - Clients	-0.245	-0.216	-0.147	-0.203	0.020
Industry - Rivalry	0.088	0.050	0.099	0.151	-0.062
Firm contingencies					
Firm - Sales	0.014	-0.049	0.073	0.094	0.204**
Firm - Intermediaries	0.117	0.080	-0.189**	-0.121	-0.054
Firm - Technical expertise	0.292**	0.200	0.030	0.071	0.019
Firm - CRM	0.163	0.217*	0.191*	-0.069	-0.293**
Strategic posture					
Engineering - R&D Product	0.000	0.000	0.000	0.000	0.188
Engineering - R&D Process	0.000	0.000	0.000	0.000	0.089
Engineering - R&D Market	0.000	0.000	0.000	0.000	0.681***
Entrepreneurial - Scope	0.000	0.000	0.000	0.000	-0.092

Path analysis results : Indirect effects of strategy and contingencies on marketing innovation

	Standardized estimates				
	R&D Product	R&D Process	R&D Market	Scope	Marketing innovation
Industry contingencies					
Industry - Barriers	0.000	0.000	0.000	0.000	0.004
Industry - Suppliers	0.000	0.000	0.000	0.000	-0.184**
Industry - Substitutes	0.000	0.000	0.000	0.000	0.158**
Industry - Clients	0.000	0.000	0.000	0.000	-0.147
Industry - Rivalry	0.000	0.000	0.000	0.000	0.074
Firm contingencies					
Firm - Sales	0.000	0.000	0.000	0.000	0.040
Firm - Intermediaries	0.000	0.000	0.000	0.000	-0.088
Firm - Technical expertise	0.000	0.000	0.000	0.000	0.087
Firm - CRM	0.000	0.000	0.000	0.000	0.186*

Model statistics: CMIN/DF = 2.167; p = 0.000; CFI = 0.800; RMSEA = 0.071

Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 37: Results to hypotheses - Contingencies on strategy-innovation relationship – Marketing innovation

Results to hypotheses [a]: Contingency effects on strategy-marketing innovation relationship

	Direct effects				Direct effects	Indirect effects
Effects of x on y	R&D Product	R&D Process	R&D Market	Scope	Marketing innovation	
Strategic posture attributes					R&D Market (+)***	
Industry contingencies	Suppliers H7a (-)* Substitutes H7a (+)***		Suppliers H7a (-)*** Substitutes H7a (+)**	Barrier H7a (-)**	H7b (NS)	Suppliers H7e (-)** Substitutes H7e (+)**
Firm contingencies	Tech. expert. H7c (+)**	CRM H7c (+)*	Intermediaries H7c (-)** CRM H7c (+)*		Sales H7d (+)** CRM H7d (-)**	CRM H7f (+)*

Notes: [a] Only significant results at $p < 0.1$ are reported
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Organizational innovation (see Tables 38; 39) is predicted by an entrepreneurial orientation for a wide scope of product-market domain, supported by a formalized organization. *Regarding direct effects*, H8a is supported with positive influence of industry rivalry and negative influence of clients' bargaining power and low barriers to entry on an entrepreneurial orientation for a wide scope of product-market domain. H8b is also supported with negative influence of industry rivalry and positive influence of clients' bargaining power on the propensity to organizational innovation. H8c is supported with positive influence of firms' managerial capabilities on an administrative choice for a formalized organization. H8d is also supported with positive influence of firms' managerial capabilities on the propensity to organizational innovation. *Regarding indirect effects*, H8e is supported with negative influence of low barriers to entry on the propensity to organizational innovation. H8f is also supported with positive influence of firms' managerial capabilities on the propensity to adopt an organizational innovation behavior.

Table 38: Contingencies on strategy-innovation relationship – Organizational innovation

Path analysis results : Direct effects of strategy and contingencies on organizational innovation

	Standardized estimates			
	Stability	Formal organization	Scope	Organizational innovation
Industry contingencies				
Industry - Barriers	-0.008	-0.097	-0.250**	0.100
Industry - Clients	0.061	0.190	-0.251**	0.148*
Industry - Rivalry	-0.055	-0.064	0.321***	-0.212**
Firm contingencies				
Firm - Management	0.046	0.264***	0.103	0.280**
Strategic posture				
Entrepreneurial - Stability	0.000	0.000	0.000	-0.068
Entrepreneurial - Scope	0.000	0.000	0.000	0.469***
Administrative - Formal organization	0.000	0.000	0.000	0.469**

Path analysis results : Indirect effects of strategy and contingencies on organizational innovation

	Standardized estimates			
	Stability	Formal organization	Scope	Organizational innovation
Industry contingencies				
Industry - Barriers	0.000	0.000	0.000	-0.162**
Industry - Clients	0.000	0.000	0.000	-0.033
Industry - Rivalry	0.000	0.000	0.000	0.124
Firm contingencies				
Firm - Management	0.000	0.000	0.000	0.169**

Model statistics: CMIN/DF = 1.509; p = 0.000; CFI = 0.912; RMSEA = 0.047

Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 39: Results to hypotheses - Contingencies on strategy-innovation relationship – Organizational innovation

Results to hypotheses [a]: Contingency effects on strategy-organizational innovation

		Direct effects		Direct effects	Indirect effects
Effects of x on y	Stability	Formal organization	Scope	Organizational innovation	
Strategic posture attributes				Scope (+)*** Formal orga. (+)**	
Industry contingencies			Barriers H8a (-)** Clients H8a (-)** Rivalry H8a (+)***	Clients H8b (+)* Rivalry H8b (-)**	Barriers H8e (-)**
Firm contingencies		Management H8c (+)***		Management H8d (+)**	Management H8f (+)**

Notes: [a] Only significant results at $p < 0.1$ are reported
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Overall, our results highlight that both industry-specific and firm-specific effects influence the differentiated alignments between strategic posture attributes and innovation behavior attributes. These empirical findings also suggest that industry and firm contingencies impact different attributes of strategic posture, as well as different attributes of innovation behavior. Furthermore, results emphasize the mediating role of strategic attributes between contingencies and innovation behavior. This provides support to the "strategic choice" perspective that views innovation as a means for achieving the goals of competitive strategy (Kotabe, 1990; Zahra and Covin, 1994) reported as follows by Zahra and Covin (1994, p. 186): "*the environment influences the selection of organizational policy (strategy) which, in turns, determines innovation*". Results not only emphasize the industrial organization perspective of the strategic choice approach but also confirm the influence of firm capabilities on strategic choice (Spanos and Lioukas, 2001) in the specific, partially explored, context of innovation generation (Raymond and St-Pierre, 2010a). Moreover, having tested the relationship between our strategic, innovation, and contingencies constructs in the configurational perspective of Miles and Snow's adaptive choices (1978, 2003), our results provide insights on an enhanced systemic scope of analysis of this strategic choice approach of innovation, as opposed to the universalistic or "best practices" approach (Raymond et al., 2010; Raymond and St-Pierre, 2010a).

5.8. Discussion

5.8.1. Theoretical implications

This research aimed at investigating, in the context of French manufacturing SMEs, the differentiated relationship between strategic posture and innovation behavior from an industry-specific and firm-specific contingencies perspective. More specifically, we intended to explore contingencies effects on the differentiated strategy-innovation alignments. To this aim, we have used of a conceptual model combining Miles and Snow's (1978) internal and Porter's (1980) external approach of competitive strategy and left possibilities for the emergence of situation-specific, empirically-derived strategic and innovation profiles.

First, results support our initial proposal for the existence of differentiated alignments between the Entrepreneurial, Engineering and Administrative characteristics of Miles and Snow's strategic postures and the characteristics of their respective innovation behavior. Thus, the study provides support to the validity of competitive strategy as a predictor of innovation behavior (Kotabe, 1990; Zahra and Covin, 1994; Becheikh et al., 2006b) and has fine-tuned this predictive validity to enhanced and detailed attributes of innovation behavior such the natures (sustained or disruptive), sources (technology-based or market-based), and activities (process, product, marketing and organizational) of innovation.

Second, results provide extensive support to the influence of industry-specific and firm-specific effects on strategy-innovation relationship, and highlight the existence of distinct but complementary effects depending on innovation dimensions. Indeed, *regarding direct effects*, results to hypotheses show that industry-specific effects seem to have a low direct influence on the sources and the activities of innovation with the exception of organizational innovation, whereas they tend to directly influence strategic posture. Among industry contingencies, substitute products tend to have a significant positive influence on firms' engineering choices, and suppliers significantly negatively influence the engineering choices. Clients tend to mainly influence a costs reduction strategic orientation while hampering innovation novelty but stimulating organizational adaptation. On the opposite, firm-specific effects tend to influence directly all dimensions of firms' innovation behavior as well as strategic posture attributes. Among firm contingencies, technical capabilities tend to have a significant direct positive impact on most dimensions of both strategic posture and innovation behavior. Whereas relationships with intermediaries have no direct effects on innovation behavior but significantly influence either positively or negatively strategic posture. Ability to manage client relationship (CRM) has positive direct effects on strategic choices of the adaptive cycle but tend to hamper innovative behavior. Results on *indirect effects* emphasize the mediating role of strategic attributes in strategy-innovation alignments under contingencies. This is especially emphasized for indirect industry effects, which, as previously stated, mainly directly influence the adaptive strategic choices, which, in turn, determine innovation behavior choices. The same prevails for indirect firm effects, where strategic posture attributes mediate firms' capabilities influence on innovation behavior (see for instance Table 27 with a negative direct effect of technical expertise on disruptive innovation, but a positive indirect effect via the mediating effect of strategic attributes).

When hypotheses are not supported, this is due to the low significance of contingencies effects on strategic or innovation attributes, such as firm direct effects on sustained innovation, direct industry effects on technology-based or market-based innovation, direct firm effects on market-based innovation, direct industry effects on process or product innovation, and direct industry effects on marketing innovation. This suggests, when industry and/or firm direct effects are not significant, the dominant contingency-mediating role of strategy as regards innovation behavior. Such results highlight that SMEs should leverage the appropriate strategic attributes that will fit the targeted innovation behavior in order to benefit from this mediating effect.

This research is the one of the very few studies having demonstrated the predictive validity of strategy-innovation relationship under industry-specific and firm-specific contingencies from a configurational perspective (Raymond and St-Pierre, 2010a, 2010b). Besides, this work also provides a contribution to the understanding of strategic maneuvering and the achievement of strategic goals through a widened and fine-tuned approach of SMEs' innovation behavior. It supports Miles and Snow strategic typology as a powerful model of SMEs' strategy and innovation behavior in the manufacturing sector. Indeed, within our empirically-derived strategic profiles, we have identified the core generic attributes qualifying the adaptive choices of Miles and Snow's initial framework (1978) as clear determinants of firms' innovation behavior. Furthermore, the exploration of strategy-innovation relationship, using attributes of empirically-derived profiles, provides a more accurate, contingency-specific, representation of strategy-innovation dynamics for SMEs of the manufacturing sector.

5.8.2. Methodological implications

This research revisits Miles and Snow's (1978) framework of adaptive strategic choices from a methodological perspective. Contrary to the paragraph approach, which cannot address the complexity of strategic configurations (Conant et al., 1990), our multiple-item Likert scale approach takes into account the differentiated propensity of firms to emphasize or not dimensions pertaining to each strategic choice of Miles and Snow adaptive cycle as well as Porter's (1980) generic typology. We then allow flexibility and parsimony in the association of adaptive strategic choice dimensions in accordance with empirically and statistically established framework (Hambrick, 1983; Segev, 1989; Shortel and Zajac, 1990; DeSarbo et al., 2005). We also provide a new methodological approach that enables the emergence of strategic constructs qualifying the differentiated organizational characteristics that fit Miles and Snow's internal and Porter's external perspective of competitive advantage. The empirically-derived constructs clearly qualify product-market strategy as well as strategic positioning, research and development objectives, production behavior, and type of organizational structure and control. Thus, this methodological approach encompasses the dimensions of competitive strategy as well as operational strategy. This is a valuable input for research on strategic management, especially for scholars aiming at exploring the influence of variables related to strategic management examined as determinants of firm's capacity to innovate (Becheikh et al. 2006b). At the innovation behavior level, we provide guidance for the emergence of distinct constructs qualifying innovation activities according to the OSLO Manual guidelines for collecting and interpreting innovation data (OECD, 2005). A methodology complying with this framework of reference will facilitate comparative research on overall innovation management. By designing innovation variables that express the propensity to adopt certain natures, sources and activities of innovation, the methodology allows a dynamic approach of overall innovation behavior.

Our methodology, based on empirically-derived strategic and innovation types, is particularly appropriate to capture the contingency-specific conditions that shape decisions on strategic posture and innovation behavior. The configurational approach we have used seems effective and well adapted to describe and predict the role of industry-specific and firm-specific contingencies in strategy-innovation differentiated alignments. Therefore, this methodology could support further research on the context-specific exploration of strategy-innovation-performance relationship (Zahra and Covin, 1994; Zahra, 1996, DeSarbo et al., 2005).

5.8.3. Managerial implications

With regard to the crucial role of innovation as a source of competitive advantage (Lefebvre and Lefebvre, 1993; Porter, 1996; Teece et al. 1997; Eisenhardt and Martin, 2000), this research provides also important managerial contribution to SMEs' trying to align strategic management with innovation management. Indeed, as previously stated, innovation plays a central role in the achievement of firms' strategic goals, and our results provide complementary insights to the assumption that industry characteristics and firm-level resources and capabilities are associated with firm-level innovation in SMEs. Moreover, there seems to exist a direct relationship between industry dynamism and firm-level innovation and a direct relationship between innovation and firm performance (Thornhill, 2006). Consequently, in today's context of uncertainty and complexity, SMEs executive are continuously facing extensive challenges with respect to choices for strategy-innovation alignment and implementation (Damanpour, 1996; Tidd, 2001; European Commission 2007). This situation has been emphasized as a source of failure for successful implementation of competitive strategy (Walker and Ruekert, 1987; Porter, 1996; Smith et al. 2008). Thus, Walker and Ruekert suggest that the differences between "intended" strategies and "realized" strategies may be due to ineffective implementation of the intended strategy. This is also due to the fact that perception of environment uncertainty and complexity affects strategic posture (Miles and Snow, 1978; Porter, 1980), the allocation and development of firms' strategic capabilities, and consequently the management and the organization of innovation.

Our research suggests that, when choosing and implementing competitive strategy, SMEs executive should consider the natures, the sources and the activities of innovation that would more likely match their strategic posture in the light of their targeted market segments characteristics and available capabilities likely to influence this strategy-innovation relationship. Given the complexity of this process, public policies aiming at fostering innovation and performance in SMEs should support and disseminate such practices of strategic management of innovation. However, investigation on the effectiveness of local innovation systems has highlighted a lack of guidance for SMEs with respect to how encompass the whole scope of strategic and innovation management from entrepreneurial choice to operational innovation strategy and the absence of contingency-specific approach during transfers of "best practices" of innovation management (European Commission, ERMIS project, 2009-2012; Méditerranée Technologies, 2009).

This research attempts to bridge the gap between theory and field practice with regard to strategic and innovation management by providing a contingency-specific approach. To this aim, we provide a set of predictive alignments between the characteristics of SMEs' strategic posture and innovation behavior based on Miles and Snow's (1978, 2003) framework characterizing Entrepreneurial, Engineering and Administrative strategic choices and Porter's contingency approach of strategic positioning (1980). This framework is particularly appropriate for the above-mentioned contingency perspective of strategic management of innovation. Indeed, *"this hybrid typology defines business strategies in terms of two major dimensions: firstly, the unit's desired rate of new product-market development* *(consistent with the prospector, Analyzer, and defender categories of Miles and Snow) and second, the unit's intended method of competing in its core business or established product markets (either through maintaining a low cost position or by differentiating itself by offering higher quality or better service, as suggested by Porter."* (Walker and Ruekert, 1987, p. 17).

From a managerial perspective, our results indicate that market forces do not directly influence the type of innovation behavior manufacturing SMEs should conduct. More specifically, market forces influence strategic posture, which in turn determines innovation behavior choices. On the other hand, firm capabilities, which influence directly both innovation behavior and strategic posture, sometimes in opposite ways, are also mediated by strategic posture. Considering, as previously stated, innovation as a means to achieve strategic goals and superior performance, this suggests that SMEs can exercise some market power providing they achieve two dimensions of fit as posited by Miles and Snow (1994); external fit between the firm and market forces, that is, the relevance of the firm's strategic posture in a given environment, and internal fit, that is, the coherence of organization's structure, processes and managerial ideology supporting this strategic posture considering available capabilities. Our findings highlight explicit strategy-innovation alignments for this appropriate dual fit towards innovation performance. Thus, this research provides explicit contingency-dependent guidance on effective relationship between strategic posture and innovation behavior. Doing so, we expect to contribute to the effective formulation and implementation of competitive strategy, hence to superior performance in manufacturing SMEs (Lefebvre and Lefebvre, 1993; Zahra and Covin, 1994; Miles and Snow, 1978, 1994, 2003; Thornhill, 2006; Raymond and St-Pierre, 2010a).

5.9. Limitations and suggestions for future research

The findings and implications of this research should also be considered in light of its limitations. From a theoretical perspective, it should be emphasized that while this research explores the overall influence of industry-specific and firm-specific effects on strategy-innovation relationship, we have not modeled the predictive influence at the individual contingency attributes level or at the strategic and innovation attributes level. Still, further theoretical work could extend this systemic approach to a finer grained investigation aiming at modeling pairwise relationship between strategic, innovation, and contingencies attributes. For instance, the specific analysis of substitutes effects on the relationship between engineering adaptive choices and innovation behavior could bring valuable insights on innovation performance with regard to market dynamism. The same prevails for technical capabilities as a leveraging firm-specific contingency likely to impact differentiated strategy-innovation attributes alignments, or CRM capabilities and their potential “client myopia” effect likely to hamper innovative behavior when firms focus on satisfying mainstream clients. Other research could also further investigate the role of SMEs’ relationships with intermediaries as a potential direction for fostering the degree of novelty of innovation, while simultaneously hampering market oriented innovation or new forms of usage-based offerings. This topic is of special interest for regional, national and European public policies aiming to stimulate innovation in SMEs through cross-cooperation in the frame of competitive clusters, with the objective of increasing the occurrence of breakthrough innovations while developing new forms of business models. A key issue in this prospect relies on intermediaries’ ability to enhance their scope of understanding of innovation beyond the sole product or process approach (OECD, Oslo Manual, 2005).

Despite the significant empirical material collected, such an attempt to model pairwise relationship between strategy, innovation, and contingencies at the attribute-level is beyond the scope of this specific research. Instead, we focused on understanding contingencies effects in the overall systemic context on strategy-innovation relationship. Moreover, the predictive validity of such a modeling attempt deserves a focused approach that might have been incompatible with the scope of the studied strategic and innovation dimensions. This research should be considered as a preliminary robust empirical basis for further specific explorations in above-mentioned directions.

Finally, this study examines strategy-innovation alignments without investigating the output of such a fit from a performance perspective. Still, the design and the scope of our conceptual framework enable such an investigation with promising theoretical and managerial prospects as *"enlarging the analysis of innovation beyond the technological domain provides a much richer and complex picture of firm's innovation strategies and performances."* (Evangelista and Vezzani, 2010, p. 1262). Moreover, the question of the causal relationship between innovation behavior and performance remains largely unexplored in small businesses (Forsman and Temel, 2010). Consequently, another direction for further research should investigate the specific alignments of strategic posture and innovation behavior associated to superior performance in SMEs. It has also been suggested that the relationship between innovation and business performance is contingency-dependent (Tidd, 2001; Rosenbusch et al., 2011). As many scholars posit that firms' performance must be thought as achieving both internal and external fit between strategy and innovation, this new direction of research should be completed by investigating to which extent industry-specific and firm-specific effects influence the strategy-innovation-performance relationship.

VI – 3rd essay

“Strategic posture and innovation behavior in SMEs: Fit, performance, and contingencies”

VI – 3rd essay: "Strategic posture and innovation behavior in SMEs: Fit, performance, and contingencies"

6.1. Abstract

This empirical research, conducted on French manufacturing SMEs, investigates the relationship between competitive strategy, innovation, and performance. We propose to explore, in this essay, the performance implication of fit between strategic posture and innovation behavior, from a contingency perspective. More specifically, the purpose of this work is to understand, on one hand, whether specific patterns of alignment between competitive strategy and innovation influence firm performance, and on the other hand, the dynamics of these alignments under industry and firm-specific effects. The research attempts to complement the seminal works conducted by Zahra and Covin (1994) on the financial implications of fit between competitive strategy and innovation, by studying the causal logic of this fit, enhancing the scope of analysis also to the marketing and organizational dimensions of innovation, and by exploring the influence of industry and firm contingencies on strategic posture, innovation, and strategy-innovation fit. To this prospect, our model is based on derived, hybrid strategic types, stemming from the rationale of Miles and Snow's adaptive cycle (1978) and Porter's generic strategies, which enable the emergence of situation-specific profiles. These works provide a theoretical and managerial contribution to further understanding the causal logic for achieving competitive advantage in small firms. Results suggest, first, the existence of differentiated empirically-derived strategy-innovation alignments where different strategic attributes predict different dimensions of innovation behavior. Second, results bring extensive support to the positive performance implication of strategy-innovation fit. Third, our findings confirm the significant influence of industry and firm-specific contingencies on the strategy-innovation-performance relationship, and

emphasize the existence of differentiated effects depending on strategic and innovation attributes.

6.2. Keywords

Strategic posture, innovation behavior, fit, performance, contingencies, SMEs

6.3. Introduction

The importance of innovation as a primary source of economic growth, industrial change and competitive advantage has largely been studied (Zahra, 1993; Christensen et al., 2004; Tidd et al., 2005). Organizations adopt innovation in response to changes in technological and managerial knowledge, industry rivalry or management strategic intent to leverage distinctive resources and capabilities to improve performance (Hamel, 1998; Damanpour, 2009). In today's context of hypercompetition and economic turbulences, innovation has become a strategic managerial tool for firms to generate sustainable competitive advantage as well as for adopting or enacting market forces (Miles and Snow, 1978, 2003; Porter, 1996; Eisenhardt and Martin, 2000; O'Regan et al., 2006). In this specific context, Small and Medium-sized Enterprises, considered by many scholars as the engines of economic growth, technological change and innovative activity, play a central role (Acs and Audretsch, 1988, 1990; Audretsch, 1995, 2001; Zeng et al., 2010) and are targeted by public policies dedicated to leverage and foster the intensity as well as the degree of novelty of innovative behaviors (OECD, 2005, European Commission, 2007). In effect, innovation has demonstrated a strong and influential relationship with SMEs performance and is considered as a key determinant of their strategic development (Ussman et al., 2001; Verhees and Meulenberg, 2004).

However, the generation of value from innovation is a complex issue, both organizationally and environmentally influenced (Miles and Snow, 1978, 1994; Damanpour, 1991; Tidd, 2001; Vaona and Pianta, 2008). Zahra and Covin (1994, p. 183) posit that the creation of value innovation relies on two interrelated issues: the first is to select the types of innovations that are congruent with firm's goals. The second is to decide whether the firm should rely exclusively on internal or external inputs for innovation or should imitate rivals. Doing so, firms should coordinate these choices with their strategic posture, i.e. the alignment of firm organization's design components with strategy and with each other (Hambrick and MacMillan, 1985; Kotabe, 1990; Porter, 1996). This coordination (or fit) is a central issue as it suggests that firms should only dedicate resources and develop capabilities to innovation behavior consistent with their strategic posture. This is even more critical for SMEs, for which innovation has become essential to counterbalance their greater vulnerability in turbulent and knowledge-based markets. Indeed, strategic posture and related innovative practices should be realigned in an adaptive cycle process (Miles and Snow, 1978, 2003) to adapt organizational configuration to new configurations of the environment.

Considering their role in today's economies (Bartelsman et al., 2005; Coulter, 2010), understanding how SMEs achieve superior performance when adopting specific innovation behavior has significant implications for SME managers and public policy makers. Increased market and financial performance of SMEs can foster their growth and profitability, and subsequently generate employment and further contribution to general economic health of a region, or a nation. This is of high importance in southern European countries where low-tech manufacturing industries are over-represented and industrial structure has a relative weakness in innovative activities capable to support the introduction of new products and the growth of new markets (EU, 2003/7, 2007). In recent years, a growing number of research works have investigated the impact of innovation on business performance. However, many issues remain partially explored in the context of SMEs such as the nature of innovation (sustained innovation versus disruptive) and its links with performance. The same prevails regarding the type - process, product, marketing, organizational - of activities of innovation (OECD, OSLO Manual, 2005) and its impact on performance. It has also been suggested that the relationships between innovation and business performance are contingency-dependent (Tidd, 2001; Rosenbusch et al., 2011) and that innovation does not necessarily lead to superior performance (Forsman and Temel, 2010). The question of the causal relationship between innovation attributes and performance also remains largely unexplored (Forsman and Temel, 2010). Besides, although studies have emphasized the fact that different competitive strategies should lead to different innovative behaviors (Lefebvre and Lefebvre, 1993; Becheikh et al., 2006; Vaona and Pianta, 2008) little has been investigated concerning the relationships between strategic variables as determinants of innovation (Becheikh et al., 2006). Accordingly, a promising field of research for scholars of strategy and innovation lies in the causal relationships concerning the fit between strategic posture, innovation behaviors and the influence of specific strategy-innovation alignments on performance. Indeed, since the seminal research conducted by Zahra and Covin (1994) on the financial implications of fit between competitive strategy and innovation, very few works have attempted to investigate further these issues.

Hence, the following research questions arise: How do specific strategic postures influence specific innovation behaviors? What are the specific configurations of alignment between strategic posture and innovation behavior associated to superior performance? To which extend are these configurations and the fit between strategic posture and innovation behavior contingency-dependent?

The present research attempts to contribute to answer these questions in the context of Small and Medium Enterprises from the manufacturing sectors by exploring the existence of most favorable strategy-innovation fit from a performance perspective. To this aim, we have built a model combining Miles and Snow's (1978) internal and Porter's (1980) external focus of competitive strategy leaving possibilities for combinations of hybrid, strategic profiles (DeSarbo et al., 2005) depending on firm and industry specific contingencies. This model also leaves possibilities for combinations of innovation profiles regarding the nature, source and activity attributes of innovation. We therefore wish to complement the seminal findings from Zahra and Covin (1994) in several directions. First, we investigate the causal relationships between attributes of strategic and innovation profiles. We subsequently demonstrate the existence of predictive strategy-innovation alignments and their influence on firm performance. Second, we bridge the gap for the need to enhance the scope of analysis of strategy-innovation relationships, usually focused on technological innovation (Becheikh et al., 2006b; Raymond and St-Pierre, 2010a) to marketing and organizational innovation (OECD, OSLO Manual, 2005). Indeed, as emphasized by Evangelista and Vezzani (2010, p. 1262) "*enlarging the analysis of innovation beyond the technological domain provides a much richer and complex picture of firm's innovation strategies and performances*". Third, as our model enables the emergence of situation-specific profiles, we demonstrate the differentiated influence of internal and external contingencies on strategic and innovation attributes, as well as on strategy-innovation configurational fit. Fourth, we expect to provide new perspectives of research together with practical outputs in the field of strategic management models for manufacturing SMEs. As previously emphasized, proposing solutions dedicated to this typology of firms is a real issue for stakeholders of regional and national economic development. Indeed as these firms are highly impacted by market forces and strongly dependent on their idiosyncratic resources, sustaining competitive advantage for SMEs is conditional to the adoption of accordingly appropriate strategic choices and organizational configurations.

This research is organized as follows. Having outlined the objectives and expected contributions above, the following sections review the literature on the central role of performance in strategy research and the relationships between strategic posture, innovation behavior and performance in SMEs under a contingency perspective. The impact of strategy-innovation fit on firm performance in then discussed. This literature review is followed by the development of our conceptual model and hypotheses. We then present the empirical background of our research by giving details on data collected and methodology. Empirical results and findings are introduced followed by discussion on answers to research hypotheses. We finally provide insights on research and practical implications of our works, while considering the limitations of this investigation and suggestions for further research.

6.4. Literature review on strategy-innovation configurational fit and firm performance

6.4.1. Firm performance: definition, dimensions and theoretical vs. empirical approach

Strategy and firm performance theories

The concept of performance is at the heart of strategic management. However, performance can be approached from various theoretical, empirical, and managerial perspectives (Venkatraman and Ramanujam, 1986) often presenting variances in outputs (Hudson et al., 2001; Gosselin, 2005). Venkatraman and Ramanujam (1986) resume that from a theoretical perspective, all research works in the field of strategic management refer implicitly or explicitly to performance since performance is the time output of any strategy. Besides, empirical investigations on strategy use the construct of performance to assess the relationships between the attributes of strategy and organizational structure and process issues. From a managerial perspective, numerous works (Miles and Snow, 1978, 2003; Conant et al., 1990; Parnell, 2002; Morgan and Strong, 2003) have highlighted the relatedness between strategic orientation, structure and process, and overall organizational performance with a prospect of firm adaptation and survival.

Venkatraman and Ramanujam (1986) view business performance as a subset of the overall concept of organizational effectiveness. They posit that research investigating on business performance should be driven by the use of two distinguishing characteristics: Firstly, whether performance refers to financial objectives, operational objectives, or both aspects of performance. Secondly, whether the data are obtained from primary (data collected directly from organizations) or secondary (data from publicly available records) sources.

However, other theorists approach firm performance as an output of relations between economic actors. Agency theorists focus on the relationship between a principal (the owner of resources) and the agent (the one who performs the work), where the principal is the shareholder and the agent is the strategic decision-making dominant coalition within the firm. In this Principal-Agent model of the firm, as executive managers are agents for shareholders, maximizing the present value of the firm is the appropriate motivating principle for management (Quinn and Jones, 1995). Indeed, when managers/agents own company stock and/or have part of their compensation contingent on financial performance an when shareholders/principals closely monitor that their interests are aligned with those of agents, superior financial performance arises (Frankforter et al., 2000). Consequently, this relationship between economic actors strongly influences the firm’s strategic orientation and explains differences in strategies pursued by firms to generate performance.

Transaction costs theorists posit that firms select the mode of entry that provides the least cost solution (Masten, 1993; Shelanski and Klein, 1995). Strategic management is then efficiency-driven towards the organizational design that provides a superior efficiency of the selected entry mode compared to other alternatives, in order to generate optimal performance. Based on this assumption, Roberts and Greenwood (1998) suggest that transaction costs-derived organizational designs generate optimal levels of organizational efficiency. The same prevails for Williamson (1991, 1996) who assumes that transaction costs solution to entry mode choice is an efficiency-based decision, which takes into account the hazards of each potential mode structure and the safeguards needed to assure compliance. As different entry structures vary in terms of their related costs and competencies, their associated hazards and safeguards costs also vary. Firms that use a transaction costs solution to optimal organizational efficiency and performance select the mode that economizes on these costs (Brouthers et al., 2003).

Another dimension of organizational performance relies in the subjective and objective dimension of performance. This is a specific issue for small privately-held firms where objective measures of organizational performance remain mainly financial and where assessment of non-financial performance is mainly subjective due to a lack of use of integrated performance measurement systems (see below, firm performance: theory and practice). Investigating on this issue, Dess and Robinson (1984) suggest that subjective perceptions of relative improvement in organizational performance were strongly correlated with objective financial measures of financial performance over the same period. Working on the measurement of performance of international joint ventures, Geringer and Hebert (1991) found empirical evidence regarding the reliability and comparability of alternative measures of subjective and objective performance as well as the relative utility of different data collection approaches.

When encompassing firm performance from a managerial perspective, different research streams have investigated to which extent superior performance occurs at the level of the firm, business units, corporation, or industry (Rumelt, 1991; Powell, 1996; McGahan and Porter, 1997; Brush et al., 1999). Strategic management theories usually invoke the concept of competitive advantage to explain firm performance (Powel, 2001) but they differ as to the sources of competitive advantage to achieve superior performance and means to generate and maintain sustainable competitive advantage. In the Industrial Organization approach, characteristics of the industry – not the firm – are viewed as the primary influences on firm performance (Mason, 1939; Bain, 1956). Among other scholars, Porter (1981) has challenged this IO perspective, noting its inability to explain large performance variances within a single industry, proposing a strategic group level of analysis of clusters of firms having homogeneous behavior within a possibly heterogeneous industry environment. This strategic group approach has evolved towards attempts to categorize business strategies in generic typologies of organizational configurations. Although many typologies have been developed (Miles and Snow, 1978, 1986; Porter, 1980, 1985, 1987; Mintzberg, 1983; Miller, 1986, 1988), those developed by Miles and Snow, and Porter remain the most widely cited and tested by scholars of strategy research (Parnell, 2002; Hambrick 2003). Porter's typology focuses primarily on the market activities essential to build and sustain a given strategy while Miles and Snow's typology focuses on the structures and managerial processes essential to follow a particular strategic approach, but both frameworks of typologies recognize that superior performance is the outcome not of the choice among those approaches but of the effectiveness with which a given approach is put together and applied (Ketchen, 2003).

The Resource-Based theory, contrary to Industrial Organization perspective emphasizes unique firm competencies and resources in strategy formulation, implementation, and performance (Penrose, 1959; Wenerfelt, 1984; Barney, 1986, 1991, 2001; Grant, 1991). Resource-based theorists posit that the ability of a firm to develop and mobilize valuable, rare, non-imitable and non-substitutable resources (Barney, 1991) is the primary determinant of its ability to generate and sustain competitive advantage and consequently performance. Therefore, the resource-based view of competitive advantage conceives superior performance as "a firm-specific phenomenon deriving from resources and capabilities that produce economic rents by virtue of their value, scarcity, imperfect imitability and rent appropriability” (Powell, 2001, p. 881).

Most researches have in fact emphasized that both organizational factors (the Resource Based View approach) and industry factors (the Industrial Organization approach) are important in determining firm performance (Parnell, 2002). McGahan and Porter (1997) found that industry accounted for 19 percent of variance in profitability within specific SIC categories, and that this difference varied across industries. Powell (1996) reported that between 17 and 20 percent of performance variance was due to industry contingencies. Spanos et al. (2004) found that firm-specific factors explained more than twice as much profit variability as industry factors. However, even though both sets of factors are important (Spanos and Lioukas, 2001), any research attempting to investigate strategy-performance relationships should take into account the varying degrees of influence of industry and firm contingencies on both strategy and performance determinant and attributes, suggesting the use of combinations of situation-specific strategies (Spanos et al., 2004; DeSarbo et al. 2006).

In Porter’s framework of generic strategies, a firm can maximize performance either by aiming at being the best at minimizing costs, or by differentiating its line of products or services from those of other firms. Both approaches can also be possibly focused on a specific market segment. In this framework, firm performance is a function of market positioning contingent to both industry and firm effects (Porter, 1991; Grant, 1991) where industry structure affects the sustainability of firm performance, whereas market positioning exhibits the firm’s ability to generate competitive advantage over competing rivals. This positioning enables a firm to exercise market power consequently to gain “monopoly-type” rents (Spanos and Lioukas, 2001). Therefore, these rents arise from the firm’s ability either to defend its positioning against market forces (power of clients, power of suppliers, new entrants, substitute offerings, intensity of competition) or to efficiently use its strategic capabilities –

i.e. bundles of skills and accumulated knowledge that enable a firm to coordinate activities and make use of its assets (DeSarbo et al., 2005) - to influence these forces in its favor.

Miles and Snow's framework relies on four strategic types that characterize the firm's intended rate of change of strategic posture. The Defender type perceives the environment to be stable and certain and seek stability and control in their operations to achieve maximum efficiency, whereas the prospector type perceives the environment as being dynamic and uncertain and seek flexibility and promote innovative behaviors to take advantage of environmental change. The Analyzers type seeks at the same time stability, flexibility and efficiency, whereas the last type, qualified as Reactors lack consistency in strategic choice and show lower efficiency than other types (Miles and Snow, 1978, 1994). As their intend was to develop a typology of competitive strategy, not to explore each type's consequences on performance, the original Miles and Snow's model does not seek to predict which of the archetypal strategic types would be highest in performance (Hambrick, 1983). However, subsequent research works have generally supported the expectation that Reactors would be outperformed by other types (Conant et al., 1990; Dyer and Song, 1997). Miles and Snow's typology rather posits the essential concept of strategic equifinality meaning that within a particular industry or environment, there are a limited number of basic stable patterns that firms can select to achieve their objectives (Hambrick, 2003). The central idea in equifinality lies in a firm's ability to "discovering and maintaining fit – strategic fit between the organization and its environment and internal fit among strategy, structure, and management processes" (Miles and Snow, 1994, p. 186). Miles and Snow's typology contributes to bridge the gap between Industrial Organization and Resource-Based View perspectives of firm performance. Indeed, "*because the structure and processes fit the strategy, resources are located where they ought to be, and information and criteria are available at the point where decisions need to be made*" (Miles and Snow, 1994, p. 21).

Firm performance: theory and practice

From above literature review, business performance can be seen as the ultimate dependent variable in the field of strategic management. However, business performance is still a theoretically confused and managerially changing construct. Among various theoretical models, the high performing systems model (Porter, 1991) has been widely used by scholars (Morgan and Strong, 2003). In this model, high performing firms are qualified as such when their business performance is superior to the one of directly comparable firms, belonging to the same strategic group. Nevertheless, controversy continues to exist in qualifying what is meant and understood by the term business performance (Morgan, Strong, 2003) and Venkatraman and Ramanujam‘s quote (1986, p. 813) that *"strategic management researchers in their quest for establishing performance implications of strategic conduct of businesses, continue to measure business performance using a wide array of operationalizing schemes"* is still valid.

Firm performance has traditionally been considered in purely accounting terms (Capon et al., 1990; Conant et al., 1990). Although the ultimate measurement of success has long emphasized profitability, most frequently measured by return on investment (Reese and Cool, 1978), many scholars, and among them Jacobsen (1987), have questioned the validity of ROI as the sole indicator of business performance. While other financial measures have enriched business performance ratios, studies have highlighted the inappropriateness of accounting indices to measure intangibles and properly value sources of competitive advantage (Bharadwaj et al., 1993). The argument on the drawbacks of accounting-based measures is their historical, back-looking, short-term approach of performance, generally incongruent with a strategic management approach (Atkinson et al., 1997). A stream of research has investigated the use of approaches combining financial and non-financial measures such as the design of balanced scorecards (Kaplan and Norton, 1996) in order to provide a wider strategic view of firm performance. Thus, beyond accounting-based performance measures, which are at the core of firm performance, there are also market-based operational performance measures such as market share, customer satisfaction and subjective measures such as ethical behavior, shareholder satisfaction, that altogether provide a broader understanding of firm performance by focusing on factors that ultimately lead to financial performance (Murphy et al., 1996; Parnell, 2002).

Scholars have investigated the practices of such performance measurement systems and attempted to evaluate between theory and practice of such systems and the influence on firm performance (Hudson et al., 2001; Gosselin, 2005; Verbeeten and Boons, 2009). Working with SMEs using primarily financial indices, Hudson et al. (2001) highlighted that the implementation of performance measurement systems combining financial and non-financial measures was problematic and considered too resource intensive and too strategically oriented therefore excluding operational measures facilitating improvements in current performance. Focusing on manufacturing firms, Gosselin (2005) shows that firms continue to use financial performance measures, whereas very few firms have implemented a balanced scorecard or integrated performance measurement systems. Verbeeten and Boons (2009) demonstrate that non-financial measures tend to be associated with specific strategic priorities such as a market-orientation, innovation intensity or personnel development. Still, they find no evidence that aligning the performance measurement system to the strategic priorities of the firm positively affects performance. According to Otley (1999), the remaining predominance of accounting performance measures relies in their inherent characteristics. Indeed, they are subject to a variety of internal controls that enhance their reliability, they are easy to understand and they integrate the results of all organizational activities into a single coherent financial performance framework. Moreover, the objectivity associated with comparing the performance level of various business units along standardized lines explains that financial measures remain the most popular and widely accepted approach in strategy-performance studies (Parnell, 2002). The relevance and reliability of using objective financial measures of performance is a key element for assessing organizational performance in SMEs where objective integrated performance measurement systems rarely exist and where non-financial performance measures rely on subjective assessment of a limited dominant coalition. This relevance and reliability is supported by the correlation between subjective perceptions and objective financial measures of organizational effectiveness (Dess and Robinson, 1984; Geringer and Hebert, 1991).

A central issue: the causal logic of firm performance

The central issue of firm success, however, mainly relies on understanding the causal logic that precedes superior performance. Porter (1991) posits that the causes of superior firm performance at a given point in time can be framed in a chain of causality. To explain firm success, Porter highlights three essential conditions that have been put to the fore by early strategy theorists. The first is that a firm develops and implements an appropriate strategy, i.e. an internally consistent set of goals and functional policies that collectively define its position in the market. The second condition for success is that this internally consistent set of goals and policies aligns the firm's strengths and weaknesses with its industry opportunities and threats, i.e. aligns the firm with its environment. The third condition for success is a firm's ability to create and exploit its distinctive competences, i.e. the unique resources and capabilities leveraged by a firm to generate competitive advantage in the context of its external environment. Therefore, to explain competitive success of firms, Porter (1991, p. 99) assumes that competitive strategy should "link environmental circumstances and firm behavior to market outcomes". The Resource-Based theory (Mahoney, 1995) focuses on the internal organizational processes that generate competitive advantage, and has investigated on dynamic organizational capabilities determining organizational effectiveness. The knowledge-based branch of the resource-based view of the firm posits that the fundamental input and primary source of value in building organizational capabilities is knowledge (Grant, 1996a). Knowledge is then seen is the determinant of firm distinctive resources and capabilities able to generate competitive advantage. Indeed, it is via shared and socially embedded knowledge that organizations can interpret environmental stimuli (e.g., clients' changing needs, competitors' moves, market and technological opportunities, …) and then initiate internal adaptive responses to design appropriate skills and competences which will ultimately generate competitive positioning or enact effectively the environment (Spanos and Lioukas, 2001). This is the quality of knowledge created and the integration of these mechanisms that generate superior performance (Grant, 1996a, 1996b).

Therefore, understanding the chain of causality of firm performance is essential to answer the following issues: What are the drivers of a firm's competitive positioning or the determinants of its product-market domain orientation? What types of strategic capabilities need to be leveraged by the firm in its environmental context? What is the causal logic nurturing these capabilities? Why are some firms able to achieve an advantaged position and sustain or fail to sustain it? How much do firm-specific or industry-specific contingencies contribute to superior performance?

Synthesis

Firm performance is a central, still complex, theoretical and managerial issue in the field of strategic management that can be seen as the ultimate dependent variable of organizational effectiveness. Even though the leading hypothesis is that sustained organizational performance stems from sustainable competitive advantage, the core of this issue is the generation and the evaluation of competitive advantage. Most researches emphasize that both organizational factors and industry factors are important in determining firm performance. Consequently, any research on strategy-performance relationships should take into account the varying degrees of influence of industry and firm contingencies on both strategy and performance determinant and attributes, while considering the theoretical and managerial context of performance measurement practice.

6.4.2. Strategic posture and firm performance: fit and contingencies

Strategic posture and the concept of fit

The issue of strategic fit as a conditional factor of firm performance has received considerable attention from both contingency and configuration theorists debating on the respective influence of internal fit versus environmental fit (Miller, 1992, 1996). The former, rooted in the Resource-Based View theory, have emphasized the influence of a proper alignment of endogenous design variables, such as organizational structure, appropriate use of distinctive resources and capabilities, and degree of strategic planning, with exogenous context variables, such as environmental complexity and uncertainty, technological patterns or firm size (Barney, 1986, 1991; Rumelt, 1991; Grant, 1991). On the other hand, configuration theorists have put to the fore that regardless of control and causality of external contingencies, within a particular industry or environment, although there is more than one way to prosper, there are not an endless number of ways to prosper. In this prospect, these typologists and taxonomists assert that successful organizations are aligned in a limited number of specific patterns or strategic postures, i.e. specific alignments of firms' organization's design components with strategy and with each other (Miles and Snow, 1978, 2003; Miller, 1990; Porter, 1996). Other streams of research have investigated to compare and contrast the divergent influence of internal and external contingencies on organizational fit with a prospect of market and financial performance (Conner, 1991; Powel, 1992; Teece et al., 1997). It has also been emphasized that organizational alignment also relies on resource-specific alignment skills, constituting a strategic factor and rent-producing resource (Powell, 1992). From this perspective, Miller (1996, p. 509) has highlighted configuration as *"a quality or property that varies among organizations and that can be defined as the degree to which an organization's elements are orchestrated and connected….Competitive advantage may reside in the orchestrating theme and integrative mechanisms that ensure complementarity among a firm's various aspects: its market domain, its skills, resources and routines, its technologies, its decision making processes."* Porter (1996) also strengthened the role of fit as the essence of sustainable competitive advantage by aligning firm's activities which each other. Fit among strategic capabilities constitutes in this sense a barrier to imitation and substitution of resources by competition. Indeed, Porter posits that fit is not only a central component of competitive advantage, but fit is strategy-specific because it enhances a position's uniqueness and amplifies strategic choices. Porter (1996) identifies three types of fit within a strategic posture although they are not mutually exclusive. First-order fit is consistency between each activity (function) and the overall strategic orientation. Consistency ensures that the competitive advantages generated by each activity cumulate and do not erode or cancel themselves out. Second-order fit occurs when activities are reinforcing one-another. Third-order fit goes beyond activity reinforcement and aims at optimization of efforts across activities to maximize efficiency. Porter's assumption is that in all three types of fit, the whole matters more than any individual part. Positions built on systems of activities provide not only superior but also more sustainable competitive advantage than those built on individual activities.

Defining and categorizing the concept of fit is therefore a central issue to empirical research in strategic management as it requires choosing between two fundamental decisions (Venkatraman, 1989): the first choice concerns the degree of specificity of the theoretical relationship(s), which indicates the level of precision in the functional form of fit, i.e. the relationship between the underlying variables of the concept; e.g. between strategy and managerial characteristics or among attributes of different patterns of configurations. The second choice is the decision to anchor or not the concept of fit to a specific criterion. Venkatraman (1989) has designed a conceptual framework, isolating six distinct perspectives of fit rooted in six distinct theoretical meanings and requiring the use of distinct analytical schemes. Among these concepts of fit, fit as gestalts (Zahra and Covin, 1994; Raymond and Saint-Pierre, 2010; Raymond et al. 2010) and fit as profile deviation (Doty et al., 1993; Zahra and Covin, 1994; Marlin et al., 1994; Zajac et al, 2000) have received considerable interest by scholars of strategic management. The Gestalts perspective approaches fit in terms of the degree of internal coherence among a set of theoretical attributes (Venkatraman, 1989). Miller and Friesen (1981) emphasize that such archetypes (or configurations) represent a set of relationships which are in a temporary state of balance and which form internally consistent and equally effective configurations. Fiss (2007, p. 1180) describes the gestalts perspective of fit as *"a systemic and holistic view of organizations where patterns or profiles rather than individual independent variables are related to an outcome such as performance"*. In the profile-deviation perspective, fit is the degree of adherence to an externally specified profile qualified as ideal for a particular environment (e.g. the level of resource deployment along a set of strategy dimensions) where "a business unit's degree of adherence to such a multidimensional profile will be positively related to performance if it has a high level of environment-strategy coalignment" (Venkatraman, 1989, p. 433). The major interest of this holistic or systemic perspective is the possibility to encompass complex interrelated relationships between, for example, strategic and environmental attributes (Marlin et al. 1994) or between attributes of strategic posture and innovation behavior (Zahra and Covin, 1994). The Gestalts and profile deviation perspectives of fit are often interrelated relatively to their predictive role of performance. Thus, investigating the relationships between strategic capabilities and innovation activities, Zahra and Covin (1994), and Raymond and Saint-Pierre (2010) suggest that deviations from gestalts may dilute resources or hamper innovation, thereby leading to lower performance. Zajac et al. (2000) assume that strategic posture can be logically predicted based on differences in specific environmental forces and organizational resources, and that organizations that deviate from predicted model of strategic fit experience negative performance consequences.

Strategic fit and contingencies

Considering that firm performance is a multidimensional phenomenon which characterizes how effectively and efficiently the firm's competitive strategy is implemented (Venkatraman and Ramanujam, 1986; Walker and Ruekert, 1987; Olson et al. 2005), Spanos and Lioukas (2001) have empirically suggested that industry and firm effects are not only both potentially significant, but instead need to complement each other given that they affect distinct but strongly linked dimensions of performance. More precisely, whereas industry forces influence directly and indirectly the market performance and the profitability of the firm, firm capabilities mainly directly influence market performance, and only via the latter, profitability. This raises the issue of the level of internal fit of strategic posture – the alignment of firm organization's design components with strategy and with each other - as one of the conditional determinant of firm performance. Edelman et al. (2005) investigations demonstrate that neither resources nor strategies alone explain firm performance. The point is therefore to explicitly examining the dynamics of the processes by which SMEs achieve to design relevant strategic posture in order to generate superior performance taking into account the influence of internal and external contingencies.

The configurational approach provides the opportunity to a deeper understanding of the relationship between strategic posture and performance (Wiklund et al., 2005). Indeed, configurationists argue that in organizations, certain attributes of strategy, structure, process, and environment tend to combine to form configurations (Miles and Snow, 1978, 2003). This suggests that within specific environments, a limited number of above-mentioned combinations where key configurational attributes are aligned will arise among a large number of firms. Configuration theory scholars (Doty et al., 1993; Ketchen et al., 1993; Miller, 1990, 1996) posit that performance is a causal logic of both the consistency of structural and strategic factors and the congruence of the structural and strategic factors with contextual factors. This means that firms will outperform competitors when their strategic posture presents a superior internal fit as well as finer alignment with external contingencies.

Coping with both internal and external fit in a complex and turbulent knowledge-based economy is a delicate issue for manufacturing SMEs having to deal simultaneously with their productivity, flexibility, quality of products, financial resources management in a context where non-linear innovation is a primary determinant of competitive advantage (Hamel, 1998, 2000; Thornhill, 2006). Acquiring and maintaining strategic capabilities, i.e. the ability to use idiosyncratic skills and accumulated knowledge to coordinate activities and make use of assets to create economic value and sustain competitive advantage (DeSarbo et al., 2005), is therefore a critical factor of SMEs' performance. Indeed, identifying the right strategic posture from a performance perspective is not only dependent on internal strengths (capabilities) and external (environment) contexts; it is also strongly related to a firm's ability to align each strategic posture attribute with each other, and to align them with external environmental attributes. This suggests that generic configurations might not properly encompass the complexity of internal and external contingencies faced by SMEs as capabilities and environmental factors interrelate with strategic type (Spanos et al., 2004;

DeSarbo et al., 2005). Consequently, understanding the mechanisms by which SMEs achieve to design relevant strategic posture in order to generate performance requires a configuration-based and contingency-based combined approach taking into account situation-specific patterns of strategic fit.

As strategic fit has to deal with both organizational and environmental contingencies, it inherently contains potential tension between a firm's strategic intent to align its strategic orientation with its environmental situation, and its intent to align its strategic orientation with its core competencies (Zajac et al., 2000). This dilemma is even amplified in a context of changing environments. Indeed, when a firm intents to change its strategic orientation to adapt to or to enact its environment, this strategic change should also require a new fit between its strategic orientation and the corresponding organizational configuration in an adaptive process (Miles and Snow, 1978, 2003) that might take the firm away from its core competencies. In a first set of research, Miller (1992) suggested that achieving both external and internal fit might be structurally incompatible as numerous changes to align strategy with external environment decrease complementarities between structure and process. Accordingly, strong internal interdependencies seem to hamper organizational flexibility and increase resistance to change thus limiting fit with external contingencies. Revisiting configurations, Miller (1996) proposes a different approach to configuration where the focus should not be typologies or taxonomies, but rather the degree to which an organization's elements are orchestrated and connected within or across strategic posture attributes. This suggests that competitive advantage and sustained performance relies more on firm's ability to ensure complementarities among its selected product-market domain, its engineering, administrative and management choices than on the possession of specific organizational resources or skills that can be imitated or purchased by others. Then, the issue for a good configuration is the possibility left for reconfiguration depending on the intended rate of change of the firm (Miller, 1996, Miles and Snow, 1978, 2003). The appropriate level of configuration is therefore strongly dependent on a firm's environment. Thus, uncertain and turbulent environments should lead firms to configure with more loosely coupled elements of strategy, structure and process. Zajac et al. (2000) emphasize the role played by strategic change in the process of rent generation, by highlighting the greater negative impacts of internal and external misfit on performance in reactive firms compared to proactive firms. They posit the uniqueness of strategic fit for a particular organization at a particular point of time and suggest that attributes of a firm's strategic posture need to be permanently realigned towards internal fit as well as in the direction of external fit with environmental factors.

Strategic fit and performance

Assuming that a firm's strategic posture is context dependent, DeSarbo et al. (2006) have identified different strategic attributes tied to performance in different strategic types. They suggest that superior performance is embedded in a contingency-driven strategic stance by which firms need to consider existing capabilities and their environmental context, then correctly choose which capabilities best complement the existing core competences to improve profit performance. Spanos et al. (2004) confirm the importance of a firm's strategic attributes over industry contingencies in the process of rent generation. Using the same approach of hybrid strategic types, they also demonstrate that different strategic postures have different effects on firm profitability. Investigating this contingency perspective in SMEs, Edelman et al. (2005) emphasize the necessity of internal fit between firm resources and strategy as a conditional factor to superior performance. They demonstrated the high impact of co-aligning firm resources and strategies on performance suggesting that neither resources nor strategies alone determine performance in SMEs. This supports the anticipated assumption from Penrose (1959) that it is the unique exploitation of resources through appropriate strategies that yields the productive value of firms. This also suggests that the lack of internal fit between attributes of strategic posture (Miles and Snow, 1978, 2003) is likely to be detrimental to rent generation, as entrepreneurial orientation and organization resources (structure, processes, routines, competences) seem to interrelate and co-activate in co-deployment.

Configuration theory posits the equifinality of performance of a limited number of strategic postures or configurations as long as each configuration relies on internal fit of strategic attributes. Consequently, research on strategy-performance relationship should lead scholars to precisely identify interactions among strategic attributes in a fit perspective, rather than identifying individual determinants of performance (Raymond et al., 2010). However, DeSarbo et al. (2006) question the equifinality perspective and suggest that different combinations of strategic capabilities, hence, different strategic postures, seem to drive different measures of performance, in different environmental contexts. In fact, empirical and theoretical ideal strategic profiles tend to have the same predictive validity of firm performance (Marlin et al., 1994) as long as the key generic strategy dimensions are included in the strategy mix of empirical profiles (Spanos et al., 2004). Therefore, the identification of situation-specific, empirically-derived strategic profiles can be a good predictor of performance in a sense that such situation-specific profiles provide more accurate guidance to identifying the relevant strategic posture attributes to be leveraged to achieve performance with regard to firms' environmental context (DeSarbo et al., 2006).

Synthesis

Strategic fit as a conditional factor of firm performance should be considered by scholars from the respective influence of both internal and environmental fit. Indeed, strategic postures leading to superior performance can be predicted based on differences in specific environmental forces and organizational capabilities. Neither strategic orientation nor resources alone determine performance. The central issue for firms is to permanently realigning overall strategic posture attributes towards internal fit as well as external fit with environmental factors, in search for approaching situation-specific configurations derived from generic strategic postures.

6.4.3. Strategic posture, innovation behavior, and firm performance: a fit and contingency perspective

Strategic posture and innovation in context: fit and contingencies

As the business environment is becoming increasingly dynamic, complex and uncertain, ability to change competitive approaches strongly impacts overall firm performance (Hamel, 1998, Stopford, 2001; Kim and Mauborgne, 2005; Ebben and Johnson, 2005). In this context, innovation has become an essential tool of small firms for improving performance as well as surviving in competitive markets (O'Regan et al., 2006). When seeking new ways of conducting business to create wealth, firms adopt new strategic posture where alignment between strategic orientation, organizational structure and processes must be permanently reconsidered according to environmental shifts (Miles and Snow, 1978, 2003). Many scholars have emphasized the strong relationships between strategic posture and innovation behavior (Lefebvre and Lefebvre, 1993; Becheikh et al., 2006a, 2006b; Vaona and Pianta, 2008; Raymond and St-Pierre, 2010a). There exists a link between competitive positioning and innovative efforts. Therefore, achieving and maintaining a distinctive competitive strategy may require differentiated innovative efforts (Lefebvre and Lefebvre, 1993). Thus, strategic attributes significantly influence technological innovation performance of small manufacturing firms, either innovation likelihood or innovation novelty, and this influence seems to be higher than other determinants such as firm R&D intensity, firm size, or industry R&D intensity (Becheikh et al. 2006a).

Strategic posture may then be considered as a powerful explanatory construct that accounts for important differences in innovation management among firms. Then, strategic attributes may influence various innovation behavior attributes such as the source (market or technology-based), the nature (sustained or disruptive) and the type (product, process, marketing, or organizational) of innovation activities (Blumentritt and Danis, 2006). From this perspective, Zahra and Covin (1993, p. 470) suggest that *"technology policy decisions should be evaluated in terms of their collective fit with competitive strategy rather than as independent decisions"*. Accordingly, fit should be considered on a dual dimension addressing fit within strategic posture, i.e. between strategic attributes, as a predictor of organizational effectiveness (Miles and Snow, 1978, 2003; Porter, 1996; Olson et al., 2005) and fit within innovation behavior, i.e. between innovation attributes, as a predictor of innovation performance (Zahra and Covin, 1993, 1994; Damanpour and Gopalakrishnan, 2001). Such pair-wise alignments between strategic attributes and innovation attributes seem critical to strategy-innovation fit from a performance perspective (Zahra and Covin, 1994; Damanpour, 1996; Carmeli et al., 2010, Raymond and St-Pierre, 2010a). Indeed, strategic posture seems to moderate the relationship between innovation behavior and firm performance while innovation behavior's fit with strategic posture is a significant predictor of firm performance (Zahra and Covin, 1993). Moreover, Zahra and Covin (1994, p. 207) demonstrate that companies with different strategic postures *"exhibit significantly different patterns of association between their innovation and financial performance criteria"* suggesting that innovation behavior and strategic posture need to be co-aligned to achieve high performance. Further, internal consistency between innovation attributes is important for firm performance. Consequently, not only innovation behavior attributes must fit strategic posture attributes, but also both strategic attributes and innovation attributes must be internally consistent. *"Lacking this consistency, innovation activities are likely to be* *misdirected, leading to poor performance"* (Zahra and Covin, 1994, p. 207). O'Regan et al. (2006) have also identified the organizational attributes that are specifically associated with innovation, and suggest, within these associations, to consider the associated attributes simultaneously rather than in isolation. Other scholars have emphasized the synchronous adoption of innovation behaviors to adapt or transform, and thus, maintain or enhance their competitive edge (Abernathy and Utterback, 1978; Pisano and Wheelwright, 1995; Damanpour and Gopalakrishnan, 2001; Ayerbe, 2006). Working on pharmaceutical firms, Pisano and Wheelwright (1995), argued that the simultaneous development of new products and new processes is conditional to superior both innovation and market performance. Indeed, process innovation supports the smoother launch of new products, easier commercialization of complex products, and faster penetration of markets. Similarly, other research found positive association between innovation attributes on the whole scope of innovation behavior. Zahra and Covin (1994) have also highlighted the positive impact of associating technological and administrative innovations, Dewar and Dutton (1986) reported positive association between radical and incremental innovations. Damanpour and Gopalakrishnan (2001) suggest that there are similarities between adoption of product and process innovations, on the one hand, and the adoption of technological and administrative innovations. Investigating the dynamics of technological and organizational innovations, Ayerbe (2006) demonstrate the inductive role of technological innovation and the supporting role of organizational innovation in an interrelated co-activation process. She posits that technological innovations are firstly initiated by organizational innovations resulting from an intended strategic change, increased business, or internal dysfunctions. Then, technological innovations lead to organizational innovations that support and facilitate the development of new products or the implementation of new processes.

Investigating the role of strategic capabilities qualifying specific organizational configurations or “gestalts” of SMEs, Raymond and St-Pierre (2010) have empirically demonstrated the predictive role of strategic capabilities on product innovation performance. Their results, based on the rationale of Miles and Snow’s adaptive cycle (2003) focusing on the firm’s intended rate of change to adapt to and enact external environment, provide a contingency perspective of strategy-innovation fit. This contingency approach is essential to the understanding of strategy-innovation fit. This must be particularly highlighted when investigating this co-alignment in SMEs. Indeed, small firms need to permanently scan their environment in order to identify market signals to adapt their strategic posture and innovation behavior accordingly if they want to derive the full benefits that innovation may provide (Lefebvre and Lefebvre, 1993).

Scholars have long studied the influence of industry or firm-specific contingencies on the relationships between firms’ strategic postures and innovation behaviors (Abernathy and Utterback, 1978; Pavitt, 1984; Van de Ven, 1986; Damanpour, 1996; Breschi et al., 2000; Thornhill, 2006; Vaona and Pianta, 2008). Abernathy and Utterback (1998) have proposed a three-stage model to explain the rate of product and process innovations throughout an industry life-cycle. Their model has contributed to emphasize the role of product and process innovations as a factor of industrial competition (Utterback, 1994), thus relating technological innovation to corporate strategy. In fact, firms of all types adopt innovations to address changes in both their external and internal environments, and innovation strategies indeed reflect a firm’s entrepreneurial orientation (Naman and Slevin, 1993; Lumpkin and Dess, 1996). Organizational factors may have unequal influence on innovation depending on the organizational structure of the firm as well as external environment factors may influence firm’s innovativeness (Van de Ven, 1986). Many scholars have observed that industries differ in the amount of firm resources devoted to innovation and in the degree of innovativeness as well as the source of innovation (Pavitt, 1984; Breschi et al., 2000; Vaona and Pianta, 2008). Such differences are commonly associated with different market structures, firm strategies, and organizational configurations, i.e., organizational elements such as firm's activities, policies, structural elements, and resources, forming a firm-specific system. Thornhill (2006) suggests that both industry characteristics and firm-level resources and capabilities are associated with firm-level innovation. Moreover, according to Thornhill, there exists a direct relationship between industry dynamism and firm-level innovation and a direct relationship between innovation and firm performance. Still, two contingencies seem to have a significant influence on the organizational management of innovation: uncertainty and complexity (Damanpour, 1996; Tidd, 2001). In a review of 21 research papers, Damanpour (1996) concludes that environmental uncertainty influences both the magnitude and the nature of innovation. Environmental conditions such as turbulence, complexity, and competitiveness do not affect organizational change and innovation equally. Thornhill (2006) provides inputs showing that in dynamic, high-technology manufacturing sectors, the number of innovations with high degree of novelty is substantially superior to low-technology sectors. Indeed, perceptions of environment uncertainty appear to affect strategic posture (Miles and Snow, 1978; Porter, 1980), and consequently, the management and the organization of innovation. Complexity is a function of the number of technologies and their interactions. Recent research assumes that the management and the organization of innovation of complex product and systems are significantly different from other types (Hobday et al. 2000). Uncertainty, from an innovation perspective, is a function of the rate of change of technologies and product-market domains, whereas complexity is a function of technological and organizational interdependencies (Miles and Snow, 1978; Damanpour, 1996; Tidd, 2001). The distinction between types of technology is an important factor involved in the development of knowledge-based organizations and the implementation of related strategic choices. For instance, in the manufacturing sectors, advanced information technology serves production flexibility and efficiency, thus supporting cost-competitive orientation dedicated to market expansion (Vaona and Pianta, 2008). According to Damanpour (1996), technological intensity might be an even more effective factor than industrial sector class in determining structure-innovation relations in organizations.

Damanpour and Gopalakrishnan (2001) also posit that different types of innovations may serve different strategic postures. They highlight the internal focus of administrative (organizational) and process innovations, while product innovations have a market focus. Studying innovation attributes is an important topic when investigating the relationships between strategic postures and related profiles of innovation and the contingency factors affecting this relationship. Indeed, some attributes can be seen as industry-specific and others as more firm-specific. Product innovations seem to be more easily observable and appropriable by firms whereas administrative and process innovations seem to be less tangible and easy to implement (Damanpour and Evan, 1984). Thus, Damanpour and Gopalakrishnan (2001) also suggest that product innovations are more industry-specific, i.e., they are more standardized across industries, whereas administrative and process innovations are more firm-specific, i.e., they are generally unique to the unit of adoption. This raises the issue of the transferability and imitability of innovations whose initial purpose is to provide competitive advantage through internal change (Barney, 1986, 2001; Grant, 1991). Firm-specific innovations cannot be imitated without significant modifications to make them compatible with the structure, culture and systems of the adopting organization; consequently, they are less likely to be replicated (Damanpour, 1996) and are strong contributors to firms' competitive advantage.

The degree of novelty of innovation behavior and its corresponding organizational configuration are also impacted by external environment and industry factors (Tushman and

Romanelli, 1985; Damanpour, 1996; Zhou et al., 2005). Tushman and Romanelli, suggest that radical (i.e. disruptive) innovation occur during periods of discontinuous change, and incremental innovations occur during periods of adaptation. Zhou et al. posit that market forces are significant contributors to radical innovation and investigate this influence from a technology or market-based approach of innovation. Demand uncertainty positively affects both types of innovations whereas technology turbulence leads to more tech-based innovations suggesting that adopting new technology is not sufficient to innovatively meet market needs. Competitive intensity leverages more market-based innovations, signifying that in this perspective, some firms do not accept the constraining factors of competition – limited market space and the need to beat rivals in order to succeed – and tend to explore new uncontested market spaces to escape intense competition (Kim and Mauborgne, 2005).

In fact, the continuous or disruptive attributes of innovation seem to be influenced by different environmental, organizational, process, and managerial factors. Koberg et al. (2003) suggest that the strategy-structure causal sequence for radical (disruptive) innovations is significantly different from the strategy-structure sequence for incremental (continuous) innovations. Indeed, different factors in the environment and in the organization limit or favor different innovation strategy efforts. Factors such as environmental dynamism, age and size of the firm, intrafirm linkages, and the age of the CEO favor incremental innovation. Factors such as environmental dynamism, intrafirm linkages, experimentation, and transitioning from one project or product to another favor radical innovations.

It is therefore critical for a firm to allow consistency between its market strategy and its innovation strategy as well as in operations depending on external environment contingencies and specific internal capabilities. However, firms should pay attention to aligning their innovation policy decisions in terms of their collective fit with the firm's strategic posture rather than as independent decisions, especially in the resource-constrained context of the SMEs (Thornhill, 2006).

Strategic posture and innovation behavior: the performance implications of fit

Research works have emphasized the crucial importance, from an organizational effectiveness perspective, of the fit between innovation behavior and strategic posture (Miles and Snow, 1978, 1994, 2003; Zahra and Covin, 1993, 1994; Olson et al., 2005; Raymond and St-Pierre, 2010a, Carmeli et al., 2010). Miles and snow (1994) posit that firm's superior performance should be thought as achieving the two dimensions of fit; external fit between the firm and its environment, that is, the good strategic posture of the firm, and internal fit, that is, the organization's structure, processes and managerial ideology supporting this firm's strategic posture. This is because strategic fit is not only crucial to a firm's ability to change and adapt to unforeseen contingencies, but also can act as a barrier to imitation (Siggelkow, 2002). From a performance perspective, scholars have demonstrated the differentiated influence of different strategic postures on financial and market performance (Snow and Hrebiniak, 1980, Hambrick, 1983; Lumpkin and Dess, 1996; Spanos and Lioukas, 2001; Spanos et al., 2004; DeSarbo et al., 2005; Raymond et al., 2010). Recent studies (DeSarbo et al., 2005; Raymond et al., 2010) also suggest that different strategic capabilities and environmental factors interrelate differently with different strategic types, and that these frameworks of interrelations influence performance dimensions differently.

The same prevails for the innovation-performance relationship as several studies (Zahra and Covin, 1993, 1994; Han et al., 1998; Zhou et al., 2005; Rosenbusch et al., 2011; Forsman and Temel, 2010) demonstrate the differentiated impact of different innovation attributes on performance. Zahra and Covin (1994) suggest that although both types and sources of innovation positively influence return on sales and sales growth, the pattern with profitability is less uniform. Similarly, they also suggest that product and process innovations are better predictor of financial performance than administrative innovation. Han et al. (1998), also underline the different contributions, although synergistic, of technological and administrative innovations to financial performance. Rosenbusch et al. (2011) find that the innovation–performance relationship is context dependent and factors such as the type of innovation, the age of the firm, and the cultural context affect the impact of innovation behavior on firm performance to a large extent. Focusing on small firms' performance, Forsman and Temel (2010) suggest that attention should be paid not only to innovation types but also to the diversity of innovations.

Even though both the fit within strategic attributes of strategic posture as well as the fit within innovation attributes of innovation behavior independently influence firm performance, strategy-innovation alignment seem to be a significant predictor of organizational effectiveness. Miles and Snow (1994) liaise such a fit between strategic posture and innovation behavior with the overall level of firm performance from failure (misfit), survival (minimal fit), excellence (tight fit) to "hall of fame" (early, tight fit) depending on the firm's ability (Miles and Snow, 2003, p. 153) to *"select a viable market domain and a set of objectives relative to it (entrepreneurial problem), to create a technological process for serving the selected domain (the engineering problem), and to develop an organization structure and a set of managerial processes to coordinate and control the selected technology, and further to direct those innovative activities necessary for maintaining the organization's continuity (the administrative problem)"*. Testing fit as deviation from profiles of Miles and Snow's (1978) strategic typology of Defenders, Prospectors, Analyzers and Reactors, Zahra and Covin (1994) demonstrated that deviation from predicted strategy-innovation patterns was significantly negatively associated with firm performance for the three stable profiles (Defenders, Prospectors, Analyzers). Similarly, testing the interrelations between competitive strategy and technology policy, Zahra and Covin (1993) had evidenced that, from a performance prospect, technology policy decisions should be evaluated relatively to their collective fit with competitive strategy rather than independently and that technology policies that should fit a particular competitive strategy are those which significantly correlate with performance among firms of those strategies. Zahra and Covin also emphasized the moderating role of competitive strategy on the relationships between technology policy and firm performance. However, this fit between strategic posture and innovation behavior seems to proceed as a co-activation phenomenon. Indeed, recent studies (Carmeli et al., 2010; Ortega, 2010) have highlighted the role of overall innovation behavior as well as innovation attributes in influencing the relationship between strategic posture and firm performance. Carmeli et al. (2010) suggest that a strong innovation leadership, qualified as a firm's orientation to promote change and adaptation, positively enhances firm performance both directly and indirectly through an impact of increasing strategic fit. Ortega (2010) posits that technological capabilities are a fundamental enhancer of the effect of competitive strategy on firm performance as long as innovation attributes fit strategic attributes. Comparing the mediating role of innovativeness and quality orientation on firms' growth, profitability and market value, Cho and Pucik (2005) demonstrate that innovativeness and quality interrelate in a co-activation process where innovativeness mediates the relationship between quality and growth, and quality mediates the relationship between innovativeness and profitability. Consequently as stated by Zahra and Covin (1994, p. 208): *"Innovation-related decisions should not be treated as side issues but, rather, as decisions which can either facilitate or detract from the effectiveness of competitive strategy choices"*.

Synthesis

Firms should pursue fit within strategic posture attributes as a predictor of organizational effectiveness, and fit within innovation behavior attributes as a predictor of innovation performance. Indeed, consistency in both strategic posture and innovation behavior independently influence firm performance. However, strategy-innovation alignment should also be consistent to enable the achievement of firms' strategic goals. Lacking this consistency, innovation activities are likely to be misdirected, and consequently, may lead to poor performance. Strategy-innovation fit must also be considered from a contingency perspective where firms need to permanently scan their environment to identify market signals. Doing so, firms can design strategic capabilities to adapt their strategic posture and innovation behavior accordingly for deriving the full benefits that innovation may provide. Moreover, in different environments, firms of different strategic postures tend to exhibit different patterns of associations between innovation behavior and performance, suggesting that innovation and strategy need to match internally and externally to achieve strategic objectives.

6.5. Model development and hypotheses

6.5.1. Conceptual model

Generic typologies and situation-specific profiles

Considering the multiple combinations of interrelations within and between strategic and innovation attributes, this investigation on strategy-innovation relationship requires a clear distinction among firms' strategic and innovation profiles. Configuration theories provide largely developed literature on the interrelations between business-level strategy and organization, assuming that for each strategic posture, there exist an ideal set of organizational characteristics. The configuration typologies mostly used by scholars (Hambrick, 2003) are Miles and Snow's (1978) and Porter's (1980) typologies. Porter's framework focuses on how a firm creates customer value compared with competing firms through generic strategies consisting in "overall cost leadership" or "differentiation", and how it defines its scope of market coverage, through a focused or marketwide approach using either a cost leadership or differentiation positioning. Miles and Snow (1978) focus on a firm's intended rate of product-market change and have developed a systemic cycle of adaptive choices relative to their product-market domain (the entrepreneurial problem), technologies and processes (the engineering problem) and structure (the administrative problem). Miles and Snow (2003, p. 29) have accordingly identified four generic profiles qualifying how firms address these choices: Defenders have "*narrow product-market domains… and devote primary attention to improving the efficiency of their existing operations."* Prospectors "*continually search for market and product opportunities and …are often the creators of change and uncertainty to which their competitors must respond."* Because of their strong concern for product and market innovation, Prospectors are not completely efficient. Analyzers "*operate in two types of product market domains, one relatively stable, the other changin*g". In their stable domains, Analyzers use formalized structures and processes towards efficiency. In their changing domain, they scan new ideas from competition and rapidly adopt the most promising ones. Miles and Snow qualify these three profiles as stable form of organizations. The fourth one, Reactors, although "perceiving change and uncertainty occurring in their markets, are unable to respond effectively because of a lack of consistent strategy-structure relationship and do not adjust until forced by environmental forces.

Porter's framework emphasizes firm's strategic positioning with an external-internal contingency perspective, but it provides little inputs regarding the strategic capabilities as regards organizational attributes and processes required for an effective implementation of each generic strategy (Walker and Ruekert, 1987). Miles and Snow's typology overcomes at least some of these limitations as the primary element underlying their typology is the firm's intended rate of product-market change and the alignments between the firm's strategic orientation, processes and structure. Miles and Snow's framework therefore encapsulates central elements of the strategic choice process, as well as the resource-based view and dynamic capabilities perspectives developed in the strategic intent approach (Hamel and Prahalad, 1989). They posit (Ketchen, 2003) that first, organizations are continually trying to adapt to their environment through a permanent adaptive process of entrepreneurial, engineering and administrative choices (Miles and Snow, 1978). Second, that there are various basic ways to adapt – the organizational typology. Third, in adapting, the firm must seek fit – between strategy and the environment, and between strategy and structure. Raymond and St-Pierre (2010a) suggest that Miles and Snow's adaptive cycle approach of entrepreneurial, engineering, and administrative choices also provides a strategic perspective of innovation .The entrepreneurial choice consists in selecting product or services to markets or market segments where the firm wants to operate. The engineering choice consists in selecting the appropriate technology to produce and distribute product or services and in implementing the appropriate information, communication and control mechanisms to support the effective use of the selected technology. The administrative choice consists in finding solutions dedicated to both reducing uncertainty within the organizational system and adapting to environment changes. Therefore, innovation behavior can be viewed as a central element of the adaptive cycle from a strategic fit perspective, where "*product innovation is viewed as the key to solve the entrepreneurial problem, process innovation as the key to solve the engineering problem, and organizational innovation as the key to the administrative problem*" (2010a, p. 50). Miles and Snow typology has been validated through extensive theoretical and empirical examination (Hambrick, 1983; Segev, 1987; Shortell and Zajac, 1990) and despite their different perspectives, research has also suggested a general congruence between Miles and Snow's typologies and Porter's cost leadership and differentiation categories (Segev, 1989).

Although Miles and Snow's framework emphasizes both internal and external fit, its generic character ignores industry and environment peculiarities (Hambrick, 1983) by stressing that the various strategic profiles would perform equally well as long as strategic posture, structure and processes are properly aligned. This postulate of "systematism" seems inconsistent with the more commonly accepted view that certain contingencies favor certain types of strategy (DeSarbo et al., 2005). To address both Miles and Snow's (1978) internal and Porter's (1980) external focus of competitive strategy, Walker and Ruekert (1987) propose a hybrid model that synthesizes the two dimensions. Their model has been frequently cited in the management literature and supported by further empirical studies (Slater and Olson 2000, 2001). Consequently, in line with these various approaches we consider in this research the following stable competitive strategy profiles: *Low-Costs Defenders, Differentiated Defenders*, *Prospectors, and Analyzers.* These strategic postures are described as follows (based on Slater and Olson, 2000; Olson et al. 2005): Low-Cost Defenders attempt to maintain a relatively stable domain by aggressively protecting their product-market position. They rarely are at the forefront of product or service development; instead, they focus on producing goods or services as efficiently as possible. In general, these firms focus on increasing share in existing markets by providing products at the best prices. Differentiated Defenders attempt to maintain a relatively stable domain by aggressively protecting their product-market position. They rarely are at the forefront of product or service development; instead, they focus on providing superior service and/or product quality. Their prices are typically higher than the industry average. Prospectors are frequently the first-to-market with new product or service concepts. They do not hesitate to entre new market segments in which there appears to be an opportunity. These firms concentrate on offering products that push performance boundaries. Their proposition is an offer of the most innovative product, whether it is based on substantial performance improvement or costs reduction. Analyzers are seldom first-in with new products or services or first to enter emerging market segments. However, by monitoring market activity, they can be early followers with a better targeting strategy, increased customer benefits or lower total costs.

What distinguishes the present study is the attempt to complement former research on the performance implication of fit between strategy and innovation (Zahra and Covin, 1993, 1994; Zahra, 1996; Olson et al., 2005; Raymond and St-Pierre, 2010a) by explicitly modelling the relationship between a firm's strategic posture and innovation behavior from a contingency perspective. Central to this work is the issue of effects of external and internal contingencies on strategy-innovation relationship. Therefore, our research enhances the scope of Miles and Snow framework by considering industry contingencies, firm contingencies and performance within this framework. Indeed, in their seminal works, Miles and Snow (1978) have not explicitly modelled the role of industry factors or firm strategic capabilities in the design of a firm's strategic posture (Hambrick, 1983) or of innovation behavior (Shortell and Zajac, 1990) from a performance perspective. Consequently, our conceptual model, even though built on the a priori strategic and organizational attributes and characteristics of Miles and Snow's (1978) and Porter's (1980) predefined typologies, leaves possibilities for the emergence of combinations of derived hybrid strategic profiles objectively and empirically determined by the structure in the data and the statistical fit of the model. Indeed, a contingency-based approach requires the use of a model enabling the emergence of situation-specific strategic types to capture the effects of environment uncertainties and idiosyncratic capabilities on strategic posture and innovation behavior. This is specifically true when using

Miles and Snow's framework in the context of SMEs, which generally pursue different innovation strategies and use different strategic inputs than large firms to introduce innovations (Cohen and Klepper, 1996; Vaona and Pianta, 2008). Moreover, complementary works revisiting Miles and Snow's (DeSarbo and al., 2005) and Porter's (Spanos et al., 2004) generic frameworks have shown that empirically-derived, hybrid strategic types clearly dominate the traditional typology in terms of firm performance.

Strategy-innovation fit and firm performance

To assess the relationship between strategic posture and innovation behavior, configuration-based studies and research can rely on existing, largely developed literature regarding fit. Configuration theory posits that for each strategic posture, an ideal set of organizational characteristics exists, that generate superior performance (Van de Ven, Drazin, 1985). These configurations are considered as "ideal", because they represent complex clusters of mutually reinforcing organizational attributes or "gestalts" that enable businesses to achieve their strategic goals (Ketchen, Thomas, Snow, 1993). The concept of fit is essential to this research from both theoretical and empirical points of view. We here adopt the theoretical posture describing fit as the degree to which a firm's strategy, structure and the elements of the organizational system complement one another (Miller, 1996; Siggelkow, 2002). In order to explore the relationship between strategy and innovation, empirical research generally follows a strategic choice approach viewing innovation as a means for achieving the goals of competitive strategy and strategy as a predictor of innovation activities (Kotabe, 1990). However, the works carried out by Zahra and Covin (1993, 1994) suggest that competitive strategy and innovation are related but distinct variables. The strategic choice approach therefore, emphasizes the central role of strategic posture attributes as predictors of innovation behavior attributes (Zahra and Covin, 1994). In order to investigate this predictive relationship, fit between strategic posture and innovation behavior must be viewed as a coalignment between the individual strategic profiles and their theoretically-predicted patterns of innovation, considering that these patterns represent ideal profiles of innovation behavior, from which deviations would be expected to be associated negatively with firm effectiveness (Zahra and Covin, 1994).

Determining ideal profiles against which fit can be assessed can be done either theoretically or empirically (Venkatraman, 1990; Zajac et al., 2000). Theoretically-derived ideal profiles are relevant when theoretical literature provides appropriate details that enable a precise scoring of the dimensions of each ideal profile (Drazin and Van de Ven, 1985). Literature on configuration theories, and specifically on Miles and Snow (1978) and Porter (1980) typologies, is numerous and sufficiently detailed (Hambrick, 1983; 2003; Segev, 1989; Shortell and Zajac, 1990) to enable the translation of theoretical statements from the literature into precise numerical estimates of strategic configuration attributes (Venkatraman, 1989). However, as previously emphasized, hybrid profiles, derived from theoretical strategic typologies may represent more suitable forms of configurations than generic typologies from an organizational effectiveness perspective (Campbell-Hunt, 2000; Spanos et al., 2004; DeSarbo et al., 2005). Moreover, even though the relationships between innovation and strategy have been explored from a coalignment perspective with strategic posture attributes, this frame of research remains partially explored and has mainly focused on technological innovation without encompassing at the same time, at the firm level, the whole scope of innovation behavior attributes in terms of activities - e.g. marketing and organizational innovation, source – market or technology based innovation, or nature – sustained or disruptive (Becheikh et al. 2006a, 2006b; DeSarbo et al., 2006; Evangelista and Vezzani, 2010).

In such situations, when ideal profiles cannot be precisely identified from existing theory, the configuration literature posits that assessing fit with empirically-derived profiles is an appropriate alternative (Venkatraman and Prescott, 1990; Ketchen et al. 1993; Zahra and Covin, 1994). This empirical approach of ideal profiles or “gestalts” emphasizes strategy implementation rather than strategy intention and therefore is particularly adapted to operationalize the strategy-innovation relationship with regard to performance (Raymond and St Pierre, 2010a). Such profiles are qualified as ideal because their innovation behavior enables the achievement of their competitive strategy (Zahra and Covin, 1993, 1994). Our investigation will follow this empirical approach of fit as “gestalt”. Indeed, this will provide methodological guidance to our exploration of the performance implication of the contingency-specific, predictive relationship between strategic posture and innovation behavior.

Doing so, we assume that there exist more favorable strategy-innovation alignments forming coherent gestalts of strategic posture - defined by the combination of firm’s entrepreneurial, engineering and administrative choices (Miles and Snow, 1978), and innovation behavior - defined by combinations of natures (sustained or disruptive), sources (market or technology-based) and activities (product, process, marketing or organizational) of innovation. We attempt to demonstrate that the goodness of fit between strategic and innovation attributes is positively associated with firm performance. Consequently, with regard to here above literature review and discussion, we can depict our overall approach, designed to investigate the existence of contingency-specific, alignments between a given firm’s strategic posture and the type of innovation behavior that will lead to superior performance, in a composite model described in Figure 15. This model enables to control for the possible direct and indirect effects of external and internal contingencies on strategy-innovation fit and performance.

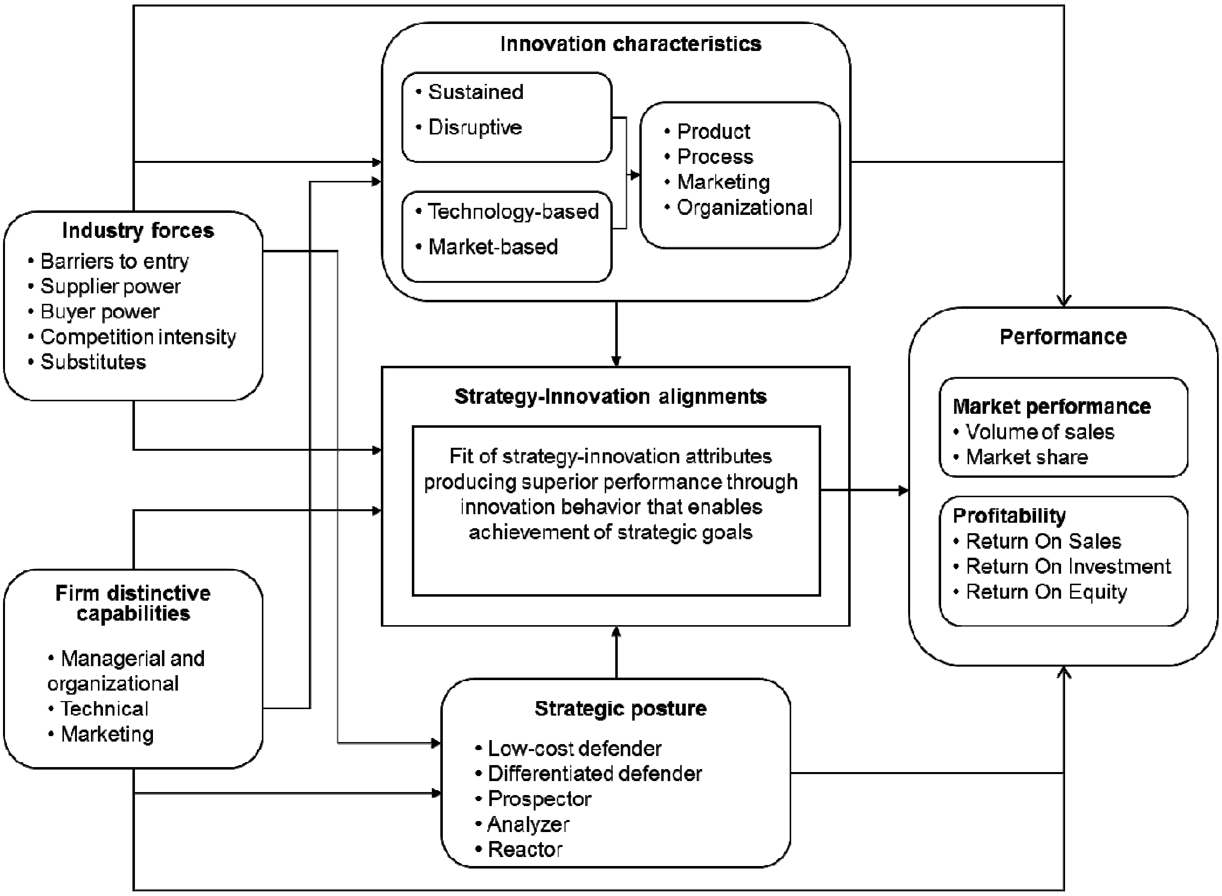


Figure 15: Fit of innovation profile with strategic posture from a performance perspective, considering industry and firm contingencies

6.5.2. Hypotheses

In the development of the hypotheses of expected relationships between innovation behavior fit with strategic posture and its performance implications, we draw directly on existing theory and empirical evidence when possible. Our theoretical basis strongly relies on Miles and Snow's framework (1978) describing four types of organizations that represent alternative ways of moving through the adaptive cycle of entrepreneurial, engineering, and administrative choices. This framework of strategic types characterizes the firm's intended rate of internal change of strategic posture, i.e. of innovation (Grant, 1991). Three of these strategic types, - The Defender, the Analyzers, and the Prospector – are "stable" forms of organization. Consequently, when a firm pursues one of these strategies, and designs the organization accordingly, then the firm may generate sustainable competitive advantage in its particular industry. Contrarily, if the firm does not design its organizational configuration according to the pursued strategy, then it will be slow to respond to opportunities and is unlikely to generate sustainable competitive advantage in its industry.

Miles and Snow (1994) posit that successful Prospectors, Defenders or Analyzers are all innovative but in different ways and adapt their innovation behavior alongside the adaptive cycle (see Figure 16). Prospectors are particularly innovative in developing new technologies and products by either anticipating or shaping the market’s direction, while Defenders are innovative in efficiently delivering an existing line of products and services to their customers. Analyzers are innovative in doing both by moving fast as well as efficiently.

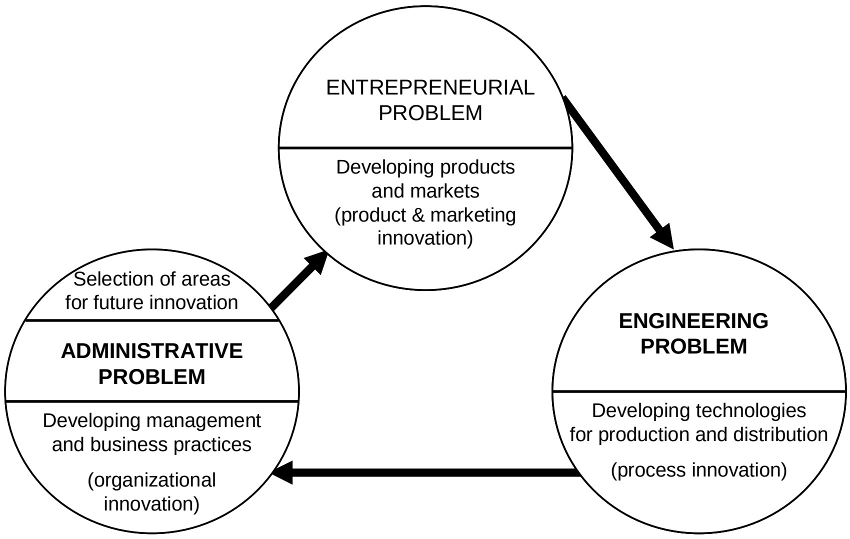


Figure 16: The adaptive cycle of innovation. Source: L. Raymond, J. Saint-Pierre (2010), adapted from Miles and Snow (1978)

However, what characterizes the innovation behavior of Defenders, Prospectors and Analyzers, as defined by Miles and Snow (1994), is the permanent search for and maintenance of fit as a source of sustainable competitive advantage ; strategic fit between the organization and its environment, and internal fit among strategy, structure, and management processes. As Miles and Snow posit (1994, p. 186) *"With fit comes fame [performance], with misfit comes failure. Fit is….a thoughtfully pursued logic. While it may evolve, it does with clear purpose [intended change] and widespread awareness… To achieve strategic fit, firms must create, understand, develop, and sustain distinctive competences that adds high value to goods and services the market desires. To achieve internal fit, companies must have a deep understanding of the operating logic linking strategies with structures and processes"*. The adaptive cycle process emphasizes that firms should perpetually cycling through sets of decisions to achieve this fit on the three dimensions of the cycle. Accordingly, a firm that makes decisions in the entrepreneurial domain in the direction of being a Prospector will, make Prospector-oriented decisions in the engineering domain, and then in the administrative domain, then even more so again in the entrepreneurial domain, and so on. With enough cycles and permanently increased external and internal fit, a given firm will become a good, comprehensively aligned and stable, Prospector, Analyzers, or Defender. If the firm fails in the fit between strategic posture and innovation behavior in this perpetual adaptive process, it will be an incongruent, unstable, poor performing Reactor (Hambrick, 2003).

The adaptive cycle then, supports the strategic choice approach of strategy being a predictor of innovation behavior (Hambrick, 1983; Kotabe, 1990) with regard to the nature (sustained or disruptive), the source (technology or market-based) and the activities (process, product, marketing or organizational) of innovation (Zhou et al., 2005; Wiklund and Shepherd, 2005; Perez-Luno et al., 2011). Innovation behavior is generally viewed as a way for firms of supporting new strategic posture to achieve strategic goals when facing new and changing competitive realities (Damanpour, 1996; Zahra, 1996). Damanpour and Gopalakrishnan (1998) emphasize differences in innovation behavior in terms of nature, source and activities of innovation depending on different environmental contingencies. Meeus and Oerlemans (2000) posit that external fit between firms' strategic positioning and dynamic environment seem beneficial for innovative performance, as firms in search for adapting to environmental change tend to emphasize technological and organizational innovation. Zhou et al. (2005) find that market forces significantly influence product innovation behavior in terms of source – market-based or technology-based – and nature – sustained or disruptive - of innovation.

Similarly, strategic capabilities also influence firm's strategic choice as they condition a firm's ability to enhance or develop its activities to pursue a more differentiated and idiosyncratic strategy (Grant, 1991; Slater and Olson, 2001; Spanos et al., 2004). Firm's capabilities also influence innovation behavior depending on their co-alignment with strategic orientation (Miles and Snow, 1994; 2003). Thus, differentiated patterns of strategic capabilities in manufacturing SMEs tend to lead to significantly different outcomes in terms of product innovation (Raymond and St-Pierre; 2010a). Zhou et al. (2005) also raise that technological capabilities are direct significant determinants of technology-based product or process innovation but have no direct effect on market-based innovation.

In fact, innovation is considered an adaptive mechanism to the environment used by firms in order to survive as well as an activity that stems from firms managerial choice and capabilities (Manu and Sriam, 1996; Vega-Jurado et al., 2008). However, Spanos and Lioukas (2001, 2004) highlight the direct and indirect effects of industry and firm contingencies on strategy-performance relationship, and emphasize the mediating effect of strategy on contingency-performance relationship. Thus, they posit that differentiated industry contingencies directly influence growth performance or profitability, and that firm contingencies mainly directly influence growth performance and only via the latter, profitability. Considering innovation behavior as a mediator in the strategy-performance relationship (Zahra and Covin, 1994), we suggest to follow Spanos and Lioukas's logic of rent generation. From this logic, strategic posture predicts innovation behavior, which in turn enables the achievement of strategic goals, hence of performance. We can then envisage that firm performance is influenced by direct and indirect industry and firm-specific effects on the strategy-innovation-performance relationship.

Fit among contextual, structural, and strategic factors has been tested as a relatively powerful predictor of organizational effectiveness (Doty et al., 1993, Zahra and Covin, 1993; 1994; Marlin et al., 1994; Vorhies and Morgan, 2003; Olson et al., 2005; Marlin et al., 2007) consistent with many organizational theories that identify a typology of effective organizational configurations (Miles and Snow, 1978; Mintzberg, 1979, 1983; Porter, 1980, 1985). Moreover, many research works suggest that the adherence with an externally specified ideal or hybrid strategy profile will have a higher effect on firm performance than a random profile (Doty et al., 1993; Zahra and Covin, 1993; 1994; Marlin et al, 1994; Spanos et al., 2004; DeSarbo et al., 2005; Olson et al., 2005). Fit and equifinality assertions are central to configuration theories. The concept of equifinality holds that superior performance can be achieved through a variety of different strategies and that overall firm performance is less dependent on a specific strategy than on how well the firm implements the chosen strategy (Hambrick, 1983; Hrebiniak and Joyce, 1985; Gresov and Drazin, 1997; Miles and Snow, 1978; 2003). Consequently, equifinality suggests that in the process of strategic management, firms can choose among different strategic postures to achieve high performance. When studying the various coherent combinations (or gestalts) of strategic posture and innovation behavior as predictor of financial performance, Zahra and Covin (1994) have emphasized the distinctiveness of the strategy and innovation concepts. They propose that superior firm performance is not only related to internal consistency within strategic posture attributes and within innovation behavior attributes, but also to the goodness of fit between innovation and strategic attributes forming gestalts of strategy-innovation alignment. As strategic and innovation attributes can combine in various ways, several gestalts can emerge depending on industry and firm-specific contingencies effects on each set of attributes.

Central to this research is the notion of strategy-innovation alignments, and the assumption that there exist field-based coherent combinations of strategic and innovation attributes forming sustainable organizational configurations likely to enable the achievement of firms' strategic goals (Kotabe, 1990). Similarly, Zahra and Covin (1993, p. 470) suggest that *"innovation policy tends to align with business strategy in a comprehensible, intuitively meaningful, and often predictable manner."* Another assumption linked to strategy-innovation alignments is that these gestalts are, as previously mentioned, equally effective in terms of performance according to the equifinality principle. Ketchen et al. (1993) suggest that this assumption can be tested by an ex-post analysis of each gestalts performance. Nevertheless, from an equifinality perspective relying on the rationale of Miles and Snow's (1978) adaptive cycle of innovation, and findings on derived-hybrid profiles (Spanos et al., 2004), it stands to reason that superior firm performance is contingent on how close to a theoretical strategy-innovation alignment the firm's innovation behavior is aligned with the requirements of a chosen specific strategic posture. Besides, this performance and this alignment are also contingent to industry-specific and firm-specific effects.

Thus, from this assumption, we suggest testing the following proposition:

The performance implication of the fit between a firm's innovation behavior and strategic posture, where strategic posture predicts innovation behavior, is influenced by direct and indirect, industry-specific and firm-specific effects, where direct effects concern direct effects of industry and firm-specific contingencies on strategic posture attributes and innovation behavior attributes, and where indirect effects concern indirect effects of industry or firm-specific contingencies on performance attributes through strategic posture attributes or innovation behavior attributes.

Building on this proposition, we will propose a line of arguments on the predictive relationship between firm performances namely growth and profitability, and the fit between strategic posture attributes namely entrepreneurial, engineering and administrative attributes, and innovation behavior attributes namely nature, source, and activity attributes of innovation with regard to industry and firm contingencies.

Nature and source of innovation

Miles and Snow characterize the entrepreneurial problem of Defenders as the permanent search to *"create stability through a series of decisions and actions which lessen the organization's vulnerability to environmental change and uncertainty"(*Miles and Snow, 2003, p. 37). Therefore, the most favorable feature of a Defender's product-market domain is its stability, narrowness and homogeneity. The targeted market segment is generally the safest of the industry. Defenders tend to protect this target segment by offering mainstream customers the full range of products or services they desire through a strategic positioning of competitive pricing (Low-Cost Defenders) and/or superior customer service (Differentiated Defenders). As their product-market domain is stable and the scope limited, Defenders have a tendency to focus on new product development only related to current goods or services, while ignoring developments outside domain. The R&D attributes of this technology orientation have been investigated by Langerak et al. (1999, p. 215) showing that *"R&D departments of Defenders ignore industry changes that have no direct influence on their operations and appear to emphasize R&D capabilities that are focused on achieving cost reductions"*. In so doing, Defenders tend to emphasize improvement of technological processes for new product development. Moreover, Lüthje and Herstatt (2004) report that when there is low heterogeneity of clients' needs on a market, innovations tend to be driven by the willingness of manufacturers to spread their technological development costs to a mainstream of users sharing the same needs. Similarly, Zahra (1996) raises that external, market-based, technology sources tend to hamper firm's effectiveness in stable and homogenous environments. Consequently, Defenders should tend to develop technology-based innovations that do not require a high understanding of heterogeneous needs from various typologies of clients but do require a high understanding of technologies needed to serve efficiently homogeneous needs of a known typology of users. Concerning firm's innovativeness, scholars (Tushman and Romanelli, 1985; Koberg et al., 2003) suggest that the degree of novelty of innovation is increased by the degree of uncertainty of the environment. Other works (Amara and Landry; 2005) show that the existence of "strong ties" such as the ones linking a firm only to the clients or suppliers of its specific product-market domain hamper the firm's ability to take advantage of new market opportunities, as would Prospectors do. Defenders' entrepreneurial orientation for product-market domain's stability and homogeneity is supported by strong, controlled, vertical and formalized management systems with a production and finance-oriented dominant coalition focused on maximum efficiency and technological specialization (Miles and Snow, 1978, 1994). Olson et al. (2005) suggest that this formal organization and cost-control orientation is associated to both Low-Cost and Differentiated Defenders. From a performance perspective, Defenders tend to emphasize profitability with a cautious and incremental growth through market penetration and continuous improvements in technology to maintain overall efficiency (Miles and Snow, 2003). Zahra (1996) supports this profit orientation and suggest that in stable and homogenous environments, a low-pioneering posture is predictive to profitability. Forsman and Temel (2010) also highlight that "low-intensive" innovation SMEs tend to benefit from superior profitability than "high-intensive" innovators. Similarly, growth through new disruptive products or services is highly sensitive to industry contingencies compared to sustained, incremental innovation.

Miles and Snow (1978) define the entrepreneurial problem of Prospectors as the permanent search for locating and exploiting new product and market opportunities in broad and continuously developing domains. They are characterized by continuous intelligence of wide range of environmental conditions and events. Prospectors rely on flexibility of technological processes, multiple technologies, R&D activities emphasizing product design and market research, and low degree of routinization supported by decentralized control and horizontal information systems favoring a product R&D and marketing dominant coalition (Miles and Snow, 1978, 1994, 2003). Prospectors also tend to emphasize R&D capabilities of scanning and networking with users to identify customer needs, monitoring market developments and interfunctional collaboration. The market orientation of Prospectors' R&D team is therefore primarily externally, rather than internally motivated, and based on strong capabilities of scanning customer needs and market developments, and interfunctional collaboration (Langerak et al., 1999). In so doing, Prospectors generate innovations that substantially differ from existing market offers (Lüthje and Herstatt, 2004). External, market-based, technology sources, according to Zahra (1996), can significantly improve firm's technological capabilities and leverage rapid response to changing market needs. Technological forecasting is positively associated with firm's effectiveness in both dynamic and heterogenous environment. In such environments, firms can *"benefit from forecasting technological forces that promote heterogeneity and create new market segments"* (Zahra, 1996, p. 213). Demand uncertainty also positively affects breakthrough, technology-based and market-based innovation. Indeed, rapid-changing consumer needs will stimulate firms to introduce more creative products to lead rather follow the market. Technological turbulence also tends to stimulate technology-based innovation. Competition rivalry stimulates market-based innovation behavior that enables firms to explore new competitive spaces (Zhou et al., 2005; Kim and Mauborgne, 2005). Consequently, the high uncertainty of their product-market domain, should lead Prospectors to emphasize both technology and market-based innovation. Indeed such a dual orientation will lead to new products that will perform better and which the firm will market easier (Gatignon and Xuereb, 1997). According to Miles and Snow, (2003, p. 59) *"The variability in the Prospector's product-market mix is reflected in the organization's technology which must be flexible enough to accommodate changing domains"*. Their organizational configuration therefore facilitates the development of "weak ties" linking the firm to the many different categories of sources of technology and market information likely to enable Prospectors introducing innovations with a high degree of novelty (Amara and Landry, 2005). From a performance perspective, Prospectors emphasize growth supported by new product and market development that may occur in spurts and consequently run the risk of low profitability (Miles and Snow, 2003). Their pioneering attitude seems profitable in the limited context of a dynamic and heterogeneous environment facilitating the exploitation of opportunities (Zahra, 1996). Forsman and Temel (2010) also confirm that during favorable economic contexts, SMEs characterized by the high diversity of disruptive innovations have the highest growth in sales. Nevertheless, their tendency to develop both technology-based and market-based innovation is predictive to prospectors' growth as well as profitability (Zahra and Covin, 1994).

From a product-market domain perspective, Analyzers pursue both stability-narrowness and dynamism-wideness objectives. Analyzers search for quickly bringing out either improved or less expensive versions of products that Prospectors introduced while defending core markets and products (Olson et al., 2005). This dual demand is made possible with well-structured marketing activities required to perform complex tasks while minimizing resources commitments (Vorhies and Morgan, 2003). Consequently, as effective protectors of their stable part of business as well as creative imitators, Analyzers should emphasize the importance of R&D strategic capabilities regarding market sensing, customer linking through close interfunctional coordination and technology monitoring (Day, 1994). Doing so, Analyzers grow through continuous market penetration as well as permanent search for differentiation through improved products or services and market development, emphasizing both efficiency on core stable product-market domains as well as flexibility to be fast followers of Prospectors (Miles and Snow, 2003). *"Consequently, Analyzers must maintain a continuous dialogue with customers to assess the shortcomings of pioneer offerings and thus identify opportunities for themselves. Furthermore, they must monitor constantly the activities of their competitors to ascertain their competitors' success and failures"* (Langerak et al., 1999, p. 215). Such firms emphasize operational excellence with continuous inputs of new ideas and improvements from inside or outside the organization that can be implemented immediately to serve as a basis for bigger potential ideas (Moss Kanter, 2010). From a performance perspective, Zahra posits (1996) that in environments characterized by both high hostility and homogeneity, a followership behavior should be preferred than pioneering relative to profitability. Miles and Snow (2003) posit that Analyzers pursue both profitability through a strong emphasis on sustained, technology and market-based innovation focused at efficiency, and growth through the imitation of demonstrably successful products. Zahra and Covin (1994) highlight the predictive effect of market-based innovation on profitability and growth of Analyzers, whereas technology-based innovation mainly supports their growth orientation.

Thus, we propose the following:

H1.1: Firm performance is positively related to the fit between strategic posture attributes and the sustained (H1.1a) or disruptive (H1.1b) nature of innovation.

H1.2: Firm performance, which is positively related to the fit between strategic posture attributes and the nature of innovation, is influenced by direct industry-specific effects on strategic (H1.2a), innovation (H1.2b) and performance (H1.2c) attributes and direct firm-

specific effects on strategic (H1.2d), innovation (H1.2e) and performance (H1.2f) attributes as well as indirect industry-specific effects on innovation (H1.2g) and performance (H1.2h) attributes and indirect firm-specific effects on innovation (H1.2i) and performance (H1.2j) attributes.

H2.1: Firm performance is positively related to the fit between strategic posture attributes and the technology-based (H2.1a) or market-based (H2.1b) source of innovation.

H2.2: Firm performance, which is positively related to the fit between strategic posture attributes and the source of innovation, is influenced by direct industry-specific on strategic (H2.2a), innovation (H2.2b) and performance (H2.2c) attributes and direct firm-specific effects on strategic (H2.2d), innovation (H2.2e) and performance (H2.2f) attributes as well as indirect industry-specific effects on innovation (H2.2g) and performance (H2.2h) attributes and indirect firm-specific effects on innovation (H2.2i) and performance (H2.2j) attributes.

Activities of innovation

In order to implement their strategy of market penetration with a limited stable product line, Defenders tend emphasize the development of strategic capabilities dedicated to process efficiency and product quality improvement (Miles and Snow, 1994). Zahra (1996) suggests that a broad, changing, product portfolio is negatively associated with firm's effectiveness in a homogenous environment. Conversely, Zahra posits that technological innovation is highly associated with firm's effectiveness in a stable and homogenous environment. This suggests that Defenders may reach their strategic objective of effectively serve their targeted clients by mainly maximizing the quality-cost ratio of their existing products. Differentiated Defenders differ from their Low-Cost counterparts by their focus on retaining customers through attention to superior service, product quality and novelty, or image (Olson et al., 2005). Consequently, Differentiated Defenders place a continuous emphasis on customer-oriented innovative behaviors directed to mainstream clients likely to develop corporate reputation for quality or technological leadership and increase brand loyalty as a barrier to entry without neglecting cost-related issues (Slater and Olson, 2001; Olson et al., 2005). This behavior is emphasized in hostile environments where firm performance positively relates to firm's propensity to focus on a niche segment in which quality is more important than low-cost (Calantone et al., 1997). From an overall performance perspective, Zahra and Covin (1993) suggest that a cost-leadership orientation is positively associated with new process development and automation. Studying the innovation orientation of best performers among Low-Cost Defenders, Olson et al. (2005) suggest that efforts at process innovation should be specifically supported and dedicated to serve the needs of mainstream clients. Zahra and Covin (1994) also strengthen that from both profit and growth perspectives Defenders should generally emphasize process innovation behavior over product innovation and should not emphasize organizational innovation. Cho and Pucik (2005) provide support in this direction suggesting that a quality orientation leverages the overall innovativeness of a firm and fosters market penetration through innovativeness. Analyzing high and low innovators in SMEs, Freel (2000) suggests that low-innovators should expect lower growth than high innovators.

Environment hostility due to competitive and technological factors tends to stimulate Prospectors strategy with intense and fast product and marketing innovation to permit the firm to exploit product and market opportunities (Calantone et al., 1997). Moreover, due to the high uncertainty of their product-market domains, Prospectors must identify users searching for innovative technological and marketing solutions to their unmet needs as a source of market related knowledge (Lettl, 2007). In so doing, Prospectors tend to develop product and marketing innovations to serve the needs of these lead-users, i.e. early-adopter clients, before these needs are shared by the majority of the customers in the market segment (von Hippel, 1986, 1988; Lüthje and Herstatt, 2004). Prospectors also tend to foster organizational innovations to adapt their structure to rapid responses to environmental change (Miles and Snow, 2003). Accordingly, due to the wide scope of their product-market domain orientation, Prospectors need to develop strategic capabilities to leverage R&D collaborations with other organizational functions in order to effectively exploit new product or market opportunities (Miles and Snow, 1978; Langerak et al., 1999). Miller and Friesen (1982) have also assumed that an "entrepreneurial" profile will naturally develop product innovation unless the firm sets up structural integration, strict analytical and strategic planning, centralized decision-making and information processing, as would Defenders do. Other researches also support the idea that an organization innovativeness and creativity is facilitated by interactions across work-groups, departments, and other discrete subgroups (Kanter, 1988; Perry-Smith and Shalley, 2003). From a performance perspective, Zahra and Covin (1993) suggest that new product development is strongly related to market research, marketing intensity and product line breath. They also suggest (Zahra and Covin, 1994) that the growth performance of Prospectors is both associated to product and process innovation behavior whereas their profitability is mostly related to product innovation. Freel (2000) also emphasizes that high product-innovation SMEs, are likely to grow more than non-innovators. Similarly, investigating performance in SMEs, Wolff and Pett (2006) highlight that innovation through new product is positively related to growth, which in turns increases profitability, whereas process innovation does not significantly impact SMEs' growth. They also suggest the strong influence of environmental hostility on the growth performance of SMEs. Verhees et al., (2010) also posit that disruptive product innovation is positively related to firm growth. Forsman and Temel (2010) findings on SMEs performance reveal that disruptive innovators benefit from superior growth than non-innovators in favorable environments while the opposite during recession periods. With regard to profitability, disruptive innovators generally underperform sustained innovators. With is consistent with Miles and Snow's assumption

(2003, p. 67) that *"The prospector cannot maximize profitability because of its inherent inefficiency"*.

Searching for organizational effectiveness to cope with both stability-narrowness and dynamism-wideness, Analyzers tend to behave as fast followers of Prospectors (Miles and Snow, 2003). Thus, Analyzers operate with a base of established products to which they add carefully chosen new products. Depending on external environment, the selection of new products is a key issue for Analyzers. Indeed, in stable and homogenous environments, too large a product portfolio tends to hamper firm's effectiveness. Conversely, in dynamic and heterogenous environments, product variety is positively associated with effectiveness (Zahra, 1996). Consequently, Analyzers typically do not originate their new products but use their process engineering and manufacturing skills to make a proven-successful new product even better adapted to market needs, and deploy their well-structured marketing skills to sell it (Miles and Snow, 1994; Vorhies and Morgan, 2003). Porter (1985) and Zahra (1996) posit that in environments combining homogeneity and hostility this followership strategy is a better option than pioneering. Analyzers also tend to leverage their process and product R&D capabilities by forming or participating in strategic alliances (Langerak et al., 1999). As they must operate and maintain a more complex administrative structure based on productivity and efficiency as well as flexibility and effectiveness (Miles and Snow, 2003), Analyzers also develop new organizational configurations able to support structural conflict. In such configurations, the critical issue is *"…formulating procedures for a new product's timely introduction by minimizing costs and by handling any adverse consequences that may arise as a result of incorporating the new product into the system"* (Miles and Snow, 2003, pp. 77). Therefore, Analyzers need to develop R&D and marketing capabilities with regard to market sensing, customer oriented networking and technology monitoring *"… to assess the shortcomings of pioneer offerings and thus identify [safest] opportunities for themselves"*

(Langerak et al., 1999, p. 215). From a performance perspective, Zahra (1996) emphasizes that a broad process portfolio is more conducive to firm's performance than product innovation as process innovation short-term payoff tends to be faster in more varied environmental conditions. Zahra and Covin (1994) posit that the growth performance of Analyzers is mainly related to product and process innovation whereas their profitability is mostly related to organizational innovation. Miles and Snow (2003, p. 80) assume that although *"the Analyzers' administrative system is ideally suited to balance stability and flexibility …The Analyzers' dual technological core means that the organization can never be completely efficient nor completely effective."*

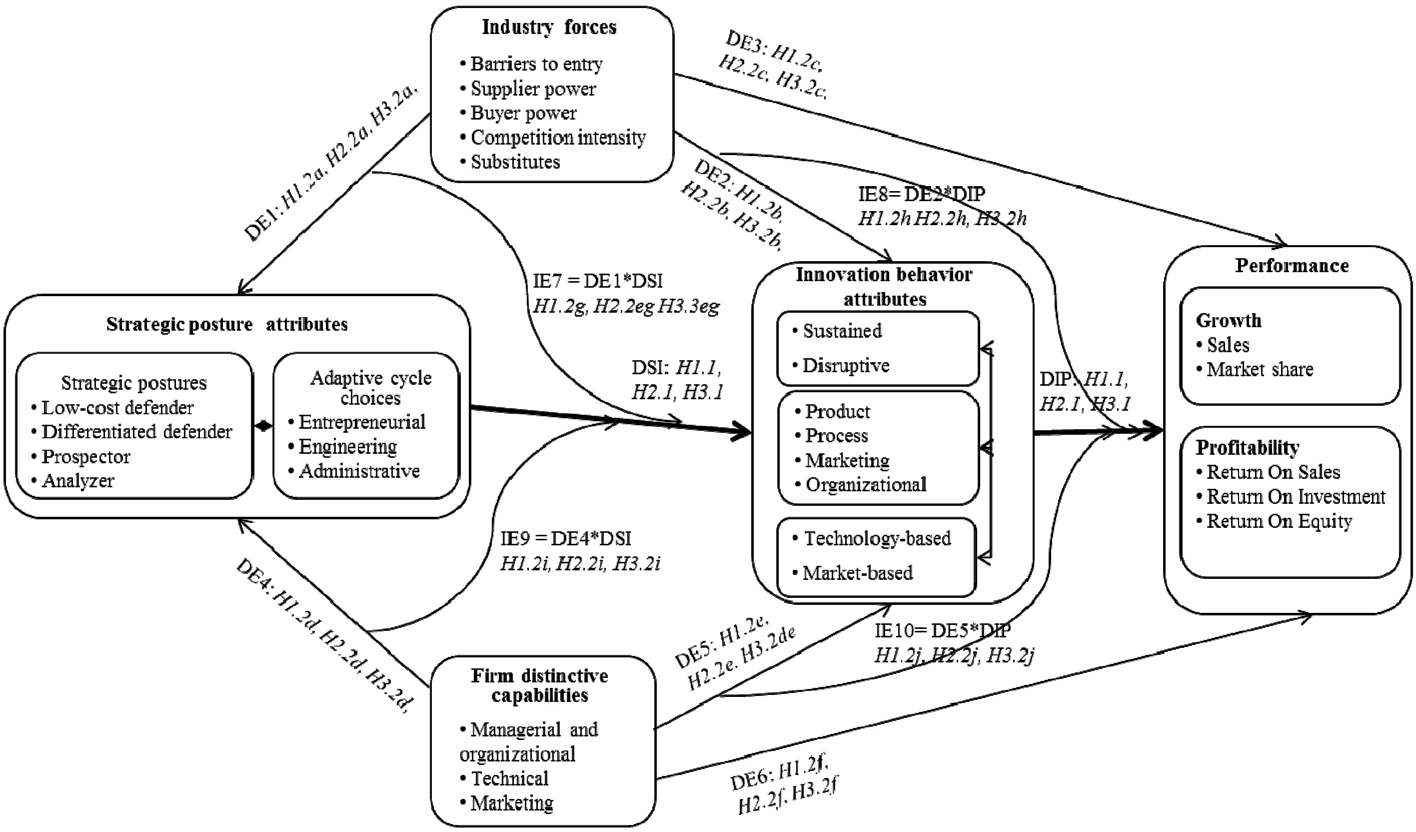
Above discussions suggest that strategic posture, innovation behavior and performance of Defenders, Prospectors and Analyzers are inherently different and strongly influenced by external and internal contingencies. Indeed, markets are constantly on the move with Prospectors opening new competitive spaces, thus influencing the balance of existing industries, while Defenders foster industry competitiveness through their permanent search for efficiency and cost-consciousness. Both Prospectors and Defenders are challenged by Analyzers' strategic posture which on one hand, as fast and efficient followers, forces Prospectors to continuously innovate to generate new competitive edge, and on the other hand puts pressure on Defenders to compensate, through increased efficiency, Analyzers' offering of more innovative, cost-effective solutions to their mainstream clients. In stable and uncomplex periods, firms tend to follow their own strategies. However, in periods of uncertainty and complexity, they are likely to move towards a transitory hybrid strategic posture throughout the adaptive cycle process (Miles and Snow, 1994; DeSarbo et al. 2005).

Thus, we predict the following:

H3.1: Firm performance is positively related to the fit between strategic posture attributes and the process (H3.1a), product (H3.1b), marketing (H3.1c), or organizational (H3.1d) activities of innovation.

H3.2: Firm performance, which is positively related to the fit between strategic posture attributes and the activities of innovation, is influenced by direct industry-specific effects on strategic (H3.2a), innovation (H3.2b) and performance (H3.2c) attributes and direct firm-specific effects on strategic (H3.2d), innovation (H3.2e) and performance (H3.2f) attributes as well as indirect industry-specific effects on innovation (H3.2g) and performance (H3.2h) attributes and indirect firm-specific effects on innovation (H3.2i) and performance (H3.2j) attributes.

Figure 17 synthesizes our hypotheses through the direct and indirect effects of industry-specific and firm-specific contingencies on the differentiated relationship between the attributes of adaptive strategic choices namely entrepreneurial, engineering and administrative (Miles and Snow, 1978, 2003), the studied dimensions of innovation behavior namely the natures, the sources and the activities of innovation, and firm performance namely growth and profitability.



Note: DE = Direct Effects; IE = Indirect Effects; DSI = Direct Strategy-Innovation relationship; DIP = Direct Innovation-Performance relationship

Figure 17 – Synthesis of hypotheses: Direct and indirect effects of contingencies on the performance implication of strategy-innovation fit

6.6. Methodology

6.6.1. Sample and data collection

Design of research sample

We selected independent SMEs as a condition to investigate strategy-innovation alignments resulting from a firm's internal decision, independently from any parent-company influences or considerations. Secondly, we followed the "Guidelines for collecting and interpreting innovation data" of the 3rd edition of the Oslo Manual [56]. Manufacturing industries were classified according to their two-digit ISIC class, characterizing the principal activity or range of activities of the firm. We targeted firms above 10 employees and we fixed the upper limit of SMEs size to 250 employees with maximum revenue of 50 million Euros [22]. Our sample included firms belonging to the manufacturing sectors as classified in the French classification edited by the French Institute for Statistics and Economic Studies (INSEE). Data were collected through a structured, on-line questionnaire, completed by firm CEOs.

The French Chambers of Commerce and Industry of Nice, Grenoble, Lyon, Toulouse, Marseille and Paris supported this research and contributed to this work by thoroughly qualifying the relevant manufacturing SMEs targeted for our works operating on their territory. The research was also supported by the network of local unions for Industries of Metallurgy (UIMM – Union des Industries et des Métiers de la Métallurgie). We therefore e-mailed the questionnaires to firms clearly identified and qualified in the database of these organizations. The a priori design of our research questionnaire was first tested during face-to-face interviews with CEOs from four manufacturing SMEs. This was followed by pre-testing the validity of our constructs on 32 manufacturing SMEs. After this final test, an official letter explaining the purpose of the research and the expected managerial outputs for SMEs development was e-mailed to the personal e-mail address of CEOs, assuring anonymity, in order for the respondents to directly fill-in the research questionnaire by clicking on a link included in the letter. This self-typing approach is a common practice in strategy research.

Econometric tools

We proceeded in a step-by-step process to investigate the relationship between strategic and innovation attributes. We first validated the existence of strategic constructs using Factor Analysis. The same process was conducted for the validation of innovation and performance constructs, as well as industry-specific and firm-specific contingencies in order to validate the existence of constructs characterizing market forces and firm capabilities. Then, we performed clustering of firms based on strategic constructs. We conducted Analysis of Variance to validate the differentiated alignments between empirically-derived clusters of strategic posture profiles and innovation behavior attributes as well as contingencies attributes. This first step was completed by assessing the relationship between strategy, innovation, performance and contingencies attributes using correlations and regressions. At each of these steps, we controlled for firm's size, firm's industry sector, firm's R&D intensity, firm's turnover, and firm's age (see 6.6.4. Controls). These steps were preliminary phases providing guidance to identify significant relationship between strategy, innovation, and contingencies constructs.

The last step of our process, central to this research, focused on investigating direct and indirect effects of market forces and firm capabilities on the strategy-innovation-performance relationship. To this aim, we used Structural Equation Modeling. Indeed, SEM enables dealing with multiple relationships simultaneously while providing statistical efficiency, and provides a transition from exploratory to confirmatory analysis, thus facilitating a more systematic and holistic understanding of problems (Hair et al., 1998). In addition, scholars have recommended that SEM be considered for assessing mediation (Baron and Kenny, 1986; Kline, 1998; Preacher and Hayes, 2004). This is of particular interest for the present research investigating direct and indirect effects of contingencies on strategy-innovation-performance relationship where strategy might mediate contingencies effects on innovation and where both strategic posture and innovation behavior attributes represent multiple potential mediators of industry and firm contingencies on firm performance. The assessment of the significance of indirect effects is a specific issue, however, in using SEM (Preacher and Hayes, 2004). As regards this specific issue, there are extensive simulation results supporting the use of bootstrapping – in particular – bias corrected (BC) bootstrapping to assess indirect effects significance as " *[BC] bootstrapping provides the most powerful and reasonable method of* *obtaining confidence limits for specific indirect effects under most conditions"* (Preacher and Hayes, 2008, pp. 886). The current version of AMOS implements a bootstrapping approach to assess indirect effects but it requires any missing values of the database to be replaced by the mean value of observed variables to perform the bootstrapping process (Arbuckle, 2006). Consequently, in order to enable the assessment of indirect effect significance, using BC bootstrapping, we have replaced all missing values of our sample by the mean value of observed variables.

Sample size

In order to follow recommendations for an appropriate sample size for Structural Equation Modeling using Maximum Likelihood Estimation procedure – the most common estimation procedure – we targeted an average of 200 respondent firms as 200 is proposed to be the critical sample size (Hair et al., 1998). Considering the responding rate of 15% completed questionnaires on our 32 pre-test sample of 214 well qualified SMEs (i.e., with personal e-mail address of CEOs), using the same on-line questioning process, we sent a total of more than 3000 emails to be on the safe side of getting 200 targeted completed questionnaires. We conducted three e-mails campaigns in March 2011, with the support of local stakeholders of economic development and above-mentioned French Chambers of Commerce and Industry. We eventually collected 238 questionnaires of which 179 were complete. A random sample of 20 firms who had not completed the questionnaire was contacted by phone in order to investigate reasons for uncompleteness. This 75.2% rate of complete questionnaire can be explained by (a) the length of the questionnaire made of 97 questions, and (b) the reluctance to divulge information. The length of the questionnaire was mainly due to the fact that for the purpose of our investigation emphasizing the relationship between strategic and innovation attributes, we enabled hybrid strategic profiles to emerge from empirical results as this empirically-derived strategic types tend to provide a more accurate representation of strategic behavior (Spanos et al., 2004; DeSarbo et al., 2005). Tables 1.1 to 1.5, in appendix 3.1, describe the distribution of responding firms according to control variables.

6.6.2. Measurement of constructs

The research questionnaire was designed as a basis for collecting data regarding the attributes characterizing a firm's competitive strategic posture and the associated attributes characterizing the firm's innovation behavior, as well as the characteristics of external and internal contingencies likely to impact firms competitive strategy (Spanos and Lioukas, 2001; Spanos et al., 2004). The competitive strategic posture was measured using multiple-item 7-point Likert scales to assess the strategic orientation of the firm as defined in Miles and Snow (1978) typology. The items were inspired by Conant et al. (1990), Hornsby et al. (2002), as well as from our own transformation into descriptive sentences of Miles and Snow's Table (1994, p. 13) of "Business Strategies and Organizational Characteristics" defining the Entrepreneurial, Engineering and Administrative dimensions of their Adaptive Cycle. These items reflect the central distinction between Defenders, Prospectors and Analyzers strategic profiles. Items on the dimensions of the organizational characteristics of Porter's (1998, p. 41) low-cost leadership or differentiation orientations were included in each set of items measuring each dimension of the Adaptive Cycle. We thus expected to enable the emergence of stable forms of strategic profiles characterized as Low-Cost Defenders, Differentiated Defenders, Prospectors, and Analyzers (Miles and Snow, 1978; Walker and Ruekert, 1987).

We used a self-typing approach whereby firms' CEOs responded to survey items designed to describe the fundamental distinctions between strategic postures in terms of "product-market strategy", "research and development", "production", organizational structure", "control process", and "planning process". We chose this "step by step", continuum approach instead of a method consisting of each respondent CEO reading paragraphs describing each strategic posture and indicating the one that best describes their company (McKee, Varadarajan, and Pride, 1989). Indeed, limitations to this “profile description” process could be that respondents may respond to what would be their ideal description of the strategic posture rather than the authentic one. Studies have anyhow demonstrated the validity of this method by proving that CEOs classify themselves in a similar way whatever the method used (Shortel and Zajac, 1990; Vazquez et al., 2001).

The innovation construct was measured with items evaluating the natures (sustained or disruptive), the sources (market-based, i.e. based on opportunities arising from market inputs, or technology-based, i.e. opportunities arising from technological inputs), and the type of activities of innovation either technological (product or process), marketing or organizational, as described in the third version of the OSLO manual (OECD, 2005). Considering the market or technology basis of innovation, we sourced the measuring items in Zhou et al.’s approach (2005).

The firm performance construct was evaluated both from a profitability perspective measuring Return On Sales, Return On Investment and Return On Equity, and a growth perspective (Venkatraman and Ramanujam, 1986) measuring the absolute volume of sales and market share and the increase in volume of sales and market share. For all these items CEOs were asked to indicate their own perception of the firm performance relative to competition over the last three years period in order to avoid possible bias from temporal fluctuations as well as to encompass a notion of sustainability of performance. This relative comparison of CEOs’ responses relies on subjective perceptions and may seem questionable. However, as Spanos and Lioukas (2001) point out, when comparing this collecting process to the alternative of collecting “objective” data (when available), and treating them as belonging to a single coherent population, how can we compare on the same variable, two firms operating in two distinct industries? This would require normalization of variables to make them comparable to respective industry reference points (e.g. the industry average), considering the biases of interpretation of industry boundaries. Moreover, subjective performance measures have been widely used by strategy scholars (Venkatraman, Ramanujam, 1986; Robinson, Pearce, 1988) and there exists strong theoretical rationale supporting the choice of subjective data (Lefebvre et al., 1997). Besides, considering the size of SMEs and on the basis of our own 15-year field experience of strong involvement with this type of firms, we had anticipated that not all financial information would be available.

Measures of the construct of firm's specific effects took into account three dimensions of firm's idiosyncratic resources and capabilities. (i) *Managerial and Organizational capabilities*, i.e. managerial competencies, knowledge and skills of employees, efficient monitoring of activities, strategic planning, ability to attract new profiles (Teece et al., 1997). (ii) *Technical capabilities* measured as technological experience and competences, technical infrastructures, structured and efficient production unit, search for economies of scales (Leonard-Barton, 1995). (iii) *Marketing capabilities*, measured as intensity of market scanning, customer and supplier relationship management, efficiency and control over distribution channels, structure of client portfolio (Lado et al., 1992). (iv) *Firm's awareness of intermediaries* in the Local Innovation System. Indeed, European authorities emphasize the role of Local Innovation Systems in leveraging innovation culture and practice in SMEs (EU, Interreg IVC program, ERMIS, 2010).

Measures of the constructs of industry forces were evaluated for each construct with several items measuring the perceived level of threat of new entrants (evaluated as the level of barriers to entry in the firm's major market, a low level of barriers to entry being the highest threat and ranking in our ranking system), the bargaining power of suppliers, the bargaining power of clients, the intensity of rivalry between competitors and the threat of substitute offerings. These items were designed in order to reflect any specific situation confronted by each firm in its major market served.

6.6.3. Validation of proposed constructs

Considering that we enabled in our model the emergence of empirically-derived strategic, innovation, and contingencies constructs, the validation of strategic posture, innovation behavior, performance, market forces and firm capabilities constructs is particularly relevant. This validation involved a two-step process. The first step was conducted to evaluate the *content validity* of our constructs. Regarding strategic posture attributes, this required identifying groups of measurement items representative of strategic attributes characterizing both the strategic issues of Miles and Snow’s adaptive cycle and Porter’s competitive positioning choices. Regarding innovation behavior attributes, we identified groups of items characterizing process-oriented, product-oriented, marketing-oriented and organizational-oriented innovation activities. Performance attributes were measured grouping items characterizing firms’ overall performance as regards profitability, measuring financial performance and growth, measuring market performance. We identified firm capabilities constructs grouping attributes measuring above-mentioned characteristics of managerial and organizational capabilities, technical capabilities, marketing capabilities, and cooperation with intermediaries involved in firm’s Local Innovation System. Market forces constructs were identified grouping attributes measuring the level of barriers to entry, the influence of suppliers, the influence of clients, the intensity of rivalry between competitors and the threat of substitute offerings on firm’s strategic posture and innovation behavior. The second step, *construct reliability*, was conducted to validate to which extent the empirical indicators provide a reliable measure of the construct.

Content validity of constructs

As previously stated, the scales employed to measure strategic posture characteristics in this research have been adopted from existing and validated scales used in the literature (Conant et al., 1990; Hornsby et al., 2002), completed with our own transformation into descriptive sentences of Miles and Snow's Table (1994, p. 13) of business strategies and organizational characteristics defining the various dimensions of their adaptive cycle. The strategic orientation and organizational characteristics of Porter's (1998, p. 41) generic strategies were also included into each set of items measuring each dimension of Miles and Snow's adaptive cycle.

Following factor analysis, differentiated strategic constructs were identified, qualifying each dimension of the adaptive cycle. Our constructs were empirically characterized as follows: *Entrepreneurial dimensions*: Differentiation orientation, characterizing a strategic focus on product or service quality and novelty; Scope of product-market domain, characterizing a strategic orientation to take advantage of product and market opportunities; Cost-control orientation, characterizing a strategic focus on overall costs control; Stability of product-market domain, characterizing a strategic orientation to position the firm on a stable product-market domain. *Engineering dimensions*: Process-efficiency R&D, characterizing R&D efforts dedicated to increasing product or service quality and overall productivity; Market-novelty R&D, characterizing R&D efforts dedicated to opening new markets or finding new forms of reaching clients; Product-novelty R&D, characterizing R&D efforts dedicated to launching new or significantly improved products or find new uses of existing products; Costs-reduction R&D, characterizing R&D efforts dedicated to finding solutions for cost reductions; Production Flexibility, characterizing an organization of production dedicated to leverage firm's flexibility in manufacturing. Production Productivity, characterizing an organization of production dedicated to leverage manufacturing expertise and productivity. *Administrative dimensions*: Formal organization, characterizing a formalized and explicit configuration of firm's structure and processes; Flexible organization, characterizing a configuration of firm's structure and processes dedicated to support organizational agility and adaptability.

We measured firm's innovation behavior following requirements from the Oslo Manual (OECD, 2005) as well as mainstream research outputs on the sustained or disruptive nature (Christensen, 1997) and technology or market-based source (Zhou et al., 2005) of innovation. The Oslo Manual characterizes four types of innovation at the level of the firm that encompass a wide range of changes in firms' activities: product innovations, process innovations, marketing innovations and organizational innovation. Factor analysis led to the emergence of four differentiated constructs. *Product innovations*, characterizing significant changes in the technological features or in the use of goods and services. *Process innovations*, characterizing significant changes in the firm's production and delivery methods. Our empirically-derived construct of process innovation also included a strong emphasis on working out new pricing methods, suggesting that a price-adaptation orientation was anchored in process innovation in our sample. *Marketing innovations*, characterizing the implementation of significantly new marketing methods, such as new product design and packaging and new sales and promotion methods. *Organizational innovation*, characterizing new business practices in the workplace organization or in the firm's external relations.

Performance attributes were measured grouping items characterizing firms' overall performance relative to competitors as perceived by firms' CEO with regard to profitability (ROS, ROI, ROE) and growth (sales, sales growth, market share, market share growth). The relevance of this self-assessment of subjective measures of financial and market performance is supported by the correlation between subjective perceptions and objective accounting measures of organizational effectiveness (Dess and Robinson, 1984; Geringer and Hebert, 1991). Factor analysis enabled the identification of clearly differentiated constructs of *Profitability,* characterizing commercial profitability namely ROS, economic profitability namely ROI, and financial profitability namely ROE, and *Growth*, characterizing sales growth, namely sales volume and increase, and market growth namely market share and increase.

Factor analysis on firm capabilities enabled the emergence of clearly differentiated constructs characterized as follows: *Firm Management,* characterizing managerial competencies, knowledge and skills of employees, efficient monitoring of activities, strategic planning, and ability to attract new profiles. *Firm Sales,* characterizing firm's ability to efficiently marketing products or services through efficient management of commercial activities. *Firm CRM*, characterizing firm's ability to generate client's loyalty through efficient customer service and follow-up. *Firm Technical expertise,* characterizing firm's technical equipment assets as well as technical staff expertise and experience. *Firm Intermediaries*, characterizing firm's cooperation with innovation agencies, external R&D teams, and firm's awareness of financing support for innovation.

Factor analysis on industry contingencies led to distinct constructs characterizing market forces. *Industry Rivalry,* characterizing the intensity of rivalry between competitors on sales, promotion, pricing and new product launching. *Industry Barriers*, characterizing legal, technical or financial barriers for new entrants in the firm's major market. *Industry Clients,* characterizing the bargaining power of clients with regard to pricing, loyalty, and weight in the firm's portfolio. *Industry Suppliers,* characterizing the bargaining power of suppliers with regard to firm's dependence on quality of supplied material in the finished product, pricing policy from suppliers, and scarcity of suppliers. *Industry Substitutes,* characterizing the threat of substitute offerings with regard to product differentiation, service differentiation, and competitive pricing.

Reliability of constructs

Construct reliability was determined using Cronbach's Alpha and factor analysis. Regarding internal consistency, most constructs met Nunnally (1978) Cronbach's Alpha value of 0.7 and all our constructs met the cut-off level of 0.5 (Van de Ven and Ferry, 1980) - with the exception of the entrepreneurial dimension of scope of product-market domain (0.426), and of the entrepreneurial dimension of cost-control orientation (0.352). Nevertheless, we decided to include these constructs in our analysis as they presented strong internal theoretical relevance (see Table 2.1 in Appendix 3.2) and coherence with Conant et al.'s multi-item scale for measuring strategic types (1990). As above-mentioned, factor analysis was used to reveal the underlying common themes between the respective attributes of strategic posture, innovation behavior, performance, industry contingencies, and firm contingencies. The size of our sample (>200) suggest that factor loadings higher than 0.40 are significant (Hair et al., 1998). All our factors met this cut-off level. The respective factor loadings and Cronbach's Alpha of strategic posture, innovation activities, performance, industry contingencies, and firm contingencies constructs are detailed in Tables 2.1, 2.2, 2.3, 2.4 and 2.5 in Appendix 3.2.

6.6.4. Controls

Building on strategy and innovation literature (Acs and Audretsch, 1987, 1988; Cohen and Klepper, 1996; Langerak et al., 1999; Malerba, 2004; Vaona and Pianta, 2008; Raymond and St-Pierre, 2010a; Raymond and St-Pierre, 2010b) we controlled for firm size (measured as the number of employees, ranked by size categories as specified by the Oslo Manual guidelines), firm's turnover (measured as the volume of sales in 2009, ranked by sales categories), metallurgy and fabricated metal products (measured as a dummy variable with 1 for firms operating in this industry, and 0 otherwise), firm's R&D intensity (measured by firm's average expenses in research and development over sales for the past three years with a cut-off rate of 2.5%), and firm age (measured in years from the firm's date of foundation).

We also investigated possible correlations between the independent variables of our model, thus increasing the estimated R^2 of the model. To this aim, we calculated the variance inflation factor (VIF). No consensus seems to have emerged regarding the cut-off value that should be used to measure multicollinearity. Studenmund (1992) suggests a value of 5 whereas other scholars (Hair et al. 1998) suggest that values up to 10 would be acceptable. No VIF-values of our model exceed a cut-off value of 5 with mean VIF values not exceeding 1.66. Consequently, the estimates of our model do not seem to be affected by multicollinearity. Therefore, the predictive ability of the regression results used in the preliminary steps of our model may not be misinterpreted.

6.7. Analysis and results

Sample characterization

Descriptive statistics in Tables 1.1 to 1.5 of Appendix 3.1 provide an overall description of our sample as regards control variables of firm size, industry sector, turnover, R&D intensity, and age. A majority of responding SMEs (81%) belong to the less than 50 employees range which correlates previous results on characteristics of French manufacturing SMEs (Barstelman et al., 2005; European Commission; 2007). 7.22% of responding firms reported staff below 10 employees although we focused on firms with 10 to 250 employees sourced from the database of French Chambers of Commerce. These firms were included in our sample as such SMEs represent a significant amount of manufacturing firms (European Commission; 2007). Although SMEs reported activity in a wide scope of industry sectors, SMEs in the Metals sector represented close to 20% of responding firms, the second largest sectors being Rubber and Plastics (10%), and Electricals and Electronics (10%). Therefore, as previously mentioned, we decided to control for industry sector as “being active in the Metals sector or not”. A majority of responding firms (51%) reported a turnover in the range of 1 to 5 million Euros. Most of the sampled SMEs (63%) can be qualified as low R&D-intensive with R&D expenses accounting for less than 2.5% of turnover. The sample is balanced between ancient firms operating for more than 20 years (27%), mature firms, operating for more than 4 years (44%), and new firms operating for less than 4 years (25.5%). Historic SMEs operating for more than 50 years represent a small part of responding firms.

Control variables

The influence of control variables on the firms’ strategic posture characteristics of our sample is generally not significant (at $p < 0.1$) except between firm size and firm’s entrepreneurial focus on product-market domain stability, or administrative focus on formalization or flexibility of organization; between industry sector and firm’s engineering focus on production productivity; between firm’s R&D intensity and firm’s entrepreneurial focus on costs, or engineering focus on process or product R&D, and administrative focus on formalization of organization; between firm’s turnover and firm’s entrepreneurial focus on scope of product-market domain, engineering focus on production productivity or administrative focus on formalization of organization; between age of the firm and firm’s engineering focus on process R&D. Results also show that there is generally no significant (at $p < 0.1$) influence of control variables on firms’ innovation behavior characteristics except between firm size and firm’s focus on sustained innovation; between industry sector and marketing innovation; between firm’s R&D intensity and most innovation characteristics; between firm’s turnover and technology-based innovation; between firm’s age and product innovation. The same prevails as regards performance, with no significant influence of control variables on firm performance except between R&D intensity or turnover and growth, and between R&D intensity or size and profitability.

With regard to industry contingencies, the only significant (at $p < 0.1$) influence of control variables concerns firm size or R&D intensity, and the bargaining power of clients. With regard to firm contingencies, results show generally no significant (at $p < 0.1$) influence of control variables except between firm size and sales capabilities; between R&D intensity and relations with intermediaries; between turnover and sales capabilities or technical expertise. Tables 3.1, 3.2, 3.3 and 3.4 in Appendix 3.3 show the ANOVA results on correlations between control variables and the respective characteristics of strategic posture, innovation behavior, performance, and industry and firm contingencies.

Clustering of strategic posture

We conducted the clustering of firms into internally similar and externally mutually exclusive groups combining both hierarchical and non-hierarchical methods to gain the benefit of each method (Hair et al., 1998). A five-group solution was considered the most appropriate classification. Table 40 shows the empirically-derived profiles of strategic postures. Results indicate that clusters of firms of our sample correspond to the major attributes of our model of Miles and Snow's and Porter's derived description of Prospectors, Low-Cost Defenders, Differentiated Defenders and Analyzers. A fifth group has been qualified as reactors based on its characteristics. However, some attributes emphasize the "hybridization" of the empirically-derived profiles. Indeed, the first cluster is characterized by the highest scores on all dimensions of the adaptive cycle, except on differentiation and costs orientation, scope of product-market domain, production flexibility and formalization of organization, which are still among the highest measures. These firms represent robust Analyzers combining at the same time the main characteristics of "pure" Prospectors and Defenders as defined by Miles and Snow (2003). The second group of SMEs combines a strong differentiation and costs orientation with quality and efficiency of processes and formalized organization. These are the chief characteristics of the Differentiated Defenders of our model. SMEs of the third group focus on taking advantage of cost-oriented, market opportunities that they obtain thanks to an aggressive search for cost-effectiveness. This group puts also low emphasis on production or organizational flexibility together with low formalization of organizational processes. We qualified these firms as “opportunistic” Low-Cost Defenders. The fourth cluster is made of firms with a focus on differentiation combined with product-market stability and process R&D orientation, but no specific emphasis on product novelty matching the differentiation orientation, nor on other strategic posture attributes. We characterize this group of firms as Reactors who do not make trade-offs to shape the firm’s structure and processes to fit the chosen strategy (Miles and Snow, 2003). SMEs in cluster five emphasize a broad product/market scope, thus characterizing the entrepreneurial choice of Prospectors. As Prospectors, these firms pay little attention on costs control. They emphasize a strong market development orientation supported by production flexibility enabling them to take advantage of market opportunities as well as some concern for process effectiveness. They coordinate activities through a flexible organization. We label these firms as “efficient” Prospectors as they mainly focus on maintaining a configuration likely to benefit from market opportunities while being careful with investments related to brand new product development. In total, our sample is made of 80 Analyzers, 47 Differentiated Defenders, 39 “opportunistic Low-Cost Defenders”, 44 Reactors, and 23 “efficient Prospectors”.

Table 40: Empirical profiles of strategic posture – Cluster results

Empirical profiles of Miles and Snow types of strategic posture: Cluster results

	Strategic Postures [a]						
	Analyzer	*Differentiated Defender*	*"Opportunistic" Low-Cost Defender*	*Reactor*	*"Efficient" Prospector*	*F*	
Strategic posture characteristics factors b	(80)	(47)	(39)	(44)	(23)		
Entrepreneurial - Differentiation orientation	0.37	0.48	-1.35	0.13	-0.21	39.425	***
Entrepreneurial - broad product/market Scope	0.60	-0.83	0.02	-0.57	0.66	32.870	***
Entrepreneurial - Cost orientation	0.28	0.41	-0.07	-0.80	-0.18	13.025	***
Entrepreneurial - product/market Stability	0.45	-0.19	-0.17	0.38	-1.62	33.119	***
Engineering - R&D Process oriented	0.31	0.29	-1.32	0.31	-0.05	32.710	***
Engineering - R&D Market oriented	0.32	-0.40	-0.19	-0.09	0.19	4.908	***
Engineering - R&D Product oriented	0.48	0.00	-0.35	-0.50	-0.12	9.836	***
Engineering - R&D Costs oriented	0.24	0.44	0.37	-0.92	-0.60	21.949	***
Engineering - Production Flexibility oriented	0.50	-0.40	-0.55	-0.32	0.64	16.962	***
Engineering - Production Productivity oriented	0.56	0.18	-0.38	-0.49	-0.71	17.325	***
Administrative - Formal organization	0.41	0.43	-0.37	-0.44	-0.85	16.574	***
Administrative - Flexible organization	0.72	-0.84	-0.30	-0.27	0.22	31.390	***

Notes:
[a] numbers in parentheses indicate group size
[b] Factors based on factor analysis of strategy characteristics
*** denotes p < 0.01

Differentiated relationship between strategic posture and innovation behavior

As an introduction to our hypotheses, we suggest that the different strategic postures relative to Low-Cost Defenders, Differentiated Defenders, Prospectors and Analyzers profiles correlate with differentiated attributes of innovation behavior. This is supported by results of Table 41 that highlight the significant differences in the natures, sources, and activities of innovation by empirically-derived strategic posture profiles. Furthermore, we posited the existence of differentiated alignments between entrepreneurial, engineering and administrative strategic posture attributes, and innovation behavior attributes in our initial proposition and in our hypotheses. We also assume that differentiated contingencies correlate with different strategic and innovation attributes. This receives also strong support, as shown in Tables 4.1, 4.4 and 4.5 of Appendix 3.4.

Table 41: Differences in innovation behavior by empirically-derived strategic posture profiles

Differentiated relationships between innovation behavior and strategic posture profiles: ANOVA results

	Strategic Postures [a]						
Innovation characteristics	*Analyzer* (80)	*Differentiated Defender* (47)	*"Opportunistic" Low-Cost Defender* (39)	*Reactor* (44)	*"Efficient" Prospector* (23)	*F*	
Nature [b]							
Sustained	6.13	5.87	4.92	5.44	4.70	12.501	***
Disruptive	4.74	4.00	4.05	3.61	4.24	5.264	***
Source [b]							
Technology-based	5.29	4.52	4.20	3.85	4.27	9.277	***
Market-based	5.92	5.24	5.07	5.02	5.52	6.186	***
Activity [c]							
Organizational	0.34	-0.07	-0.21	-0.43	0.12	5.301	***
Process	0.31	-0.06	-0.16	-0.31	-0.09	3.520	***
Marketing	0.16	-0.07	-0.27	0.06	-0.05	1.357	NS
Product	0.20	0.17	-0.22	-0.21	-0.25	2.526	**

Notes: [a] numbers in parentheses indicate group size
[b] 7-point scale (1: very low practice of this type of innovation behavior; 7: very high practice)
[c] Based on factor analysis of innovation activities
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Differentiated relationship between strategic posture, innovation behavior and performance

In introduction to our hypotheses, we also posit that there exist field-based coherent combinations of strategic and innovation attributes forming sustainable organizational configurations likely to generate firm performance. We also assume that such gestalts are equally effective in terms of performance according to the equifinality principle providing that there exist internal fit within configurational attributes as well as external fit with the environment (Miles and Snow, 1978; Ketchen, 2003; Raymond and St-Pierre, 2010a) meaning that these alignments and this performance are contingent to industry-specific and firm-specific effects. Table 42 shows that the equifinality principle is partially supported (with no significant difference on growth performance but significant difference at $p < 0.1$ on profitability) with regard to empirically-derived, contingency-dependent strategic profiles.

Moreover, growth and profitability tend to be related to differentiated strategic attributes and innovation attributes as well as differentiated industry-specific and firm-specific contingencies (see Tables 4.2, 4.3, 4.6, 4.7, 4.8 and 4.9 in Appendix 3.4).

Table 42: Differences in performance by empirically-derived strategic posture profiles

Differentiated performance and strategic posture profiles: ANOVA results

	Strategic Postures [a]						
Performance characteristics [b]	*Analyzer* (80)	*Differentiated Defender* (47)	*"Opportunistic" Low-Cost Defender* (39)	*Reactor* (44)	*"Efficient" Prospector* (23)	*F*	
Growth	0.156	0.127	-0.268	-0.090	-0.177	1.664	NS
Profitability	0.227	0.019	-0.263	-0.042	-0.300	2.229	*

Notes: [a] numbers in parentheses indicate group size
[b] Based on factor analysis of performance
* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01
NS: Non Significant

Path analysis: Model estimation and fit

We examined the structural relations among the strategic constructs, each innovation construct, performance, and contingencies construct of our model with path analysis. To estimate each path analysis, we used the most common estimation procedure, maximum likelihood estimation (MLE), in AMOS statistical tool. MLE was particularly appropriate to our sample size as a sample size of 200 is viewed as the critical sample size (Hair et al. 1998). To test model fit we used CMIN/DF (minimum discrepancy divided by degrees of freedom) completed by Comparative Fit Index (CFI) and Root Mean Square Approximation (RMSEA) indexes (Arbuckle, 2006). There is no commonly agreed cut-off point for CMIN/DF, some scholars arguing that a cut-off value of 5 indicate a reasonable fit whereas other recommend values below 3 or even 2 (Arbuckle, 2006). From the CMIN/DF perspective, the path analyses conducted in this research show values below a 3 cut-off point, indicating a good fit of the overall model. As regards CFI, which is truncated to fall between 0 and 1 with values close to 1 indicating a very good fit (Arbuckle, 2006), our path analyses results show CFI values ranging from 0.768 to 0.851 indicating a good fit of the overall model. Practical experience suggests that RMSEA values of about 0.05 or less would indicate a very good fit, with RMSEA values below 0.08 indicating a reasonable fit (Arbuckle, 2006). Regarding our overall model, RMSEA values range below the 0.08 value, except for the strategy-technology-based innovation-performance path, which nevertheless shows a CMIN/DF value of 3, and reveal a good fit of the overall model.

Strategic posture, innovation, performance, and contingencies: Results to hypotheses

We have proposed to test hypotheses on the predictive relationship between firm performances namely growth and profitability, and the fit between strategic posture attributes namely entrepreneurial, engineering and administrative attributes, and innovation behavior attributes namely nature, source, and activity attributes of innovation with regard to industry and firm contingencies. Results to our hypotheses are presented in the following section.

Nature of innovation*:* we proposed in hypothesis H1.1 that *Firm performance is positively related to the fit between strategic posture attributes and the sustained (H1.1a) or disruptive (H1.1b) nature of innovation.* **Sustained innovation** (see Tables 43; 44) is significantly predicted by an engineering focus on process R&D, supported by a formalized organization. These strategic attributes directly positively influence growth and profitability. However, although sustained innovation also positively influences growth and profitability, this influence is not significant. The mediating effect of sustained innovation on the strategy-innovation-performance relationship is therefore not significant and consequently H1.1a is not supported. **Disruptive innovation** (see Tables 45, 46) is predicted an entrepreneurial focus on costs control, an engineering focus on product R&D and a flexible organizational structure. Product R&D and costs orientation have a significant positive direct influence on growth and profitability. However, disruptive innovation has a significant negative impact on both the growth and profitability of SMEs of our sample. Therefore, H1.1b is not supported due to the negative direct influence of disruptive innovation on performance. These results do not support the role of the nature of innovation as a facilitator of strategic goals achievement despite the existence of fit between strategic posture attributes and innovation nature attributes.

We also proposed in hypothesis H1.2 that *Firm performance, which is positively related to the fit between strategic posture attributes and the nature of innovation, is influenced by direct industry-specific effects on strategic (H1.2a), innovation (H1.2b) and performance (H1.2c) attributes and direct firm-specific effects on strategic (H1.2d), innovation (H1.2e) and performance (H1.2f) attributes as well as indirect industry-specific effects on innovation (H1.2g) and performance (H1.2h) attributes and indirect firm-specific effects on innovation (H1.2i) and performance (H1.2j) attributes.*

Regarding *direct industry-specific effects* in a context of **sustained innovation,** clients have a direct significant negative influence that hampers firm's product R&D, whereas the threat of substitutes significantly positively stimulates product R&D. Therefore, H1.2a is supported. Suppliers tend to negatively influence a sustained innovation behavior, which supports H1.2b. H1.2c, on industry effects on performance, is supported with a negative influence of clients on both growth and profitability and a negative influence of low barriers to entry. With regard to *direct firm-specific effects*, H1.2d is supported with a positive effect of technical expertise on efforts towards product and process R&D in a formalized organization. H1.2e is not supported and highlights the low direct influence of firm-capabilities on sustained innovation. Firm's technical capabilities positively influence both growth and profitability. Thus, H1.2f is supported. *Indirect industry-specific effects* do not influence significantly a sustained innovation behavior or firm performance. Thus, H1.2g and H1.2h are not supported. However, as regards *indirect firm-specific effects*, technical expertise positively influences sustained innovation through strategic attributes, thus supporting H1.2i. However, H1.2j is not supported as neither strategic nor sustained innovation attributes have a significant direct effect on performance.

Table 43: Path analysis results **-** Contingencies on strategy-sustained innovation-performance relationship

Path analysis results : Direct effects of strategy, sustained innovation and contingencies on performance

	Standardized estimates					
	Formal organization	R&D Product	R&D Process	Sustained innovation	Growth	Profitability
Industry contingencies						
Industry - Barriers	-0.150	-0.123	-0.071	0.000	-0.204**	-0.154
Industry - Rivalry	0.014	0.073	0.035	0.104	-0.001	-0.037
Industry - Clients	0.072	-0.194**	-0.178	-0.020	-0.283***	-0.251**
Industry - Suppliers	-0.072	-0.095	0.078	-0.119*	-0.059	-0.079
Industry - Substitutes	0.001	0.228**	0.014	0.043	-0.012	-0.002
Firm contingencies						
Firm - Technical expertise	0.228**	0.341***	0.299**	0.093	0.298***	0.403***
Strategic posture						
Administrative - Formal organization	0.000	0.000	0.000	0.275***	-0.001	0.038
Engineering - R&D Product	0.000	0.000	0.000	0.126	0.044	-0.083
Engineering - R&D Process	0.000	0.000	0.000	0.322**	-0.012	-0.054
Innovation behavior						
Sustained innovation	0.000	0.000	0.000	0.000	0.097	0.141

Path analysis results : Indirect effects of strategy, sustained innovation and contingencies on performance

	Standardized estimates					
	Formal organization	R&D Product	R&D Process	Sustained innovation	Growth	Profitability
Industry contingencies						
Industry - Barriers	0.000	0.000	0.000	-0.080	-0.012	-0.003
Industry - Rivalry	0.000	0.000	0.000	0.025	0.015	0.011
Industry - Clients	0.000	0.000	0.000	-0.062	-0.014	0.017
Industry - Suppliers	0.000	0.000	0.000	-0.006	-0.017	-0.017
Industry - Substitutes	0.000	0.000	0.000	0.033	0.017	-0.009
Firm contingencies						
Firm - Technical expertise	0.000	0.000	0.000	0.202***	0.040	0.006
Strategic posture						
Administrative - Formal organization	0.000	0.000	0.000	0.000	0.027	0.039
Engineering - R&D Product	0.000	0.000	0.000	0.000	0.012	0.018
Engineering - R&D Process	0.000	0.000	0.000	0.000	0.031	0.045
Innovation behavior						
Sustained innovation	0.000	0.000	0.000	0.000	0.000	0.000

Model statistics: CMIN/DF = 2.232; p = 0.000; CFI = 0.804; RMSEA = 0.073
Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 44: Results to hypotheses - Contingencies on strategy-sustained innovation-performance relationship

Results to hypotheses [a]: Contingency effects on strategy-sustained innovation-performance relationship

	Direct effects			Direct effects	Indirect effects	Direct effects	Indirect effects	Direct effects	Indirect effects
Effects of x on y	Formal organization	R&D Product	R&D Process	Sustained innovation		Growth		Profitability	
Strategic posture attributes				Formal orga. (+)*** R&D process (+)**			Formal orga. H1.1a (+) (NS) R&D Process H1.1a (+) (NS)		Formal orga. H1.1a (+) (NS) R&D Process H1.1a (+) (NS)
Sustained innovation						(+)		(+)	
Industry contingencies		Clients H1.2a (-)** Substitutes H1.2a (+)**		Suppliers H1.2b (-)*	H1.2g (NS)	Barriers H1.2c (-)** Clients H1.2c (-)***	H1.2h (NS)	Clients H1.2c (-)**	H1.2h (NS)
Firm contingencies	Tech. expert. H1.2d (+)**	Tech. expert. H1.2d (+)***	Tech. expert. H1.2d (+)**	H1.2e (NS)	Tech. expert. H1.2i (+)***	Tech. expert. H1.2f (+)***	H1.2j (NS)	Tech. expert. H1.2f (+)***	H1.2j (NS)

Notes: [a] Only significant results at p < 0.1 are reported
* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01
(+) denotes a positive significant effect; (-) denotes a negative significant effect
NS: Not Supported

Regarding *direct industry-specific effects* in a context of **disruptive innovation,** suppliers, clients or the threat of substitute offerings significantly influence, either positively or negatively, firms' strategic posture attributes namely market R&D, product R&D or a costs control orientation. Therefore, H1.2a is supported. The power of clients also tends to significantly hamper a disruptive innovation behavior whereas low barriers to enter their markets tend to stimulate the degree of novelty of innovation. Thus, H1.2b is supported. With regard to firm performance, H1.2c is validated with clients, here considered as mainstream clients, having a significant negative impact on both firms' growth and profitability. Considering *direct firm-specific effects*, H1.2d and H1.2e are supported with significant positive or negative effects of firms' technical expertise and management capabilities on strategic attributes and ability to generate disruptive innovation. From a performance perspective, firms' management capabilities significantly positively influence growth performance and profitability, thus supporting H1.2f. *With regard to indirect effects*, clients and substitute offerings have a significant positive influence on disruptive innovation through the positive mediating effects of respectively costs control orientation and efforts dedicated to product R&D on disruptive innovation. Thus, H1.2g is supported. Clients also positively indirectly influence growth and profitability through the positive mediating effect of disruptive innovation on performance. Therefore, H1.2h is supported. Regarding, firm-specific effects, technical expertise has an indirect influence on disruptive innovation through the mediating effect of efforts in product R&D and costs control orientation. Similarly, technical expertise has a positive indirect influence on both growth and profitability through the mediating effect of strategic posture and disruptive innovation attributes. Thus, H1.2i and H1.2j are supported.

As for sustained innovation, results emphasize the role of strategy as a mediator of contingencies effects on disruptive innovation, which in turn acts as a mediator of contingencies effects on performance. This supports the influence of contingencies on the strategy-nature of innovation-performance relationship.

Table 45: Path analysis - Contingencies on strategy-disruptive innovation-performance relationship

Path analysis results : Direct effects of strategy, disruptive innovation and contingencies on performance

	Standardized estimates						
	Flexible organization	R&D Market	R&D Product	Costs orientation	Disruptive innovation	Growth	Profitability
Industry contingencies							
Industry - Rivalry	-0.049	0.140	0.018	-0.101	0.065	0.105	0.007
Industry - Suppliers	0.137	-0.203**	-0.172*	0.065	-0.093	-0.203	-0.207
Industry - Substitutes	0.007	0.145*	0.261***	0.108	-0.072	-0.202	-0.124
Industry - Clients	-0.011	-0.085	-0.111	0.552***	-0.530***	-1.222***	-0.824***
Industry - Barriers	0.000	0.082	-0.044	-0.139	0.235*	0.146	0.127
Firm contingencies							
Firm - Technical expertise	-0.053	-0.021	0.236***	0.277**	-0.397***	-0.445	-0.184
Firm - CRM	0.162	0.218	0.021	0.134	-0.012	0.120	0.166
Firm - Management	0.083	0.132	0.254***	-0.297**	0.265*	0.628**	0.502**
Strategic posture							
Administrative - Flexible organization	0.000	0.000	0.000	0.000	0.216**	0.119	0.134
Engineering - R&D Market	0.000	0.000	0.000	0.000	-0.137	-0.091	-0.121
Engineering - R&D Product	0.000	0.000	0.000	0.000	0.508***	0.716**	0.427*
Entrepreneurial - Costs orientation	0.000	0.000	0.000	0.000	0.809***	1.608***	1.082**
Innovation behavior							
Disruptive innovation	0.000	0.000	0.000	0.000	0.000	-1.185***	-0.863***

Path analysis results : Indirect effects of strategy, disruptive innovation and contingencies on performance

	Standardized estimates						
	Flexible organization	R&D Market	R&D Product	Costs orientation	Disruptive innovation	Growth	Profitability
Industry contingencies							
Industry - Rivalry	0.000	0.000	0.000	0.000	-0.103	-0.124	-0.093
Industry - Suppliers	0.000	0.000	0.000	0.000	0.023	0.100	0.101
Industry - Substitutes	0.000	0.000	0.000	0.000	0.201*	0.194	0.099
Industry - Clients	0.000	0.000	0.000	0.000	0.401**	0.970***	0.672**
Industry - Barriers	0.000	0.000	0.000	0.000	-0.146	-0.368	-0.256
Firm contingencies							
Firm - Technical expertise	0.000	0.000	0.000	0.000	0.335**	0.683**	0.449**
Firm - CRM	0.000	0.000	0.000	0.000	0.124	0.098	0.053
Firm - Management	0.000	0.000	0.000	0.000	-0.112	-0.481	-0.351*
Strategic posture							
Administrative - Flexible organization	0.000	0.000	0.000	0.000	0.000	-0.255**	-0.186**
Engineering - R&D Market	0.000	0.000	0.000	0.000	0.000	0.162	0.118
Engineering - R&D Product	0.000	0.000	0.000	0.000	0.000	-0.602***	-0.439***
Entrepreneurial - Costs orientation	0.000	0.000	0.000	0.000	0.000	-0.958***	-0.698***
Innovation behavior							
Disruptive innovation	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Model statistics: CMIN/DF = 2.106; p = 0.000; CFI = 0.806; RMSEA = 0.069

Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 46: Results to hypotheses - Contingencies on strategy-disruptive innovation-performance relationship

Results to hypotheses [a]: Contingency effects on strategy-disruptive innovation-performance relationship

	Direct effects				Direct effects	Indirect effects	Direct effects	Indirect effects	Direct effects	Indirect effects
Effects of x on y	Flexible organization	R&D Market	R&D Product	Costs orientation	Disruptive innovation		Growth		Profitability	
Strategic posture attributes					Flexible orga. (+)**			Flexible orga. H1.1b (-)** (NS)		Flexible orga. H1.1b (-)** (NS)
					R&D Product (+)***		R&D Product (+)**	R&D Product H1.1b (-)*** (NS)	R&D Product (+)*	R&D Product H1.1b (-)*** (NS)
					Costs orient. (+)***		Costs orient. (+)***	Costs orient. H1.1b (-)*** (NS)	Costs orient. (+)**	Costs orient. H1.1b (-)*** (NS)
Disruptive innovation							(-) ***		(-) ***	
Industry contingencies		Suppliers H1.2a (-)**	Suppliers H1.2a (-)*	Clients H1.2a (+)***	Clients H1.2b (-)***	Clients H1.2g (+)**	Clients H1.2c (-)***	Clients H1.2h (+)***	Clients H1.2c(-)***	Clients H1.2h (+)**
		Substitutes H1.2a (+)*	Substitutes H1.2a (+)***		Barriers H1.2b (+)*	Substitutes H1.2g (+)*				
Firm contingencies			Tech. expert. H1.2d (+)***	Tech. expert. H1.2d (+)**	Tech. expert. H1.2e (-)***	Tech. expert. H1.2i (+)**	Management H1.2f (+)**	Tech. expert. H1.2j (+)**	Management H1.2f (+)**	Tech. expert. H1.2j (+)**
			Management H1.2d (+)***	Management H1.2d (-)**	Management H1.2e (+)*					Management H1.2j (-)*

Notes: [a] Only significant results at p < 0.1 are reported
* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Source of innovation: we proposed in hypothesis H2.1 that *Firm performance is positively related to the fit between strategic posture attributes and the technology-based (H2.1a) or market-based (H2.1b) source of innovation.* **Technology-based innovation** (see Tables 47; 48) is significantly predicted by an engineering focus on costs reductions, a formalized and a flexible organization. R&D efforts towards cost reductions have a significant positive influence on growth and profitability. However, technology-based innovation tends to negatively influence growth and profitability, even though this influence is not significant. The mediating effect of technology-based innovation in the strategy-innovation fit is therefore not significant and not potentially positively related to performance. Consequently, H2.1a is not supported. **Market-based innovation** (see Tables 49; 50) is significantly predicted by an entrepreneurial orientation towards product/market domain stability, or costs control, an engineering focus on product R&D, production flexibility, and supported by a flexible organization. A costs control orientation and a focus on product R&D positively influence growth whereas costs orientation and production flexibility positively influence profitability. However, market-based innovation has a significant negative impact on both growth and profitability. Consequently, the mediating effect of technology-based innovation in the strategy-innovation fit hampers firm performance, meaning that H2.1b is also not supported. Similarly to the nature of innovation, these results do not support the role of the source of innovation as a facilitator of strategic goals achievement despite the existence of fit between strategic posture attributes and innovation source attributes.

We also proposed in hypothesis H2.2 that *Firm performance, which is positively related to the fit between strategic posture attributes and the source of innovation, is influenced by direct industry-specific on strategic (H2.2a), innovation (H2.2b) and performance (H2.2c) attributes and direct firm-specific effects on strategic (H2.2d), innovation (H2.2e) and performance (H2.2f) attributes as well as indirect industry-specific effects on innovation (H2.2g) and performance (H2.2h) attributes and indirect firm-specific effects on innovation (H2.2i) and performance (H2.2j) attributes.*

Regarding *direct industry-specific effects* in a context of **technology-based innovation,** the power of clients significantly positively influence R&D efforts towards solutions to reduce costs, and foster the formalization of firms' organization. Thus, H2.2a is supported. Conversely, industry effects have no significant influence on a technology-based innovation behavior in the SMEs of our sample, meaning that H2.2b is not supported. From a performance perspective, clients significantly negatively influence growth as well as profitability. Thus, H2.2c is supported. With regard to *direct firm-specific effects*, H2.2d is supported with the significant influence of firms' technical capabilities on formalization of the organization. Similarly to industry effects, firm effects do not significantly influence a technology-based innovation behavior. H2.2e is therefore not supported. However, technical capabilities significantly positively influence growth and profitability. H2.2f is supported. *With regard to indirect effects*, industry contingencies do not significantly influence technology-based innovation through the mediating effect of strategic attributes. Thus, H2.2g is not supported. The same prevails for firm performance through the mediating effect of technology-based innovation. H2.2h is not supported. Similarly, there is no indirect effect of firm-specific contingencies on technology-based innovation or firm performance.

Table 47: Path analysis - Contingencies on strategy-technology-based innovation-performance relationship

Path analysis results : Direct effects of strategy, technology-based innovation and contingencies on performance

	Standardized estimates					
	Formal organization	Flexible organization	R&D Costs	Technology-based innovation	Growth	Profitability
Industry contingencies						
Industry - Barriers	-0.089	-0.163	0.045	-0.063	-0.174	-0.150
Industry - Clients	0.325**	-0.065	0.478***	-0.369	-0.933***	-0.899**
Firm contingencies						
Firm - Technical expertise	0.197**	0.030	0.016	0.120	0.433**	0.359*
Strategic posture						
Administrative - Formal organization	0.000	0.000	0.000	0.398***	0.331	0.389
Administrative - Flexible organization	0.000	0.000	0.000	0.244**	-0.028	0.036
Engineering - R&D Costs	0.000	0.000	0.000	0.397***	0.535**	0.549**
Innovation behavior						
Technology-based innovation	0.000	0.000	0.000	0.000	-0.296	-0.242

Path analysis results : Indirect effects of strategy, technology-based innovation and contingencies on performance

	Standardized estimates					
	Formal organization	Flexible organization	R&D Costs	Technology-based innovation	Growth	Profitability
Industry contingencies						
Industry - Barriers	0.000	0.000	0.000	-0.057	0.035	0.013
Industry - Clients	0.000	0.000	0.000	0.304	0.385*	0.403*
Firm contingencies						
Firm - Technical expertise	0.000	0.000	0.000	0.092	0.010	0.035
Strategic posture						
Administrative - Formal organization	0.000	0.000	0.000	0.000	-0.118	-0.096
Administrative - Flexible organization	0.000	0.000	0.000	0.000	-0.072	-0.059
Engineering - R&D Costs	0.000	0.000	0.000	0.000	-0.118	-0.096
Innovation behavior						
Technology-based innovation	0.000	0.000	0.000	0.000	0.000	0.000

Model statistics: CMIN/DF = 3.000; p = 0.000; CFI = 0.768; RMSEA = 0.093

Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 48: Results to hypotheses **-** Contingencies on strategy-technology-based innovation-performance relationship

Results to hypotheses [a]: Contingency effects on strategy-technology-based innovation-performance relationship

Effects of x on y	Direct effects			Direct effects	Indirect effects	Direct effects	Indirect effects	Direct effects	Indirect effects
	Formal organization	Flexible organization	R&D Costs	Technology-based innovation		Growth		Profitability	
Strategic posture attributes				Formal orga. (+)*** Flexible orga. (+)** R&D Costs (+)***		R&D Costs (+)***	Formal orga H2.1a (-) (NS) Flexible orga H2.1a (-) (NS) R&D Costs H2.1a (-) (NS)	R&D Costs (+)***	Formal orga H2.1a (-) (NS) Flexible orga H2.1a (-) (NS) R&D Costs H2.1a (-) (NS)
Technology-based innovation						(-)		(-)	
Industry contingencies	Clients H2.2a (+)***		Clients H2.2a (+)***	H2.2b (NS)	H2.2g (NS)	Clients H2.2c (-)***	H2.2h (NS)	Clients H2.2c (-)**	H2.2h (NS)
Firm contingencies	Tech. expert. H2.2d (+)**			H2.2e (NS)	H2.2i (NS)	Tech. expert. H2.2f (+)**	H2.2j (NS)	Tech. expert. H2.2f (+)*	H2.2j (NS)

Notes: [a] Only significant results at $p < 0.1$ are reported
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Regarding *direct industry-specific effects* in a context of **market-based innovation,** results highlight the significant positive influence of suppliers and substitutes on costs control, and the negative influence of suppliers and the positive influence of substitutes on efforts dedicated to product R&D. Thus, H2.2a is supported. H2.2b is also supported with the positive influence of competition rivalry on market-based innovation. H2.2c is not supported as there is no significant influence of industry contingencies on performance. *Direct firm-specific effects* of technical capabilities positively influence orientations towards costs control, stability of product/market domain, product R&D and production flexibility. Cooperation with intermediaries negatively influences orientation towards costs control and production flexibility. H2.2d is therefore supported. Technical capabilities negatively influence a market-based innovation behavior whereas intermediaries have a positive influence. H2.2e is supported. Similarly, technical capabilities negatively influence profitability whereas intermediaries positively influence growth and profitability, thus supporting H2.2f. With regard to *indirect industry effects,* substitutes significantly positively influence market-based innovation through the mediating effect of costs control and product R&D orientation. H2.2g is supported. H2.2h is not supported, as industry contingencies have no significant effects on performance through the mediating effect of market-based innovation. Concerning *indirect firm effects*, technical capabilities positively influence market-based innovation through the mediating effect of costs orientation, product/market domain stability, production flexibility and product R&D. Cooperation with intermediaries negatively influence market-based innovation through the mediating effect of costs orientation and production flexibility. Therefore, H2.2i is supported. Considering firm performance, technical capabilities positively influence growth and profitability through the conjunction of their negative impact on the likelihood of market-based innovation, which in turn cannot negatively influence performance, and their positive impact on strategic attributes, which in turn positively influence performance. Intermediaries negatively influence growth and profitability as their positive effect on market-based innovation leverages the negative influence of market-based innovation on performance. H2.2j is supported.

Contrary to technology-based innovation, results emphasize the role of strategy as a mediator of contingencies effects on market-based innovation, which in turn acts as a mediator of contingencies effects on performance. This supports the influence of contingencies on the strategy-market-based innovation-performance relationship.

Table 49: Path analysis - Contingencies on strategy-market-based innovation-performance relationship

Path analysis results : Direct effects of strategy, market-based innovation and contingencies on performance

	Standardized estimates							
	Flexible organization	Costs orientation	Stability	Production Flexibility	R&D Product	Market-based innovation	Growth	Profitability
Industry contingencies								
Industry - Rivalry	-0.074	-0.217	-0.048	-0.148	-0.022	0.182*	0.320	0.247
Industry - Suppliers	0.138	0.340*	-0.013	0.014	-0.206*	-0.206	-0.642	-0.593
Industry - Substitutes	0.023	0.234*	-0.072	0.005	0.231**	-0.052	-0.406	-0.322
Firm contingencies								
Firm - Technical expertise	0.049	0.486***	0.132*	0.219***	0.313***	-0.397***	-0.630	-0.444*
Firm - Intermediaries	-0.104	-0.545***	-0.094	-0.278**	0.139	0.507***	0.996***	0.924***
Strategic posture								
Administrative - Flexible organization	0.000	0.000	0.000	0.000	0.000	0.230**	-0.004	0.052
Entrepreneurial - Costs orientation	0.000	0.000	0.000	0.000	0.000	0.619***	1.728***	1.468***
Entrepreneurial - Stability	0.000	0.000	0.000	0.000	0.000	0.158**	0.071	0.083
Engineering - Production Flexibility	0.000	0.000	0.000	0.000	0.000	0.204**	0.129	0.229**
Engineering - R&D Product	0.000	0.000	0.000	0.000	0.000	0.272***	0.283***	0.134
Innovation behavior								
Market-based innovation	0.000	0.000	0.000	0.000	0.000	0.000	-0.323**	-0.374**

Path analysis results : Indirect effects of strategy, market-based innovation and contingencies on performance

	Standardized estimates							
	Flexible organization	Costs orientation	Stability	Production Flexibility	R&D Product	Market-based innovation	Growth	Profitability
Industry contingencies								
Industry - Rivalry	0.000	0.000	0.000	0.000	0.000	-0.195	-0.399	-0.358
Industry - Suppliers	0.000	0.000	0.000	0.000	0.000	0.188	0.536	0.489
Industry - Substitutes	0.000	0.000	0.000	0.000	0.000	0.203**	0.416	0.314
Firm contingencies								
Firm - Technical expertise	0.000	0.000	0.000	0.000	0.000	0.463***	0.944***	0.794***
Firm - Intermediaries	0.000	0.000	0.000	0.000	0.000	-0.395***	-0.981**	-0.900**
Strategic posture								
Administrative - Flexible organization	0.000	0.000	0.000	0.000	0.000	0.000	-0.074**	-0.086***
Entrepreneurial - Costs orientation	0.000	0.000	0.000	0.000	0.000	0.000	-0.200**	-0.232***
Entrepreneurial - Stability	0.000	0.000	0.000	0.000	0.000	0.000	-0.051**	-0.059***
Engineering - Production Flexibility	0.000	0.000	0.000	0.000	0.000	0.000	-0.066**	-0.076**
Engineering - R&D Product	0.000	0.000	0.000	0.000	0.000	0.000	-0.088**	-0.102***
Innovation behavior								
Market-based innovation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Model statistics: CMIN/DF = 2.211; p = 0.000; CFI = 0.840; RMSEA = 0.072

Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 50: Results to hypotheses - Contingencies on strategy-market-based innovation-performance relationship

Results to hypotheses [a]: Contingency effects on strategy-market-based innovation-performance relationship

Effects of x on y	Direct effects					Direct effects	Indirect effects	Direct effects	Indirect effects	Direct effects	Indirect effects
	Flexible orga.	Costs orientation	Stability	Production Flexibility	R&D Product	Market-based innovation		Growth		Profitability	
Strategic posture attributes						Flexible orga. (+)**			Flexible orga. H2.1 (-)**(NS)	Costs orient. (+)***	Flexible orga. H2.1 (-)***(NS)
						Costs orient. (+)***		Costs orient. (+)***	Costs orient. H2.1 (-)**(NS)		Costs orient. H2.1 (-)***(NS)
						Stability (+)**			Stability H2.1 (-)**(NS)		Stability H2.1 (-)***(NS)
						Prod. Flexib. (+)**			Prod. Flexib. H2.1 (-)**(NS)	Prod. Flexib (+)*	Prod. Flexib. H2.1 (-)**(NS)
						R&D Product (+)***		R&D Product (+)***	R&D Product H2.1 (-)**(NS)		R&D Product H2.1 (-)***(NS)
Market-based innovation								(-)**		(-)**	
Industry contingencies		Suppliers H2.2a (+)*			Suppliers H2.2a (-)*	Rivalry H2.2b (+)*		H2.2c (NS)	H2.2h (NS)	H2.2c (NS)	H2.2h (NS)
		Substitutes H2.2a (+)*			Substitutes H2.2a (+)**		Substitutes H2.2g (+)**				
Firm contingencies		Tech. expert. H2.2d (+)***	Tech. expert. H2.2d (+)*	Tech. expert. H2.2d (+)***	Tech. expert. H2.2d (+)***	Tech. expert. H2.2e (-)***	Tech. expert. H2.2i (+)***		Tech. expert. H2.2j(+)***	Tech. expert. H2.2f (-)*	Tech. expert. H2.2j(+)***
		Intermediaries H2.2d (-)***		Intermediaries H2.2d (-)**		Intermediaries H2.2e (+)***	Intermediaries H2.2i (-)***	Intermediaries H2.2f (+)***	Intermediaries H2.2j (-)**	Intermediaries H2.2f (+)***	Intermediaries H2.2j (-)**

Notes: [a] Only significant results at p < 0.1 are reported
* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

***Activities of innovation*:** We proposed in hypothesis H3.1 that *Firm performance is positively related to the fit between strategic posture attributes and the process (H3.1a), product (H3.1b), marketing (H3.1c), or organizational (H3.1d) activities of innovation.* **Process innovation** (see Tables 51; 52) is predicted by an engineering focus on process R&D and market R&D. Both process and market R&D have a significant direct negative influence on growth and profitability. Conversely, process innovation has a positive influence on growth and profitability and therefore positively mediates the positive predictive strategy-innovation relationship towards firm performance, although results on our sample do not show this influence as significant. Consequently, H3.1a cannot be supported. This is mainly due to the moderate although significant predictive relationship between strategic attributes and process innovation. **Product innovation** (see Tables 53; 54) is strongly predicted by an entrepreneurial orientation towards differentiation, stability of product/market domain, and an engineering focus on product R&D. Product innovation has a significant positive influence on growth and profitability. Although product innovation predictive strategic attributes have a negative direct influence on performance, the fit between product innovation and strategic attributes is a predictor of both growth and profitability as highlighted by indirect positive effects of strategic attributes on performance through the mediating effect of product innovation. Therefore, H3.1b is supported. **Marketing innovation** (see Tables 55; 56) is strongly predicted by firms' engineering focus on market R&D. Marketing innovation, in turns has a significant positive influence growth and profitability. Although market R&D has a negative direct influence on performance, the fit between marketing innovation and market R&D is a predictor of both growth and profitability as highlighted by indirect positive effects of the strategic attribute on performance through the mediating effect of marketing innovation. Therefore, H3.1c is supported. **Organizational innovation** (see Tables 57; 58) is strongly predicted by an entrepreneurial orientation towards a wide scope of product/market domain and a formalized organization, whereas a strategic choice of product/market stability is negatively related to organizational innovation. Organizational innovation has a positive influence, although not significant, on growth and profitability. The strong fit between strategic attributes namely scope of product/market domain and formalized organization, and organizational innovation is a significant predictor of growth but has no significant effect, although positive, on profitability. Conversely, results suggest that the negative stability-organizational innovation relationship hampers growth. Therefore, H3.1d is supported for growth performance.

These results confirm the positive performance implication of the fit between strategic posture and activities of innovation, providing the significant influence of innovation behavior on performance.

We also proposed in hypothesis H3.2 that *Firm performance, which is positively related to the fit between strategic posture attributes and the activities of innovation, is influenced is influenced by direct industry-specific effects on strategic (H3.2a), innovation (H3.2b) and performance (H3.2c) attributes and direct firm-specific effects on strategic (H3.2d), innovation (H3.2e) and performance (H3.2f) attributes as well as indirect industry-specific effects on innovation (H3.2g) and performance (H3.2h) attributes and indirect firm-specific effects on innovation (H3.2i) and performance (H3.2j) attributes.*

Process innovation: Regarding *direct industry-specific effects* in a context of process innovation, results highlight the significant negative effect of the influence of suppliers on firms' efforts dedicated to investigating new market opportunities through market R&D, thus supporting H3.2a. There is no significant direct influence of industry contingencies on process innovation. H3.2b, is therefore not supported, whereas, H3.2c is supported with the significant negative effect of suppliers on both growth and profitability. Regarding *direct firm-specific effects*, ability to manage clients relationship has a significant positive influence on both market and process R&D. The same prevails for technical capabilities on process R&D. Thus, H3.2d is supported. Technical capabilities also directly positively influence process innovation, supporting H3.2d. From a performance perspective, CRM capabilities positively influence growth and profitability. H3.2f is supported. Regarding *indirect industry effects,* industry contingencies do not significantly influence process innovation through the mediating effect of strategic attributes. H3.2g is therefore not supported. Similarly, growth is not significantly influenced by industry contingencies through process innovation, whereas profitability is positively significantly influenced by suppliers effects through the mediating influence of market R&D. Thus, H3.2h is supported for profitability. With regard to *indirect firm contingencies,* results do not highlight significant influence on process innovation through the mediating effect of strategic posture attributes. H3.2i is not supported. However, both growth and profitability are significantly negatively influenced through the mediating effects of market and process R&D. Therefore, H3.2j is supported.

Table 51: Path analysis - Contingencies on strategy-process innovation-performance relationship

Path analysis results : Direct effects of strategy, process innovation and contingencies on performance

	Standardized estimates				
	R&D Market	R&D Process	Process innovation	Growth	Profitability
Industry contingencies					
Industry - Rivalry	0.106	-0.054	-0.031	-0.039	-0.067
Industry - Suppliers	-0.253**	0.057	0.108	-0.277**	-0.289**
Industry - Substitutes	0.133	-0.008	0.138	0.031	0.032
Firm contingencies					
Firm - Technical expertise	-0.047	0.163**	0.237**	0.158	0.229
Firm - CRM	0.679***	0.505***	-0.119	1.199**	1.167**
Strategic posture					
Engineering - R&D Market	0.000	0.000	0.463	-0.686**	-0.738**
Engineering - R&D Process	0.000	0.000	0.226	-0.312*	-0.337*
Innovation behavior					
Process innovation	0.000	0.000	0.000	0.245	0.199

Path analysis results : Indirect effects of strategy, process innovation and contingencies on performance

	Standardized estimates				
	R&D Market	R&D Process	Process innovation	Growth	Profitability
Industry contingencies					
Industry - Rivalry	0.000	0.000	0.037	-0.055	-0.059
Industry - Suppliers	0.000	0.000	-0.104	0.157	0.168*
Industry - Substitutes	0.000	0.000	0.060	-0.040	-0.056
Firm contingencies					
Firm - Technical expertise	0.000	0.000	0.015	0.043	0.030
Firm - CRM	0.000	0.000	0.428	-0.547**	-0.609**
Strategic posture					
Engineering - R&D Market	0.000	0.000	0.000	0.113	0.092
Engineering - R&D Process	0.000	0.000	0.000	0.055	0.045
Innovation behavior					
Process innovation	0.000	0.000	0.000	0.000	0.000

Model statistics: CMIN/DF = 2.230; p = 0.000; CFI = 0.850; RMSEA = 0.073

Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 52: Results to hypotheses - Contingencies on strategy-process innovation-performance relationship

Results to hypotheses [a]: Contingency effects on strategy-process innovation-performance relationship

Effects of x on y	Direct effects R&D Market	Direct effects R&D Process	Process innovation Direct effects	Process innovation Indirect effects	Growth Direct effects	Growth Indirect effects	Profitability Direct effects	Profitability Indirect effects
Strategic posture attributes			R&D Market (+)		R&D Market (-)**	R&D Market H3.1a (+) (NS)	R&D Market (-)**	R&D Market H3.1a (+) (NS)
			R&D Process (+)		R&D Process (-)*	R&D Process H3.1a (+) (NS)	R&D Process (-)*	R&D Process H3.1a (+) (NS)
Process innovation					(+)		(+)	
Industry contingencies	Suppliers H3.2a (-)**		H3.2b (NS)	H3.2g (NS)	Suppliers H3.2c (-)**	H3.2h (NS)	Suppliers H3.2c (-)**	Suppliers H3.2h (+)*
Firm contingencies		Tech. expert. H3.2d (+)**	Tech. expert. H3.2e (+)**	H3.2i (NS)				
	CRM H3.2d (+)***	CRM H3.2d (+)***			CRM H3.2f (+)**	CRM H3.2j (-)**	CRM H3.2f (+)**	CRM H3.2j (-)**

Notes: [a] Only significant results at p < 0.1 are reported
* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Product innovation: regarding *direct industry-specific effects* in a context of product innovation, results highlight the significant negative influence of suppliers on differentiation orientation, and efforts dedicated to market and product R&D, whereas substitute offerings positively influence market and product R&D. Therefore, H3.2a is supported. H3.2b is however not supported with no significant influence of industry contingencies on product innovation. With regard to firm performance, suppliers have a significant negative influence on both growth and profitability, thus supporting H3.2c. As regards *direct firm-specific effects*, CRM and technical capabilities have a significant positive influence on a differentiation orientation and engineering efforts dedicated to product and market R&D. Intermediaries, negatively influence market R&D. H3.2d is supported. CRM capabilities significantly negatively influence product innovation, supporting H3.2e. From a performance perspective, CRM capabilities positively influence growth and profitability whereas intermediaries have a negative influence. H3.2f is supported. With regard to *indirect industry contingencies*, suppliers and substitutes have respectively a negative and positive influence on product innovation through the mediating effect of differentiation and product R&D for the former and the mediating effect of product R&D for the latter. H3.2g is then supported. Regarding firm performance, results show the positive influence of substitutes on growth through the mediating effect of market R&D, whereas suppliers positively influence profitability through the mediating effect of differentiation and product R&D. H3.2h is supported. *Indirect firm-specific contingencies* significantly influence product innovation with the positive influence of both technical capabilities and intermediaries through the respective mediating effect of differentiation and product R&D, and market R&D. Therefore, H3.2i is supported. With regard to performance, H3.2j is supported with the significant negative influence of CRM capabilities on both growth and profitability through the mediating effect of product innovation, and the positive influence of intermediaries on growth and profitability through the mediating effect of product innovation, as well as the positive influence of sales capabilities through the mediating effect of market R&D.

Table 53: Path analysis - Contingencies on strategy-product innovation-performance relationship

Path analysis results : Direct effects of strategy, product innovation and contingencies on performance

	Standardized estimates						
	Differentiation	Stability	R&D Market	R&D Product	Product innovation	Growth	Profitability
Industry contingencies							
Industry - Rivalry	0.103	-0.033	0.102	-0.004	0.001	-0.114	-0.134
Industry - Suppliers	-0.264**	-0.031	-0.289***	-0.289***	0.131	-0.286**	-0.345***
Industry - Substitutes	0.063	-0.080	0.177*	0.246***	0.056	-0.056	-0.066
Firm contingencies							
Firm - Technical expertise	0.209*	0.076	0.007	0.230**	-0.003	0.049	0.186
Firm - CRM	0.143	0.095	0.244**	0.145	-0.334***	0.610***	0.684***
Firm - Sales	0.126	0.028	0.089	0.075	0.130	0.152	0.002
Firm - Intermediaries	0.041	-0.084	-0.147*	0.154	0.129	-0.203**	-0.202*
Strategic posture							
Entrepreneurial - Differentiation	0.000	0.000	0.000	0.000	0.301**	-0.359*	-0.422
Entrepreneurial - Stability	0.000	0.000	0.000	0.000	0.165**	-0.203**	-0.224*
Engineering - R&D Market	0.000	0.000	0.000	0.000	-0.108	0.195*	0.191
Engineering - R&D Product	0.000	0.000	0.000	0.000	0.828***	-1.123***	-1.404***
Innovation behavior							
Product innovation	0.000	0.000	0.000	0.000	0.000	1.455***	1.67***

Path analysis results : Indirect effects of strategy, product innovation and contingencies on performance

	Standardized estimates						
	Differentiation	Stability	R&D Market	R&D Product	Product innovation	Growth	Profitability
Industry contingencies							
Industry - Rivalry	0.000	0.000	0.000	0.000	0.011	0.011	0.009
Industry - Suppliers	0.000	0.000	0.000	0.000	-0.293***	0.135	0.200*
Industry - Substitutes	0.000	0.000	0.000	0.000	0.191**	0.110*	0.091
Firm contingencies							
Firm - Technical expertise	0.000	0.000	0.000	0.000	0.265***	0.034	0.010
Firm - CRM	0.000	0.000	0.000	0.000	0.152	-0.45**	-0.541**
Firm - Sales	0.000	0.000	0.000	0.000	0.095	0.209***	0.227**
Firm - Intermediaries	0.000	0.000	0.000	0.000	0.142**	0.196**	0.210**
Strategic posture							
Entrepreneurial - Differentiation	0.000	0.000	0.000	0.000	0.000	0.438***	0.502***
Entrepreneurial - Stability	0.000	0.000	0.000	0.000	0.000	0.240***	0.276***
Engineering - R&D Market	0.000	0.000	0.000	0.000	0.000	-0.158**	-0.181**
Engineering - R&D Product	0.000	0.000	0.000	0.000	0.000	1.205***	1.383***
Innovation behavior							
Product innovation	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Model statistics: CMIN/DF = 2.442; p = 0.000; CFI = 0.810; RMSEA = 0.079

Notes: * denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 54: Results to hypotheses **-** Contingencies on strategy-product innovation-performance relationship

Results to hypotheses [a]: Contingency effects on strategy-product innovation-performancerelationship

	Direct effects				Direct effects	Indirect effects	Direct effects	Indirect effects	Direct effects	Indirect effects
Effects of x on y	Differentiation	Stability	R&D Market	R&D Product	Product innovation		Growth		Profitability	
Strategic posture attributes					Differentiation (+)** Stability (+)** R&D Product (+)*** R&D Market (-)		Differentiation (-)* Stability (-)** R&D Product (-)*** R&D Market (+)*	Differentiation H3.1b (+)*** Stability H3.1b (+)*** R&D Product H3.1b (+)***	Stability (-)* R&D Product (-)*** R&D Market (+)	Differentiation H3.1b (+)*** Stability H3.1b (+)*** R&D Product H3.1b (+)***
Product innovation							(+)***		(+)***	
Industry contingencies	Suppliers H3.2a (-)**		Suppliers H3.2a (-)*** Substitutes H3.2a (+)*	Suppliers H3.2a (-)*** Substitutes H3.2a (+)***	H3.2b (NS)	Suppliers H3.2g (-)*** Substitutes H3.2a (+)**	Suppliers H3.2c (-)**	Substitutes H3.2h (+)*	Suppliers H3.2c (-)***	Suppliers H3.2h (+)*
Firm contingencies	Tech. expert. H3.2d (+)*		CRM H3.2d (+)** Intermediaries H3.2d (-)* Sales (+)	Tech. expert. H3.2d (+)**	CRM H3.2e (-)*** Sales (+)	Tech. expert. H3.2i (+)*** Intermediaries H3.2i (+)**	CRM H3.2f (+)*** Intermediaries H3.2f (-)**	CRM H3.2j (-)** Intermediaries H3.2j (+)** Sales H3.2j (+)***	CRM H3.2f (+)*** Intermediaries H3.2f (-)*	CRM H3.2j (-)** Intermediaries H3.2j (+)** Sales H3.2j (+)**

Notes: [a] Only significant results at $p < 0.1$ are reported
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Marketing innovation: Regarding *direct industry-specific effects* in a context of marketing innovation, results highlight the significant positive influence of substitutes on product R&D and market R&D, the negative influence of suppliers on market R&D, and the negative influence of low barriers to entry and clients on the scope of product/market domain. Therefore, H3.2a is supported. Conversely, results do not show significant direct influence of industry contingencies on marketing innovation. H3.2b is not supported. H3.2c is neither supported with no significant direct influence of industry contingencies on performance. *Direct firm-specific effects* significantly influence strategic posture with a positive influence of technical expertise on product R&D, a positive influence of CRM capabilities on process and market R&D and a negative influence of intermediaries on market R&D. Therefore, H3.2d is supported. H3.2e is also supported with a significant negative influence of CRM capabilities, and a significant positive influence of sales capabilities on marketing innovation. From a performance perspective, CRM capabilities directly significantly positively influence both growth and profitability, thus supporting H3.2f. With regard to *indirect industry contingencies* in a context of marketing innovation, suppliers have a significant negative influence and substitutes have a significant positive influence on a marketing innovation behavior through the mediating effect of market R&D. Therefore, H3.2g is supported. Similarly to direct effects, indirect industry effects do not significantly influence firm performance, meaning that, in a context of marketing innovation, both strategic and innovation attributes tend to moderate more than mediate industry contingencies. H3.2h is not supported. Regarding *indirect firm contingencies*, results show the significant positive influence of CRM capabilities on marketing innovation through the mediating effect of market R&D. H3.2i is supported. H3.2j is also supported with the significant positive influence of sales capabilities and the significant negative influence of CRM capabilities on growth and profitability through the mediating effect of marketing innovation.

Table 55: Path analysis - Contingencies on strategy-marketing innovation-performance relationship

Path analysis results : Direct effects of strategy, marketing innovation and contingencies on performance

	Standardized estimates						
	R&D Product	R&D Process	R&D Market	Scope	Marketing innovation	Growth	Profitability
Industry contingencies							
Industry - Barriers	-0.077	-0.046	0.029	-0.235***	0.062	-0.314	-0.203
Industry - Suppliers	-0.160	0.090	-0.240**	-0.040	0.105	-0.410	-0.373
Industry - Substitutes	0.246***	-0.005	0.183**	0.128	-0.040	0.130	0.101
Industry - Clients	-0.306	-0.267	-0.266	-0.229*	0.175	-0.626	-0.499
Industry - Rivalry	0.112	0.065	0.180	0.169	-0.171	0.344	0.241
Firm contingencies							
Firm - Sales	-0.005	-0.067	0.039	0.083	0.232**	-0.147	-0.253
Firm - Intermediaries	0.111	0.080	-0.172*	-0.119	-0.018	0.025	0.053
Firm - Technical expertise	0.299***	0.207	0.036	0.069	0.008	0.128	0.248
Firm - CRM	0.189	0.250**	0.319**	-0.047	-0.517***	1.411**	1.247***
Strategic posture							
Engineering - R&D Product	0.000	0.000	0.000	0.000	0.178	-0.360	-0.408
Engineering - R&D Process	0.000	0.000	0.000	0.000	0.106	-0.258	-0.220
Engineering - R&D Market	0.000	0.000	0.000	0.000	0.997***	-2.367***	-2.040***
Entrepreneurial - Scope	0.000	0.000	0.000	0.000	-0.129	0.355	0.388*
Innovation behavior							
Marketing innovation	0.000	0.000	0.000	0.000	0.000	2.365***	1.967***

Path analysis results : Indirect effects of strategy, marketing innovation and contingencies on performance

	Standardized estimates						
	R&D Product	R&D Process	R&D Market	Scope	Marketing innovation	Growth	Profitability
Industry contingencies							
Industry - Barriers	0.000	0.000	0.000	0.000	0.041	0.130	0.093
Industry - Suppliers	0.000	0.000	0.000	0.000	-0.253*	0.238	0.229
Industry - Substitutes	0.000	0.000	0.000	0.000	0.209*	-0.074	-0.090
Industry - Clients	0.000	0.000	0.000	0.000	-0.318	0.388	0.355
Industry - Rivalry	0.000	0.000	0.000	0.000	0.185	-0.391	-0.335
Firm contingencies							
Firm - Sales	0.000	0.000	0.000	0.000	0.021	0.552**	0.464**
Firm - Intermediaries	0.000	0.000	0.000	0.000	-0.128	-0.041	-0.045
Firm - Technical expertise	0.000	0.000	0.000	0.000	0.102	0.040	0.004
Firm - CRM	0.000	0.000	0.000	0.000	0.385**	-1.217**	-1.061**
Strategic posture							
Engineering - R&D Product	0.000	0.000	0.000	0.000	0.000	0.422	0.351
Engineering - R&D Process	0.000	0.000	0.000	0.000	0.000	0.252	0.209
Engineering - R&D Market	0.000	0.000	0.000	0.000	0.000	2.358***	1.961***
Entrepreneurial - Scope	0.000	0.000	0.000	0.000	0.000	-0.304	-0.253
Innovation behavior							
Marketing innovation	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Model statistics: CMIN/DF = 2.225; p = 0.000; CFI = 0.796; RMSEA = 0.073

Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 56: Results to hypotheses **-** Contingencies on strategy-marketing innovation-performance relationship

Results to hypotheses [a]: Contingency effects on strategy-marketing innovation-performance relationship

	Direct effects				Direct effects	Indirect effects	Direct effects	Indirect effects	Direct effects	Indirect effects
Effects of x on y	R&D Product	R&D Process	R&D Market	Scope	Marketing innovation		Growth		Profitability	
Strategic posture attributes					R&D Market (+)***		R&D Market (-)***	R&D Market H3.1c (+)***	R&D Market (-)***	R&D Market H3.1c (+)***
Marketing innovation							(+)***		(+)***	
Industry contingencies	Substitutes H3.2a (+)***		Substitutes H3.2a (+)** Suppliers H3.2a (-)**	Barriers H3.2a (-)*** Clients H3.2a (-)*	H3.2b (NS)	Suppliers H3.2g (-)* Substitutes H3.2g (+)*	H3.2c (NS)	H3.2h (NS)	H3.2c (NS)	H3.2h (NS)
Firm contingencies	Tech. expert. H3.2d (+)***	CRM H3.2d (+)**	CRM H3.2d (+)** Intermediaries H3.2d (-)*		CRM H3.2e (-)*** Sales H3.2e (+)**	CRM H3.2i (+)**	CRM H3.2f (+)**	CRM H3.2j (-)** Sales H3.2j (+)**	CRM H3.2f (+)***	CRM H3.2j (-)** Sales H3.2j (+)**

Notes: [a] Only significant results at $p < 0.1$ are reported
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Organizational innovation: Regarding *direct industry-specific effects* in a context of organizational innovation, H3.2a is supported with the significant positive influence of clients on an orientation towards stability of product/market domain and a formalized organization, and the positive influence of competitive rivalry and the negative influence of low barriers to entry on an orientation towards a wide scope of product/market domain. H3.2b is also supported with the significant negative influence of competitive rivalry on organizational innovation. The same prevails for H3.2c with the significant negative influence of clients on both growth and profitability. With regard to *direct firm-specific effects*, management capabilities significantly positively influence an orientation towards a formalized organization as well as an organizational innovation behavior. Therefore, both H3.2d and H3.2e are supported. However, there is no significant direct influence of firm-specific contingencies on performance, thus not supporting H3.2f. *Indirect industry contingencies* significantly influence an organizational innovation behavior with the positive influence of competitive rivalry and the negative influence of low barriers to entry through the mediating effect of scope of product/market domain. Therefore, H3.2g is supported. With regard firm performance, H3.2h is also supported with the significant positive influence of clients on growth and profitability through the mediating effect of stability of product/market domain. Regarding *indirect firm contingencies*, management capabilities significantly positively influence organizational innovation through the mediating effect of a formalized organization, thus supporting H3.2i. Similarly, H3.2j is also supported for both growth and profitability with the positive influence of management capabilities through the mediating effect of organizational innovation.

Table 57: Path analysis **-** Contingencies on strategy-organizational innovation-performance relationship

Path analysis results : Direct effects of strategy, organizational innovation and contingencies on performance

	Standardized estimates					
	Stability	Formal organization	Scope	Organizational innovation	Growth	Profitability
Industry contingencies						
Industry - Barriers	0.005	-0.099	-0.248*	0.081	-0.125	-0.053
Industry - Clients	0.763***	0.341***	0.060	0.553	-0.911***	-0.975***
Industry - Rivalry	-0.128	-0.046	0.244**	-0.239*	0.107	0.085
Firm contingencies						
Firm - Management	0.044	0.257***	0.110	0.327***	0.021	0.053
Strategic posture						
Entrepreneurial - Stability	0.000	0.000	0.000	-0.515**	0.786***	0.834***
Entrepreneurial - Scope	0.000	0.000	0.000	0.409***	-0.061	-0.079
Administrative - Formal organization	0.000	0.000	0.000	0.392***	-0.079	-0.023
Innovation behavior						
Organizational innovation	0.000	0.000	0.000	0.000	0.517	0.462

Path analysis results : Indirect effects of strategy, organizational innovation and contingencies on performance

	Standardized estimates					
	Stability	Formal organization	Scope	Organizational innovation	Growth	Profitability
Industry contingencies						
Industry - Barriers	0.000	0.000	0.000	-0.143**	-0.005	-0.002
Industry - Clients	0.000	0.000	0.000	-0.235	0.734***	0.771***
Industry - Rivalry	0.000	0.000	0.000	0.148*	-0.159	-0.167
Firm contingencies						
Firm - Management	0.000	0.000	0.000	0.123**	0.240**	0.230**
Strategic posture						
Entrepreneurial - Stability	0.000	0.000	0.000	0.000	-0.266*	-0.238
Entrepreneurial - Scope	0.000	0.000	0.000	0.000	0.211*	0.189
Administrative - Formal organization	0.000	0.000	0.000	0.000	0.203*	0.181
Innovation behavior						
Organizational innovation	0.000	0.000	0.000	0.000	0.000	0.000

Model statistics: CMIN/DF = 2.060; p = 0.000; CFI = 0.851; RMSEA = 0.068

Notes: * denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 58: Results to hypotheses **-** Contingencies on strategy-organizational innovation-performance relationship

Results to hypotheses [a]: Contingency effects on strategy-organizational innovation-performance relationship

		Direct effects		Direct effects	Indirect effects	Direct effects	Indirect effects	Direct effects	Indirect effects
Effects of x on y	Stability	Formal organization	Scope	Organizational innovation		Growth		Profitability	
Strategic posture attributes				Stability (-)** Scope (+)*** Formal orga. (+)***		Stability (+)*** Scope (-) Formal orga (-)	Stability (-)* Scope H3.1d (+)* Formal orga. H3.1d (+)*	Stability (+)*** Scope (-) Formal orga (-)	Stability (-) Scope H3.1d (+) (NS) Formal orga. H3.1d (+) (NS)
Organizational innovation						(+)		(+)	
Industry contingencies	Clients H3.2a (+)***	Clients H3.2a (+)***	Rivalry H3.2a (+)** Barriers H3.2a (-)*	Rivalry H3.2b (-)*	Rivalry H3.2g (+)* Barriers H3.2g (-)**	Clients H3.2c (-)***	Clients H3.2h (+)***	Clients H3.2c (-)***	Clients H3.2h (+)***
Firm contingencies		Management H3.2d (+)***		Management H3.2e (+)***	Management H3.2i (+)**	H3.2f (NS)	Management H3.2j (+)**	H3.2f (NS)	Management H3.2j (+)**

Notes: [a] Only significant results at $p < 0.1$ are reported
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$
(+) denotes a positive effect; (-) denotes a negative effect
NS: Not Supported

Results on activities of innovation emphasize the role of strategy as a mediator of contingencies effects on activities of innovation, which in turn acts as a mediator of contingencies effects on performance. This supports the influence of contingencies on the strategy innovation activities-performance relationship.

Overall, these results, confirm the performance implication of fit between strategic posture and innovation behavior attributes, and suggest that strategic attributes are important qualifying factors of firms' innovation-related decisions and the type of performance to be expected from these decisions (Zahra and Covin, 1994). Results also highlight the significant influence of contingencies on the mediating effect of innovation attributes in the strategy-innovation-performance relationship. Consequently, as illustrated by direct and indirect effects of disruptive or market-based innovation on performance, the role of innovation as a means for achieving strategic goals is contingent to industry-specific and firm-specific influences. This supports other results on the context-specific performance level related to the nature of innovation (Forsman and Temel, 2010) and the source of innovation (Zhou et al., 2005). Our findings on the various dimensions of strategic posture namely entrepreneurial, engineering and administrative and the various dimensions of innovation behavior namely the nature, the source and the activities of innovation show that external and internal contingencies influence all levels of the strategy-innovation-performance relationship directly and indirectly, with strategy acting as a mediator of contingencies on both innovation and performance and innovation acting as a mediator of contingencies and strategy on performance. This provides support to the contingency-dependent "strategic choice" perspective viewing innovation as a conveyor of competitive strategy where (Zahra and Covin, 1994, p. 186) *"the environment influences the selection of organizational policy (strategy) which, in turns, determines innovation"*. Results also emphasize both the industrial organization and the resource-based approach of firm performance (Spanos and Lioukas, 2001) in the specific, partially explored, context of innovation generation (Raymond and St-Pierre, 2010a). Moreover, the relationship between strategy, innovation, performance, and contingencies constructs has been tested in the configurational perspective of Miles and Snow's adaptive choices (1978, 2003), thus providing insights on an enhanced systemic scope of analysis as opposed to the universalistic or "best practices" approach (Raymond et al., 2010; Raymond and St-Pierre, 2010a).

6.8. Discussion

6.8.1. Theoretical implications

The present research attempted to explore, in the context of French manufacturing SMEs the performance implication of fit between strategic posture and innovation behavior from an industry-specific and firm-specific contingencies perspective. To this aim, we have built a model combining Miles and Snow's (1978) internal and Porter's (1980) external focus of competitive strategy leaving possibilities for combinations of hybrid, context-specific strategic profiles (DeSarbo et al., 2005). This model also leaves possibilities for combinations of innovation profiles regarding the nature, source and activity attributes of innovation. We therefore aimed to complement the seminal findings from Zahra and Covin (1994) by investigating strategy-innovation relationship from a contingency-related configurational perspective between strategic and innovation attributes, in an enhanced scope of innovation behavior encompassing technological, marketing and organizational innovation.

First, results support our initial proposal for the existence of differentiated empirically-derived strategy-innovation alignments where different strategic attributes related to different adaptive choices, namely Entrepreneurial, Engineering and Administrative characteristics of Miles and Snow's strategic postures, predict different dimensions of innovation behavior. Thus, the study validates the predictive influence of strategic posture on innovation behavior (Kotabe, 1990; Zahra and Covin, 1994; Becheikh et al., 2006b) and has fine-tuned this predictive validity to enhanced and detailed attributes of innovation behavior such the natures (sustained or disruptive), sources (technology-based or market-based), and activities (process, product, marketing and organizational) of innovation.

Second, results bring extensive support to the performance implication of strategy-innovation fit, providing that innovation attributes directly positively influence firm performance. In this prospect, this study puts to the fore the significant negative influence of disruptive and market-based innovation on both growth and profitability. This tends to support Forsman and Temel (2010) assumption on the need for SMEs to consider what might be the return of different innovation types, depending on present and future environmental conditions. This highlights the need for internal configurational fit, or gestalt, aiming at a strategic management of innovation, where the entrepreneurial choice consists in innovating in selecting the right products or services to address markets where the firm wants to operate, the engineering choice consists in innovating in selecting the right processes to produce and distribute products or services, and the administration choice consists in innovating in designing and implementing solutions dedicated to both reducing uncertainty within the organizational system and adapting to environmental changes (Raymond and St-Pierre, 2010b). Tables 40 and 41 on our empirically-derived clusters of strategic profiles confirm that Prospectors, Defenders and Analyzers are characterized by significantly different postures and are all innovative but in different ways (Miles and Snow, 1994), thus emphasizing the need for identifying the right strategy-innovation gestalts at the attributes level. Similarly, results to hypotheses show that depending on the dimension of innovation, differentiated strategic attributes fit the so-called dimension towards performance. Nevertheless, Table 42 on ANOVA results on the differentiated performance of strategic profiles do not show any significant differences between profiles as regards growth and highlight differences on profitability only at $p < 0.10$ suggesting that the equifinality principle posited by Miles and Snow (1978) does not apply to innovation behavior but is valid for performance.

Third, results strongly support the influence of industry and firm-specific effects on the strategy-innovation-performance relationship, and emphasize the existence of differentiated effects depending on innovation and strategic attributes. Indeed, regarding direct effects, activities of innovation tend to be mostly significantly influenced by firm contingencies, except for organizational innovation. Conversely, strategic attributes tend to be directly influenced by both industry and firm-specific effects. With regard to performance, both growth and profitability are negatively related to industry-specific contingencies whereas firm-specific contingencies tend to positively influence firm performance. Regarding indirect effects, firm-specific contingencies also tend to have a more significant influence on firm performance though the mediating effect of strategy and innovation. While these findings confirm the combined influence of industry and firm contingencies on strategic posture, they also give support to the resource-based view of competitive advantage, here considered as the ability the creating internal change through innovation (Grant, 1991), putting to the fore the dominance of firm strategic capabilities over industry effects and suggesting that firm performance depends more on firm-level strategy-innovation fit than industry conditions (Barney, 2001; Spanos et al., 2004). Among industry effects, suppliers tend to negatively influence the search for new product or market opportunities, thus hampering firm innovativeness through the mediating effect of engineering choices. Consequently, suppliers' influence prevents firms from benefiting from the leveraging effect of innovation on growth. Similarly, clients tend to support entrepreneurial, engineering and administrative choices towards costs reduction, stability and formalization, and consequently negatively influence firm's propensity to innovate to address new markets or develop new products. Conversely, substitutes significantly influence engineering choices focused on R&D efforts to develop new markets and products and foster innovation behavior. Among firm contingencies, technical capabilities tend to be positive determinants of differentiated strategic choices leading to sustained, disruptive, technology-based or market-based product innovation behavior. Consequently, technical capabilities are likely to indirectly leveraging growth and profitability through either strategic attributes or innovation attributes. Firm management capabilities mostly influence strategy-innovation-performance relationship in a context of disruptive innovation or organizational innovation. CRM capabilities mainly influence activities of innovation and the strategy-innovation-performance relationship through the mediating effect of search for new market opportunities and improved processes. Strong relationship with clients tends to hamper firms' ability to innovate when not aligned with strategic attributes. This tends to support the assumption of client's myopia, leading to low-value innovation posited by scholars (Christensen and Bower, 1996; Meredith, 2002) as firms may lose the foresight of creative innovation when focusing on serving existing customers' needs.

With regard to non-supported hypotheses on the performance implication of strategy-innovation fit, results highlight some limits of Miles and Snow's framework of strategic typologies to the understanding of strategy-innovation fit from a performance perspective. These limits may come from the fact that Miles and Snow's typology is embedded in the rationales of industrial organization and resource-based theories. According to these rationales, firms would, on one hand, search to align their decisions and organization to moderate market forces by cycling through entrepreneurial, engineering and administrative adaptive choices, and on the other hand, firms would develop appropriate capabilities that add the more to their core competences to support these choices and to enact market forces. From this perspective, and according to the equifinality principle (Miles and Snow, 1978, 2003), Prospectors would keep on prospecting and Defenders would keep on defending to improve performance (Hambrick, 1983; DeSarbo et al., 2006). However, this postulate does not take into account the context-dependent environment-strategy link and the more typical view that certain contexts favors certain types of strategic posture (Conant et al., 1990; Shortell and Zajac, 1990; DeSarbo et al., 2004, 2006). The above-mentioned limits question the equifinality of innovation mediating effect in the strategy-innovation-performance relationship. This is clearly illustrated by some outputs showing the non-significant or negative predictive influence of innovation attributes on firm performance despite strong strategy-innovation fit. Thus, the negative performance effect of the strong fit between product R&D and disruptive innovation or between costs orientation and disruptive innovation suggests that the role of innovation as a means for achieving strategic goals is contingency-dependent. Thus, results of Table 46 suggest that a costs orientation is positively influenced by clients, which conversely tend to hamper disruptive innovation, as they might be reluctant to a radical change in the offering they are used to get from firms. As a result, despite the positive direct influence of a costs orientation on performance, when providing a high degree of novelty in the products, services or relations to their clients, firms are likely to face this reluctance to change, which in turns will negatively influence both growth and profitability. Consequently, firms cannot financially benefit from their costs control efforts through disruptive innovative practices. Similarly, Table 46 also shows that product R&D is positively influenced by technical expertise. However, technical capabilities tend to hamper disruptive innovation, as they might be focused on meeting the needs of mainstream clients. Thus, despite the direct positive effect of product R&D efforts on both growth and profitability, technical expertise dedicated to disruptive product R&D may in fact contribute to affect firm performance by not addressing the needs of those mainstream clients. Results of Table 50 also highlight a negative influence of market-based innovation on firms' growth and profitability despite a strong strategy-innovation fit as regards product R&D or costs orientation attributes. Thus, while technical capabilities support product R&D efforts, which in turn positively influence growth, technical capabilities tend to hamper market-based novelty, as they are likely to be dedicated to support the competences needed to serve core market segments. Then, when investing in R&D efforts to develop new products aimed at new market needs, firms lack focusing on their mainstream clients, and consequently, cannot benefit from this market novelty through market share growth. The same prevails for the contingency effect of technical capabilities on a costs orientation dedicated to serve new market needs. Conversely, the influence of intermediaries (innovation agencies, R&D centers, public investment institutions, …) do not seem to support a costs orientation but tend to leverage market-based innovation, and directly influence growth and profitability. However, when dedicated to market-based innovation, the leveraging effect of intermediaries hampers both growth and profitability, suggesting that firms' strategic goals might not match those of intermediaries.

With regard to non-supported hypotheses on the significance of contingencies effects on strategy-innovation relationship, such as direct firm effects on sustained innovation and technology-based innovation or direct industry effects on technology-based innovation, process, product, and marketing innovation, results highlight the dominant contingency-mediating role of strategic posture as regards innovation behavior. Similarly, the non-significance of contingencies effects on strategy-innovation-performance relationship, such as direct industry effects on growth and profitability in a context of market-based or marketing innovation, or direct firm effects on growth and profitability in a context of organizational innovation, highlights the dominant contingency-mediating role of strategic posture or innovation behavior as regards performance. Such results suggest that in a performance prospect, in order to benefit from this mediating effect, SMEs should leverage the appropriate strategic attributes that will fit the targeted innovation behavior and the targeted performance from a contingency perspective.

These results on the negative performance impact of contingencies on strategy-innovation fit should be also considered in light of firm specificities. Indeed, results on control variables (see Table 3.4 in Appendix 3.3) show that the influence of technical capabilities is significantly related to firm turnover, the influence of clients is related to firm size and R&D intensity, and the influence of intermediaries is related to firm R&D intensity. Freel (2000), who found similar results as regards disruptive innovation and performance, suggests that non-innovators' higher performance in terms of profitability could be a size-related issue, as smaller firms cannot achieve similar benefits from innovations to the ones expected in larger SMEs. Forsman and Temel (2010) suggest that outputs of innovation are strongly contingent to the economic situation. Thus, while the degree of innovativeness (disruptive innovation) and the scope (market-based innovation) of innovation are performance-leveraging factors in favorable economic situations, they tend to hamper both growth and profitability in unfavorable periods. Our findings on the influence of clients' effects, and technical or intermediaries capabilities seem consistent with this standpoint. Indeed, it seems coherent that during the past unfavorable three-year period considered in this research, clients would emphasize safe, well-known offering from SMEs and that SMEs' technical expertise would be mostly dedicated to securing existing markets. Conversely, intermediaries, who are strongly encouraged by public policies to help leveraging innovation, would be mostly active to counterbalance this low-risk attitude by technically and financially supporting innovation novelty and scope, thus damaging the achievement of firms' strategic objectives.

From a theoretical perspective, this study confirms findings on the existence of industry-specific, differentiated strategy-innovation gestalts involving differentiated strategic capabilities associated with superior innovation performance (Raymond and St-Pierre, 2010a) as well as growth and profitability (Spanos and Lioukas, 2000; DeSarbo et al. 2005; Zhou et al., 2005). Moreover, this research is the one of the very few studies having demonstrated the predictive validity of strategy-innovation-performance relationship under industry-specific and firm-specific contingencies from a configurational perspective (Raymond and St-Pierre, 2010a, 2010b). This work also provides a contribution to the understanding of strategic maneuvering and the achievement of performance through a widened and fine-tuned approach of SMEs' innovation behavior. Indeed, from a performance perspective, the exploration of strategy-innovation relationship, using attributes of empirically-derived profiles, provides a more accurate, contingency-specific, representation of strategy-innovation dynamics. Furthermore, results on the clustering of empirically-derived strategic profiles suggest that clusters with the highest score on the key attributes of "pure" Miles and Snow's (1978) profiles namely here Analyzers and Differentiated Defenders (see Table 40) tend to be positively related with superior performance in growth and profitability (see Table 42) even though results are not significant for growth. This supports other findings suggesting that the Miles and Snow strategic framework, considered in conjunction with firm contingencies and industry contingencies is a powerful model of strategy-innovation behavior with real implications for SMEs performance (DeSarbo et al., 2005).

However, the emergence of so-called "efficient" Prospectors and "opportunistic" Low-Costs Defenders strategic profiles that do not neatly fall into Miles and Snow groupings and tend to underperform suggests that the theoretical ground of Miles and Snow's framework might not enable encompassing all strategic postures from a prescriptive standpoint. Thus, as these empirically-derived clusters are highly context-dependent, other contexts would likely lead to the emergence of new strategic profiles. From this standpoint, other theoretical frameworks could add valuable insights to the understanding of strategy-innovation fit and firm performance. In this prospect, the Agency theory on the nature of the principal-agent relationship might help exploring strategic and innovation choices of shareholder versus non-shareholder managers (Frankforter et al., 2000). Transaction costs theory on the efficiency-driven mode of market entry could also provide prescriptive guidance with respect to the different strategic postures and innovation behaviors for entry in terms of their related costs and competencies (Brouthers et al., 2003). Similarly, organizational ecology theory on the implication of structural inertia on reliable and accountable performance might complement the configurational view by highlighting the dynamics of strategy-innovation relationship and the reasons why some firms may underperform in the process (Hannan and Freeman, 1984).

6.8.2. Methodological implications

This study revisits Miles and Snow's (1978) framework of strategic types from a methodological perspective. Contrary to the paragraph approach, which cannot address the complexity of strategic configurations (Conant et al., 1990), our multiple-item Likert scale approach takes into account the differentiated propensity of firms to emphasize or not dimensions pertaining to each strategic choice of Miles and Snow adaptive cycle as well as Porter's (1980) generic typology. We also provide a new methodological approach that enables the emergence of strategic constructs qualifying the differentiated configurational characteristics that fit Miles and Snow's internal and Porter's external perspective of competitive advantage. The empirically-derived constructs clearly qualify product-market strategy as well as strategic positioning, research and development objectives, production behavior, and type of organizational structure and control. Thus, this methodological approach encompasses differentiated dimensions of competitive strategy as well as operational strategy. This is a valuable input for research on strategic management of innovation, especially for scholars aiming at exploring the influence of strategic attributes predicting firm's capacity to innovate (Becheikh et al. 2006b). At the innovation behavior level, we provide guidance for the emergence of distinct constructs qualifying innovation activities according to the OSLO Manual guidelines for collecting and interpreting innovation data (OECD, 2005), thus complying with a framework of reference likely to facilitating comparative research on overall innovation management. By designing innovation variables that express the propensity to adopt certain natures, sources and activities of innovation, the methodology allows a dynamic and systemic approach of innovation behavior.

Our methodology, based on empirically-derived strategic and innovation types, is particularly appropriate to capture the contingency-specific conditions that shape decisions aiming at matching strategic posture and innovation behavior with a performance prospect.

The configurational approach we have used seems effective and well adapted to describe and predict the role of industry-specific and firm-specific contingencies in the performance implication of strategy-innovation fit. Therefore, this methodology could support further research on the context-specific modeling of strategy-innovation-performance relationship (Zahra and Covin, 1994; Zahra, 1996, DeSarbo et al., 2005).

6.8.3. Managerial implications

This research provides also important managerial contribution to SMEs' trying to align strategic management with innovation management in view of achieving strategic objectives. Our results provide complementary insights to the assumption that industry characteristics and firm capabilities are significant determinants of strategic posture and innovation behavior attributes as well as strategy-innovation fit and performance in SMEs. Today's context of uncertainty and complexity, the lack of strategy-innovation alignment has been emphasized as a source of failure for successful implementation of competitive strategy (Walker and Ruekert, 1987; Porter, 1996; Smith et al. 2008). This is mainly because perception of environment uncertainty and complexity affects strategic posture (Spanos and Lioukas, 2001; DeSarbo et al., 2005) and the allocation and development of firms' strategic capabilities likely to leverage the appropriate innovation behavior towards the achievement of strategic goals (Raymond and St-Pierre, 2010a).

From a performance perspective, our findings suggests that, when choosing and implementing competitive strategy, SMEs executive should consider the natures, the sources and the activities of innovation that would more likely match their strategic posture in the light of market segments characteristics and available capabilities likely to influence this strategy-innovation relationship as well as the achievement of strategic goals. Given the complexity of this process, SMEs should benefit from the support of public policies aiming at fostering innovation and disseminating such practices of strategic management of innovation. However, local innovation systems lack effectiveness in the guidance of SMEs with respect to how encompass the whole scope of strategic and innovation management from entrepreneurial choice to operational innovation strategy. Public policies also tend to by-pass the contingency-specific approach during transfers of “best practices” of innovation management and favor the “one-size-fits-all” ineffective approach (European Commission, ERMIS project, 2009-2012; Méditerranée Technologies, 2009). From this prospect, the findings of this study on the influence of external and internal contingencies on innovation management could bring valuable insight to help adjusting public policies towards increased effectiveness.

This research attempts to bridge the gap between theory and field practice with regard to the strategic management of innovation by providing this contingency-specific approach. To this aim, we provide a set of predictive alignments between the characteristics of SMEs’ strategic posture and innovation behavior based on Miles and Snow’s (1978, 2003) framework characterizing Entrepreneurial, Engineering and Administrative strategic choices and Porter’s contingency approach of strategic positioning (1980). This framework is particularly appropriate for the above-mentioned contingency perspective of strategic management of innovation. Indeed, *“this hybrid typology defines business strategies in terms of two major dimensions: firstly, the unit’s desired rate of new product-market development (consistent with the prospector, Analyzer, and defender categories of Miles and Snow) and second, the unit’s intended method of competing in its core business or established product markets (either through maintaining a low cost position or by differentiating itself by offering higher quality or better service, as suggested by Porter.”* (Walker and Ruekert, 1987, p. 17).

Results indicate that market forces do not significantly directly influence the innovation behavior matching strategic posture. More specifically, market forces influence strategic posture, which in turn determines innovation behavior choices. Firm capabilities, which influence directly both innovation behavior and strategic posture, are also mediated by strategic posture. With regard to performance, both growth and profitability are negatively related to industry-specific contingencies whereas firm-specific contingencies tend to positively influence firm performance. When considering indirect effects, firm-specific contingencies also tend to have a more significant influence on firm performance though the mediating effect of strategy and innovation. This suggests that SMEs can exercise some market power providing they achieve two dimensions of fit as posited by Miles and Snow (1994); external fit between the firm and market forces, that is, the relevance of the firm's strategic posture in a given environment, and internal fit, that is, considering available capabilities, the coherence of organization's structure, processes and managerial ideology supporting this strategic posture. Our findings highlight explicit strategy-innovation alignments for this appropriate dual fit towards firm performance in terms of growth and profitability. Thus, this research provides explicit contingency-dependent guidance on effective combinations between strategic attributes and innovation attributes. Doing so, we expect to contribute to the effective formulation and implementation of competitive strategy, hence to superior performance in manufacturing SMEs (Lefebvre and Lefebvre, 1993; Zahra and Covin, 1994; Miles and Snow, 1978, 1994, 2003; Thornhill, 2006; Raymond and St-Pierre, 2010a).

6.9. Limitations and suggestions for future research

The findings and implications of this research shed some light on the dynamics of the strategy-innovation relationship in SMEs and the leveraging effect of innovation behavior on firm performance depending on internal and external contingencies. The design and the scope of our conceptual framework has enabled such an investigation with promising theoretical and managerial prospects as *"enlarging the analysis of innovation beyond the technological domain provides a much richer and complex picture of firm's innovation strategies and performances."* (Evangelista and Vezzani, 2010, p. 1262). However, this should be evaluated in light of the study's limitations. From a theoretical perspective, it should be emphasized that while this research explores the performance implication of fit between strategic posture and innovation behavior attributes from a contingency perspective, we have not modeled the predictive influence of this fit at the individual contingency attributes level or at the strategic and innovation attributes level. Further theoretical work could then extend this systemic approach to a finer grained investigation aiming at modeling pairwise relationship between strategic, innovation, performance and contingencies attributes. For instance, the specific analysis of clients effects on strategic choices at all levels of the adaptive cycle, and on innovation behavior, and their impact on growth and profitability could provide managerial insights on the efficient articulation between R&D, sales and marketing teams in SMEs from different strategic profiles. Similarly, investigating substitutes effects on the relationship between engineering adaptive choices and innovation behavior could help further understanding the mediating effect of innovation on firm performance with regard to market dynamism. The leveraging or hampering effect of suppliers on product innovation and performance in the specific context of manufacturing SMEs could also be explored from an entrepreneurial or engineering choice perspective. The same prevails for technical capabilities as a leveraging firm-specific contingency likely to impact differentiated strategy-innovation attributes alignments and different dimensions of performance, or CRM capabilities and their potential "client myopia" effect likely to hamper innovative behavior when firms focus on satisfying mainstream clients, while nevertheless positively influencing both growth and profitability. Other research could also further investigate the role of SMEs' relationships with intermediaries as a potential direction for fostering market-based and product innovation, while simultaneously hampering R&D efforts towards new markets. This topic is of special interest for regional, national and European public policies aiming to stimulate innovation in SMEs through cross-cooperation dedicated to breakthrough innovations and new forms of business models. A key issue in this prospect relies on intermediaries' ability to enhance their scope of understanding innovation behavior in SMEs beyond the sole product or process approach (OECD, Oslo Manual, 2005).

Such an attempt to model pairwise relationship between strategy, innovation, performance and contingencies at the attribute-level is beyond the scope of this specific study and would probably require the collection of objective quantitative data regarding firm performance as opposed to subjective perception of SMEs' management evaluating their relative performance versus competitors. Instead, we have focused on understanding contingencies effects in the overall systemic context on strategy-innovation-performance relationship. Moreover, the predictive validity of such a modeling attempt deserves a focused approach that might have been incompatible with the scope of the studied strategic and innovation dimensions. This research should be considered as a preliminary robust empirical basis for further specific explorations in above-mentioned directions.

Future research could also investigate the performance impact of strategy-innovation relationship comparing the predictive accuracy of various strategic typologies using a composite model borrowing from an enhanced theoretical scope that would complement Miles and Snow's Industrial Organisation and Resource-Based perspective (Hambrick, 2003). From this standpoint, organizational ecology theory (Hannan and Freeman, 1977, 1984) might complement the understanding of the deterministic role of environment on strategic and innovation behavior, hence on performance. Organizational ecology posits that organizations are often less able to respond properly to radical changes in the environment. Therefore, in uncertain and complex environments, "*selection pressures favor organizations that can* *reliably produce collective action and can account rationally for their activities. A prerequisite for reliable and accountable performance is the capacity to reproduce a structure with high fidelity. The price paid for high-fidelity reproduction is structural inertia. Thus if selection favors reliable, accountable organizations, it also favors organizations with high levels of inertia."* (Hannan and Freeman, 1984, p. 164). This assumption could help understanding the dynamics of the formation of differentiated strategy-innovation alignments. Similarly, the initial rationale of the agency theory, which emphasizes mechanisms to solve problems created by the separation of ownership and control, might provide new insights on the strategic choice approach of industry and firm contingencies. Agency theorists focus on the relationship between a principal (the owner of resources) and the agent (the one who performs the work), where the principal is the shareholder and the agent is the strategic decision-making dominant coalition within the firm. In this Principal-Agent model of the firm, as executive managers are agents for shareholders, maximizing the present value of the firm is the appropriate motivating principle for management (Quinn and Jones, 1995). Indeed, when managers/agents own company stock and/or have part of their compensation contingent on financial performance an when shareholders/principals closely monitor that their interests are aligned with those of agents, superior financial performance arises (Frankforter et al., 2000). Consequently, this relationship between economic actors strongly influences the firm's strategic orientation and explains differences in strategies pursued by firms to generate performance. Thus, the link between firm management and firm-ownership could be a valuable qualifying factor of strategic and innovation behavior, which is not encompassed in Miles and Snow framework. As it contrasts with the 'capability-based' view of firm scope as regards vertical integration decisions (Argyres, 1996), transaction costs theory could also bring a complementary perspective to the resource-based dimension of Miles and Snow's framework. Transaction costs theorists posit that firms select the mode of entry that provides the least cost solution (Masten, 1993; Shelanski and Klein, 1995). Strategic management is then efficiency-driven towards the organizational design that provides a superior efficiency of the selected entry mode compared to other alternatives, in order to generate optimal performance. Based on this assumption, transaction costs-derived strategic postures aim at optimal levels of organizational efficiency (Roberts and Greenwood, 1998). As different entry structures vary in terms of their related costs and competencies, firms that use a transaction costs solution to optimal organizational efficiency and performance select the mode that economizes on these costs (Brouthers et al., 2003).

Therefore, further research could compare the respective contribution of different strategy conceptual frameworks to the understanding of the strategy-innovation-performance relationship: "Pure" Miles and Snow profiles, empirically-derived Miles and Snow profiles, and profiles characterized by attributes qualifying postures designed by above-mentioned theoretical perspectives. The theoretical, methodological and managerial contributions of such investigations would likely complement the present research and provide an enhanced prescriptive scope of findings.

Finally, this study has examined the causal strategy-innovation-performance relationship without controlling for the economic situation. Still, the causal relationship between innovation behavior and performance in SMEs remains largely influenced by the economic context (Forsman and Temel, 2010). Consequently, further research should investigate the specific alignments of strategic posture and innovation behavior associated to superior performance from a longitudinal perspective covering favorable and unfavorable periods. The use of our conceptual model in this prospect would provide a more in-depth exploration of contingencies effects on the performance implication of strategy-innovation fit. This would possibly contribute to highlight even more accurate representations of effective behavior as regards strategic management of innovation in SMEs.

VII - General conclusion

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7.1. Reminder of the research framework and objectives

Little has been explored in the field of strategy research to study the fit between strategic posture, innovation and performance from both the industry and firm contingencies perspective. On one side, research on competitive strategy has largely emphasized the differentiated influence of industry and firm-level contingencies on strategic choices (Rumelt, 1991; McGahan and Porter, 1997; Spanos and Lioukas; 2001; Spanos et al., 2004). There is also a volume of research on the relationship between business strategies and innovation (Lefebvre and Lefebvre, 1993; Becheikh et al., 2006a) but there is less evidence on the dynamics of this relationship from a performance perspective. The generation of value from innovation is a complex issue, both organizationally and environmentally influenced (Miles and Snow, 1978, 1994; Damanpour, 1991; Tidd, 2001; Vaona and Pianta, 2008). Value innovation relies on firms' ability to select the types of innovations that are congruent with firm's goals. Doing so, firms should coordinate innovation choices with their strategic posture, i.e. the alignment of firm organization's design components with strategy and with each other thus using innovation as an efficient means to achieve strategic goals (Hambrick and MacMillan, 1985; Kotabe, 1990; Porter, 1996).

This coordination (or fit) is a central issue as it suggests that firms should only dedicate resources and develop capabilities to innovation behavior consistent with their strategic posture. This is even more critical for SMEs, for which innovation has become essential to counterbalance their greater vulnerability in turbulent and knowledge-based markets. Considering their role as an engine in today's economic development (Bartelsman et al., 2005; Coulter, 2010), understanding how SMEs achieve superior performance when adopting specific innovation behavior has significant implications for SME managers and public policy makers. Increased market and financial performance of SMEs generate employment and contribution to general economic health of a region, or a nation. This is of high importance in southern European countries where low-tech manufacturing industries are over-represented and industrial structure has a relative weakness in innovative activities capable to support the introduction of new products and the growth of new markets (EU, 2003/7, 2007). In recent years, a growing number of research works have investigated the impact of innovation on business performance. However, the question of the causal relationship between innovation attributes and performance remains partially explored in the context of SMEs with regard to attributes such as the nature (sustained innovation versus disruptive) or the source (technology or market-based) of innovation (Forsman and Temel, 2010). The same prevails regarding the type - process, product, marketing, organizational - of activities of innovation (Evangelista and Vezzani, 2010). It has also been suggested that the relationship between innovation and performance is contingency-dependent (Tidd, 2001; Rosenbusch et al., 2011) and that innovation does not necessarily lead to superior performance (Forsman and Temel, 2010). Besides, although studies have emphasized the fact that different competitive strategies should lead to different innovative behaviors (Lefebvre and Lefebvre, 1993; Becheikh et al., 2006; Vaona and Pianta, 2008) little has been investigated concerning the relationships between strategic variables as determinants of innovation (Becheikh et al., 2006). Accordingly, a promising field of research for scholars of strategy and innovation lies in the investigating causal relationship concerning the fit between strategic posture, innovation behavior and the influence of specific strategy-innovation alignments on performance from a contingencies perspective. Indeed, since the seminal research conducted by Zahra and Covin (1994) on the financial implications of fit between competitive strategy and innovation, very few works have attempted to investigate further these issues, and fewer have approached such a research in the light of contingencies effects.

Hence, the following research questions arise: How do specific strategic postures influence specific innovation behaviors? What are the specific configurations of alignment between strategic posture and innovation behavior associated to superior performance? To which extend are these configurations and the fit between strategic posture and innovation behavior contingency-dependent?

The present research attempts to contribute to answer these questions in the context of SMEs from the manufacturing sectors. To this aim, throughout our three essays, we use a model combining Miles and Snow's (1978) internal and Porter's (1980) external focus of competitive strategy leaving possibilities for combinations of contingency-specific hybrid, strategic profiles (DeSarbo et al., 2005). This model also leaves possibilities for combinations of innovation profiles regarding the nature, source and activity attributes of innovation. Doing so, we wish to complement the seminal findings from Zahra and Covin (1994) in several directions.

In our first essay, we investigate the causal relationships within and between attributes of strategic and innovation profiles. We subsequently attempt to demonstrate the existence of predictive alignments between the Entrepreneurial, Engineering and Administrative of Miles and Snow's strategic postures and the characteristics of their respective innovation behavior. We also bridge the gap for the need to enhance the scope of analysis of strategy-innovation relationship, usually focused on technological innovation (Becheikh et al., 2006b; Raymond and St-Pierre, 2010a) by including marketing and organizational innovation in this analysis (OECD, OSLO Manual, 2005). In our second essay, we explore the differentiated relationship between strategic posture and innovation behavior from an industry-specific and firm-specific contingencies perspective. We study the effects of contingencies on strategy-innovation relationship and the likelihood of the existence of differentiated effects depending on strategic and innovation attributes. Doing so, we attempt to demonstrate the contingency-specific predictive validity of strategy innovation-relationship from a configurational perspective (Raymond and St-Pierre, 2010a, 2010b). In our third essay, we investigate from a performance perspective the causal relationships between attributes of strategic and innovation profiles under the effects of industry and firm contingencies. Thus, we attempt to demonstrate the existence of predictive strategy-innovation alignments and their influence on firm performance. By enhancing the scope of analysis of strategy-innovation relationships to the nature, the source and technological but also marketing and organizational dimensions of innovation behavior, we wish to bring new insights to the performance implication of fit between strategic attributes and innovation attributes. Indeed, as emphasized by Evangelista and Vezzani (2010, p. 1262) *"enlarging the analysis of innovation beyond the technological domain provides a much richer and complex picture of firm's innovation strategies and performances"*. We then investigate the existence of industry-specific, differentiated strategy-innovation gestalts involving differentiated strategic capabilities associated with superior innovation performance (Raymond and St-Pierre, 2010a) as well as growth and profitability (Spanos and Lioukas, 2000; DeSarbo et al. 2005; Zhou et al., 2005).

Through these three studies, we expect to provide new perspectives of research together with methodological and practical outputs in the field of strategic management of innovation for manufacturing SMEs. As previously stated, proposing solutions dedicated to this typology of firms is a real issue for stakeholders of regional and national economic development. Indeed as SMEs are highly impacted by market forces and strongly dependent on their idiosyncratic capabilities, sustaining competitive advantage is conditional to the adoption of appropriate strategic postures likely to leveraging innovation performance towards the achievement of strategic goals.

7.2. Major contributions

Theoretical contributions

Overall, the results of these three essays contribute to the understanding of the strategic management in innovation in manufacturing SMEs from theoretical, methodological and managerial perspectives. With regard to theoretical insights, this research provides contribution in several ways. First, our results support our proposal for the existence of differentiated alignments between the Entrepreneurial, Engineering and Administrative characteristics of Miles and Snow's strategic postures and the characteristics of their respective innovation behavior. Thus, the studies provide support to other research works on the validity of competitive strategy as a predictor of innovation behavior (Kotabe, 1990; Zahra and Covin, 1994; Becheikh et al., 2006b). Our findings also confirm other works suggesting that the equifinality position proposed by Miles and Snow (1978) with regard to strategy-performance relationship does not apply to strategy-innovation relationship (Blumentritt and Danis, 2006). The use of a conceptual model combining Miles and Snow's framework and Porter's typology has enabled to fine-tune the analysis of this predictive validity to the level of firm's organizational strategy, structure and processes. This has also fine-tuned and enhanced the level of analysis to a systemic approach of innovation behavior taking into account the attributes of the natures (sustained or disruptive), sources (technology-based or market-based), and activities (process, product, marketing and organizational) of innovation. This approach has provided an extensive understanding of the predictive innovation strategy of a firm based on the determinants of its strategic configuration. These works also support Miles and Snow strategic typology as a powerful model of SMEs' strategy and innovation behavior in the manufacturing sector. Indeed, within our empirically-derived groups of firms, the core generic attributes qualifying the adaptive choices of Miles and Snow's initial strategic profiles (1978) have also been identified as clear determinants of the firms' innovation behavior. Besides, the exploration of strategy-innovation relationship based on attributes of empirically-derived profiles provides a more accurate, contingency-specific, representation of strategy-innovation dynamics in manufacturing SMEs, while the combination of Miles and Snow's and Porter's typologies provides a new dual internal-external perspective of this level of strategy-innovation relationship.

Second, results of the second and the third essays provide extensive support to the influence of industry-specific and firm-specific effects on strategy-innovation relationship, and highlight the existence of distinct but complementary effects depending on innovation dimensions. Thus, industry-specific effects seem to have a low direct influence on innovation behavior, with the exception of organizational innovation, whereas they tend to significantly influence strategic posture. Conversely, firm-specific effects tend to influence directly all dimensions of firms' innovation behavior as well as strategic posture attributes. Results on indirect effects emphasize the mediating role of strategic attributes in strategy-innovation alignments under contingencies. This is emphasized by the differentiated influence of both indirect industry effects, which, as previously stated, mainly directly influence the adaptive strategic choices, which, in turn, determine innovation behavior choices, and the influence of indirect firm effects, where strategic posture attributes mediate differentiated firms' capabilities effects on innovation behavior. This research is thus one on the few studies having demonstrated the predictive validity of strategy-innovation relationship under industry-specific and firm-specific contingencies from a configurational perspective (Raymond and St-Pierre, 2010a, 2010b).

Third, results of our last essay bring extensive support to the performance implication of fit between strategic posture and innovation behavior attributes, and suggest that strategic attributes are important qualifying factors of firms' innovation-related decisions and the type of performance to be expected from these decisions. Accordingly, results clearly show that when strategic attributes negatively directly influence firm performance, strategy-innovation fit is conducive to increased performance through the positive mediating effect of innovation attributes. Results also tend to support Forsman and Temel (2010) assumption that innovation is not always predictive of increased performance and suggest that SMEs should consider what might be the return of different innovation types, depending on present and future economic conditions. This highlights the need for internal configurational fit, or gestalt, aiming at a strategic management of innovation, where the entrepreneurial choice consists in innovating in selecting the right products or services to address markets where the firm wants to operate, the engineering choice consists in innovating in selecting the right processes to produce and distribute products or services, and the administration choice consists in innovating in designing and implementing solutions dedicated to both reducing uncertainty within the organizational system and adapting to environmental changes (Raymond and St-Pierre, 2010b). Our empirically-derived clusters of strategic profiles also confirm that Prospectors, Defenders and Analyzers are characterized by significantly different postures and are all innovative but in different ways (Miles and Snow, 1994), thus emphasizing the need for identifying the right strategy-innovation gestalts at the attributes level.

Results also highlight the significant influence of contingencies on the mediating effect of innovation attributes in the strategy-innovation-performance relationship. Consequently, as illustrated by direct and indirect effects of disruptive or market-based innovation on performance, the role of innovation as a means for achieving strategic goals is contingent to industry-specific and firm-specific influences. This supports other findings on the context-specific performance level related to the nature of innovation (Forsman and Temel, 2010) and the source of innovation (Zhou et al., 2005). Finally, our findings on the respective performance of empirically-derived clusters of strategic profiles, suggest that the Miles and Snow strategic typology, considered in conjunction with the firm-industry contingencies framework, is a powerful model of strategic and innovation behavior with real implications for the performance of SMEs in the manufacturing sector.

However, the emergence of empirically-derived strategic profiles that do not neatly fall into Miles and Snow groupings and tend to underperform suggests that the theoretical ground of Miles and Snow's framework might not enable encompassing all strategic postures from a prescriptive standpoint. From this standpoint, then, other theoretical frameworks could add valuable perspectives to the understanding of strategy-innovation fit and firm performance. In this prospect, agency theory, on the nature of the principal-agent relationship, transaction costs theory, on the efficiency-driven mode of market entry, or organizational ecology theory, on the implication of structural inertia on reliable and accountable performance, might complement Miles and Snow's configurational view, and provide new insights on the dynamics of strategy-innovation relationship and the reasons why some firms may underperform in the process.

Methodological contributions

With regard to methodological insights, contrary to the paragraph approach, which cannot address the complexity of strategic configurations (Conant et al., 1991), our multiple-item Likert scale approach takes into account the differentiated propensity of firms to emphasize or not dimensions pertaining to each strategic choice of Miles and Snow adaptive cycle (1978) as well as Porter's (1960) generic typology. We also provide a new model that enables the emergence of empirically-derived constructs that clearly qualify product-market orientation as well as strategic positioning, research and development objectives, production behavior, and type of organizational structure and control. Thus, this methodological approach encompasses the dimensions of competitive strategy as well as operational strategy. This is a valuable input for works exploring the influence of variables related to strategic management examined as determinants of firm's capacity to innovate (Becheikh et al., 2006b). At the innovation behavior level, our methodology complies with the OSLO Manual guidelines for collecting and interpreting innovation data and should provide guidance for comparative research between Local Innovation Systems focused on fostering innovation in SMEs. By designing innovation variables that express the propensity to adopt certain natures, sources and activities of innovation, the methodology also allows a dynamic approach of overall innovation behavior.

Finally, our model is particularly appropriate to capture the contingency-specific conditions that shape decisions on strategic posture and innovation behavior towards the achievement of strategic goals. The configurational approach we have used seems effective and well adapted to describe and predict the effects of industry and firm-specific contingencies in the performance implication of fit between strategic and innovation attributes. Therefore, this methodology could support further research on the context-specific exploration of strategy-innovation-performance relationship.

Managerial contributions

From a managerial perspective, in light of the crucial role of innovation as a source of competitive advantage (Lefebvre and Lefebvre, 1993; Porter, 1996; Teece et al. 1997; Eisenhardt and Martin, 2000), this research provides also important contributions to SMEs' trying to align strategic management with innovation management. Indeed, today's context of uncertainty and complexity creates extensive challenges for SMEs with respect to choices for strategy-innovation alignment and implementation (Damanpour, 1996; Tidd, 2001; European Commission 2007). This situation has been analyzed as a source of failure for successful implementation of competitive strategy as the perception of environment uncertainty and complexity affects strategic posture, the allocation and development of firms' strategic capabilities, and consequently the management and the organization of innovation (Miles and Snow, 1978; Ketchen, 2003; Smith et al., 2008). Indeed, given their limited resources, SMEs cannot afford to develop or adopt innovation behaviors that are not aligned with their strategic objectives. More precisely, our research suggests that, when choosing and implementing competitive strategy, SMEs executives should consider the natures, the sources and the activities of innovation that would match their strategic posture in light of targeted market segments characteristics and available capabilities likely to influence this strategy-innovation relationship. Given the complexity of this process, public policies aiming at fostering innovation and performance in SMEs should support and disseminate such practices of strategic management of innovation. This requires a different approach than the "one-size-fits-all" policy, which cannot take into account the configurational diversity of SMEs. However, investigation on the effectiveness of Local Innovation Systems has highlighted a lack of guidance of SMEs in this matter and the absence of context-specific approach during transfers of "best practices" of innovation management (European Commission, ERMIS, 2009-2012).

Built on a contingency-specific approach of strategic and innovation management, this research contributes to bridge the gap between theory and field practice. To this aim, we provide a set of predictive alignments between the characteristics of SMEs' strategic posture and innovation behavior based on Miles and Snow's (1978, 2003) framework characterizing Entrepreneurial, Engineering and Administrative strategic choices and Porter's contingency approach of strategic positioning (1980). This framework is particularly appropriate for the above-mentioned contingency perspective of strategic management of innovation as it provides simultaneously an internal-external and external-internal approach of competitive advantage. Our field-based results on the effects of contingencies on the causal relationship between strategic posture, innovation behavior and performance indicate that SMEs can exercise some market power, providing they achieve both external fit between the firm's strategic posture and market forces, and internal fit, within this strategic posture, between the organization's structure, processes and managerial orientation, in light of available capabilities. We highlight explicit strategy-innovation alignments for this appropriate dual fit towards firm performance. By providing explicit contingency-dependent guidance on the relationship between strategic posture and innovation behavior, we expect to contribute to the effective formulation and implementation of competitive strategy in manufacturing SMEs.

7.3. Limitations and perspectives for future research

The findings and implications of this research should also be considered in light of its limitations. The design and the scope of our systemic conceptual framework has highlighted the dynamics of the strategy-innovation relationship in SMEs and the leveraging effect of innovation behavior on firm performance depending on internal and external contingencies. However, this systemic investigation on the fit between attributes of strategic posture and innovation behavior and the performance implications of this fit could not enable modeling pairwise relationship between strategic, innovation, performance and contingencies attributes.

Such an attempt is beyond the scope of this specific study and the predictive validity of this modeling would deserve a focused approach that might have been incompatible with the scope of the studied strategic and innovation dimensions. This would probably also require the collection of objective quantitative data regarding firm performance as opposed to subjective perception of SMEs' management evaluating their relative performance versus competitors. Such a prerequisite also raises the issue of the public availability of performance measures from a typology of firms that are usually reluctant to divulge strategic information. Instead, we have focused on understanding contingencies effects in the overall systemic context of strategy-innovation-performance relationship. Consequently, this research should be considered as a preliminary robust empirical basis for further specific explorations in above-mentioned directions.

As previously mentioned, the performance impact of strategy-innovation relationship could also be explored comparing the predictive accuracy of various strategic typologies. To this end, further research could build on a composite model borrowing from an enhanced theoretical scope that would complement Miles and Snow’s Industrial Organisation and Resource-Based perspective. Organizational ecology theory (Hannan and Freeman, 1977, 1984) might bring new insights on the deterministic role of environment on strategic and innovation behavior, hence on performance. Organizational ecology posits that organizations are often less able to respond properly to radical changes in the environment, suggesting that environment selection pressures favor reproduction, hence structural inertia, as a condition to reliable and accountable performance. This assumption could help understanding the dynamics of the formation of differentiated strategy-innovation alignments with respect to how firms with different strategic postures would deal with innovativeness. Similarly, agency theory, which emphasizes the issue of the separation of ownership and control, might add the perspective of the link between firm management and firm-ownership, as a valuable qualifying factor of strategic and innovation behavior, to Miles and Snow’s framework. Transaction costs theory could also bring complementary insights to the resource-based dimension of Miles and Snow’s perspective of strategy-innovation relationship. Indeed, transaction costs theory posits that strategic management is efficiency-driven towards the organizational design that provides a superior efficiency of the selected entry mode compared to other alternatives, in order to generate optimal performance. Based on this assumption, transaction costs-derived strategic postures aim at optimal levels of organizational efficiency, and consequently, as different entry structures vary in terms of their related costs and competencies, firms that use a transaction costs solution to optimize organizational effectiveness will select the mode that economizes on these costs (Brouthers et al., 2003).

Further research could then compare the contribution of different conceptual frameworks of strategic postures to the understanding of the performance implication of fit between strategic and innovation behaviors: "Pure" Miles and Snow profiles, empirically-derived Miles and Snow profiles, and profiles characterized by attributes qualifying postures designed by above-mentioned theoretical perspectives. From a theoretical, methodological, and managerial standpoint, this would likely complement the present research by enhancing the prescriptive scope of our works.

Finally, this study has examined the causal strategy-innovation-performance relationship without controlling for the economic situation. This is a research direction that would deserve real focus as the relationship between innovation behavior and performance in SMEs remains largely influenced by the economic context (Forsman and Temel, 2010). Therefore, further research should investigate the specific strategy-innovation alignments associated to superior performance from a longitudinal perspective covering favorable and unfavorable periods. The use of our conceptual model in this prospect would be particularly appropriate, as it would provide an in-depth exploration of contingencies effects on the performance implication of strategy-innovation fit. This would possibly contribute to highlighting even more accurate representations of effective behavior as regards strategic management of innovation and sustained performance in SMEs.

VIII – References

VIII – References

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IX - Appendices

IX – Appendices of the three essays

9.1. Appendices – 1st essay "Strategic posture and innovation behavior in SMEs: Type and relationship"

9.2. Appendices – 2nd essay "Strategic posture and innovation behavior in SMEs: The impact of industry and firm contingencies on type and relationship"

9.3. Appendices – 3rd essay "Strategic posture and innovation behavior in SMEs: Fit, performance, and contingencies"

9.1. Appendices – 1st essay: "Strategic posture and innovation behavior in SMEs: Type and relationship"

9.1.1. Appendix 1.1: Descriptive statistics

Table 1.1: Firm size in number of employees

Firm size (nb of employees)

Size	Freq.	Percent	Cum.
<10	13	7.22	7.22
10-49	133	73.89	81.11
50-99	17	9.44	90.56
100-249	17	9.44	100.00
Total	180	100.00	

Table 1.2: Firm industry sectors

Firm industry sectors

Sectors	Freq.	Percent	Cum.
Food	18	10.11	10.11
Textile & wearing	11	6.18	16.29
Wood & paper	10	5.62	21.91
Printing	7	3.93	25.84
Chemicals & pharmaceuticals	14	7.87	33.71
Rubber & plastics	18	10.11	43.82
Metals	35	19.66	63.48
Electricals & electronics	18	10.11	73.60
Machinary & equipments NEC	14	7.87	81.46
Automotive & transport	5	2.81	84.27
Furniture	6	3.37	87.64
Other manufacturing	9	5.06	92.70
Reparing	10	5.62	98.31
Others	3	1.69	100.00
Total	178	100.00	

Table 1.3: Firm R&D intensity in percentage of R&D expenses on turnover

Firm R&D intensity (% of turnover)

R&D intensity	Freq.	Percent	Cum.
<2,5%	113	62.78	62.78
>2,5%	67	37.22	100.00
Total	180	100.00	

Table 1.4: Firm turnover in thousands Euros

Firm turnover (000 €)

Turnover	Freq.	Percent	Cum.
<500	13	7.22	7.22
500-999	16	8.89	16.11
1000-4999	92	51.11	67.22
5000-14999	35	19.44	86.67
15000-50000	19	10.56	97.22
>50000	5	2.78	100.00
Total	180	100.00	

Table 1.5: Firm age characterized as date of creation

Firm age (date of creation)

Age	Freq.	Percent	Cum.
Before 1960	7	3.89	3.89
1960-1989	48	26.67	30.56
1989-2006	79	43.89	74.44
after 2006	46	25.56	100.00
Total	180	100.00	

9.1.2. Appendix 1.2: Construct validation

Table 2.1: Factor analysis – Identification of strategic posture constructs

Factor Analysis - Strategic posture constructs

Constructs	*Measures*	*First order loadings* [a]	*Cronbach's alpha*
Entrepreneurial - Differentiation			0.502
	Quality of offering to clients	0.831	
	Novelty of offering to clients	0.723	
Entrepreneurial - Scope			0.426
	New markets opportunities	0.754	
	Scope of product-market domains	0.733	
Entrepreneurial - Costs			0.352
	Cost competitiveness	0.770	
	Market penetration and consolidation	0.728	
Entrepreneurial - Stability			1.000
	Product-market domain stability	0.970	
Engineering - R&D Process			0.734
	R&D focus on quality of offering	0.870	
	R&D focus on improvement of existing offering	0.729	
	R&D focus on production and logistics efficiency	0.710	
Engineering - R&D Market			0.694
	R&D focus on new market opportunities	0.863	
	R&D focus on new business models	0.810	
Engineering - R&D Product			0.722
	R&D focus on new products	0.876	
	R&D focus on new applications for products	0.730	
Engineering - R&D Costs			1.000
	R&D focus on cost leadership	0.957	
Engineering - Production Flexibility			0.655
	Versatility and flexibility of production staff	0.874	
	Flexibility of production equipment and processes	0.841	
Engineering - Production			0.534
	Specialization of production staff	0.844	
	Specialization of production processes	0.800	
Administrative - Formal organization			0.664
	Strict monitoring of planning	0.778	
	Formalized job description	0.687	
	Strict adherence to procedures	0.649	
	Management through planification of tasks	0.646	
Administrative - Flexible			0.555
	Management through adaptation to contingencies	0.787	
	Job flexibility	0.712	
	Setting of vision and generic directions	0.623	
	Management by project	0.441	

Notes [a] all factor loadings significant at $p < 0.01$

Table 2.2: Factor analysis – Identification of innovation behavior constructs

Factor Analysis - Innovation behavior constructs

Constructs	*Measures*	*First order loadings* [a]	*Cronbach's alpha*
Organizational innovation			0.786
	New operational management methods	0.812	
	New practices of business networking	0.693	
	New practices of cooperation with external R&D units	0.693	
	New practices of cooperation with clients or suppliers	0.689	
	New practices of organizing the firm's workplace	0.600	
Process innovation			0.762
	New production methods	0.772	
	New logistics methods	0.702	
	New engineering methods	0.621	
	New costing methods	0.602	
Marketing innovation			0.767
	New product design	0.798	
	New product packaging	0.771	
	New sales and product placement methods	0.630	
Product innovation			0.598
	New technological features of products	0.805	
	New use of products	0.600	

Notes [a] all factor loadings significant at $p < 0.01$

9.1.3. Appendix 1.3: Control variables - ANOVA results

Table 3.1: ANOVA results on correlations between control variables and strategic posture attributes

Control variables and strategic posture characteristics : ANOVA results [a] (F test reported)

	Control variables																						
	Size					*Metal sector*			*R&D Intensity*			*Turnover*							*Age*				
Strategic posture characteristics [b]	<10	10-49	50-99	100-249	F test	Y	N	F test	< 2.5	> 2.5	F test	< 500	500-999	1000-4999	5000-14999	15000-50000	> 50000	F test	Historic	Ancient	Mature	New	F test
Entrepreneurial - Differentiation																							
Entrepreneurial - Scope												-0.173	0.2	0.125	-0.224	0.379	0.92	0.0864					
Entrepreneurial - Costs									0.097	-0.198	0.0681												
Entrepreneurial - Stability	-0.042	-0.079	0.374	0.502	0.0508																		
Engineering - R&D Process									-0.118	0.287	0.0103								0.309	0.298	-0.165	0.033	0.0839
Engineering - R&D Market																							
Engineering - R&D Product									-0.198	0.385	0.0004												
Engineering - R&D Costs																							
Engineering - Production Flexibility																							
Engineering - Production Productivity						-0.085	0.396	0.0102				0.126	-0.363	0.098	-0.348	0.361	0.172	0.0722					
Administrative - Formal organization	-0.67	-0.048	0.372	0.464	0.0097				-0.144	0.215	0.0249	-0.078	-0.675	0.01	-0.079	0.628	-0.026	0.0146	0.228	0.352	-0.179	-0.115	0.0339
Administrative - Flexible organization																							

Notes [a] Only significant results at p < 0.1 are reported

[b] Based on factor analysis of strategy characteristics

Table 3.2: ANOVA results on correlations between control variables and innovation behavior attributes

Control variables and innovation behavior characteristics : ANOVA results [a] **(F test reported)**

	Control variables																						
	Size					*Metal sector*			*R&D Intensity*			*Turnover*							*Age*				
Innovation behavior characteristics	<10	10-49	50-99	100-249	F test	Y	N	F test	< 2.5	> 2.5	F test	< 500	500-999	1000-4999	5000-14999	15000-50000	> 50000	F test	Historic	Ancient	Mature	New	F test
Sustained (scale 1-7)	4.769	5.611	5.823	6	0.0755				5.459	5.848	0.0626												
Disruptive (scale 1-7)									4.073	4.631	0.0267												
Technology-based (scale 1-7)									4.345	5.076	0.0041	4.538	4.375	4.82	3.886	5.056	5.6	0.0364					
Market-based (scale 1-7)																							
Organizational [b]									-0.162	0.276	0.0096												
Process [b]									0.106	-0.223	0.0566												
Marketing [b]						0.127	-0.326	0.0174															
Product [b]									-0.267	0.425	0.0000	0.306	-0.004	-0.038	-0.124	0.455	-0.907	0.082					

Notes [a] Only significant results at $p < 0.1$ are reported

[b] Based on factor analysis of innovation characteristics

9.1.4. Appendix 1.4: Interrelations - Strategy attributes

Table 4.1: Intercorrelations between strategic posture attributes

Intercorrelations among strategic posture variables [a]

Strategic posture characteristics [b]	*Strategic posture characteristics b*											
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
1 Entrepreneurial - Differentiation orientation	1.000											
2 Entrepreneurial - broad product/market Scope		1.000										
3 Entrepreneurial - Cost orientation			1.000									
4 Entrepreneurial - product/market Stability				1.000								
5 Engineering - R&D Process oriented	0.353***			0.169**	1.000							
6 Engineering - R&D Market oriented		0.279***				1.000						
7 Engineering - R&D Product oriented	0.221***	0.212***					1.000					
8 Engineering - R&D Costs oriented		0.139*	0.369***					1.000				
9 Engineering - Production Flexibility oriented		0.233***	0.169**		0.168**	0.135*			1.000			
10 Engineering - Production Productivity oriented	0.131*		0.204***		0.140*	0.256***		0.156**		1.000		
11 Administrative - Formal organization	0.185**		0.130*	0.206***	0.187**		0.254***	0.202***		0.394***	1.000	
12 Administrative - Flexible organization	0.134*	0.281***				0.224***	0.194**		0.324***	0.205***		1.000

Notes

[a] Only significant correlations at $p < 0.1$ are reported

[b] Based on factor analysis of strategy characteristics

* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 4.2: Regressions between strategic posture attributes – Entrepreneurial

Significant regressions [a] - Strategic posture characteristics - Entrepreneurial choice [b]

Strategic posture characteristics: Entrepreneurial	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + strategy variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Entrepreneurial - Differentiation			*NS*			*0.0005*	*1.36*
				Engineering - R&D Process	0.332***		1.22
				Engineering - R&D Market	0.178**		1.28
				Engineering - R&D Product	0.241***		1.31
				Engineering - R&D Cost	-0.133*		1.28
Entrepreneurial - product/market Scope			*NS*			*0.0033*	*1.38*
				Engineering - R&D Market	0.158*		1.30
				Engineering - Production Flexibility	0.226**		1.40
Entrepreneurial - Costs			*0.0522*			*0.0000*	*1.36*
	R&D intensity	-0.374**		R&D intensity	-0.359*		1.40
	Age	-0.224**		Age	-0.173*		1.18
				Engineering - R&D Costs	0.321***		1.18
				Engineering - Production Flexibility	0.265***		1.38
				Engineering - Production Productivity	0.265***		1.57
				Administrative - flexible	-0.201**		1.60
Entrepreneurial - product/market Stability			*NS*			*NS*	*1.40*

Notes [a] Only significant relations at p < 0.1 are reported
[b] Based on factor analysis of strategy characteristics
* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 4.3: Regressions between strategic posture attributes: Engineering R&D

Significant regressions [a] - Strategic posture characteristics - Engineering R&D choice [b]							
	Regression 1			Regression 2			
Strategic posture characteristics: Engineering R&D	*Control variables*	*Coef.*	*Model Sig. Prob > F*	*Control + strategy variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Engineering - R&D Process oriented			*0.0646*			*0.0001*	*1.36*
	R&D intensity	0.328**		R&D intensity	0.482***		1.36
				Entrepreneurial - Differentiation	0.392***		1.17
				Engineering - R&D Market	-0.168**		1.29
				Engineering - R&D Product	-0.253***		1.31
				Administrative - Formal	0.173*		1.50
Engineering - R&D Market oriented			*NS*			*0.0008*	*1.37*
	Age	0.166*		Age	0.208**		1.17
				Entrepreneurial - Differentiation	0.238**		1.29
				Entrepreneurial - Scope	0.172*		1.26
				Engineering - R&D Process	-0.19**		1.35
				Engineering - R&D Product	-0.190**		1.36
				Engineering - Production Productivity	0.262**		1.58
				Administrative - Flexible	0.245**		1.58
Engineering - R&D Product oriented			*0.0087*			*0.0001*	*1.35*
	R&D intensity	0.595***		R&D intensity	0.630***		1.31
				Entrepreneurial - Differentiation	0.297***		1.25
				Engineering - R&D Process	-0.264***		1.30
				Engineering - R&D Market	-0.176**		1.29
				Administrative - Formal	0.189**		1.46
				Administrative - Flexible	0.241**		1.58
Engineering - R&D Costs oriented			*NS*			*0.0018*	*1.37*
				Entrepreneurial - Differentiation	-0.165*		1.32
				Entrepreneurial - Costs	0.318***		1.29
				Administrative - Formal	0.153*		1.48

Notes [a] Only significant relations at $p < 0.1$ are reported

[b] Based on factor analysis of strategy characteristics

* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 4.4: Regressions between strategic posture attributes – Engineering choice / production

Significant regressions [a] - Strategic posture characteristics - Engineering production choice [b]

Strategic posture characteristics: Engineering Production	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + strategy variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Engineering - Production Flexibility oriented			*NS*			*0.0000*	*1.35*
				Entrepreneurial - Scope	0.202**		1.24
				Entrepreneurial - Costs	0.231***		1.31
				Engineering - Production Productivity	-0.279***		1.55
				Administrative - Flexible	0.427***		1.38
Engineering - Production Productivity oriented			*0.013*			*0.0000*	*1.33*
	Industry sector	0.476**		Industry sector	0.315*		1.07
	Age	-0.204**		R&D intensity	-0.291*		1.40
				Age	-0.147*		1.18
				Entrepreneurial - Costs	0.199***		1.36
				Engineering - R&D Market	0.184**		1.27
				Engineering - Production Flexibility	-0.240***		1.37
				Administrative - Formal	0.288***		1.36
				Administrative - Flexible	0.219***		1.57

Notes [a] Only significant relations at p < 0.1 are reported
[b] Based on factor analysis of strategy characteristics
* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 4.5: Regressions between strategic posture attributes – Administrative choice

Significant regressions [a] - Strategic posture characteristics - Administrative choice [b]

Strategic posture characteristics: Administrative	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + independent variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Administrative - Formal organization			*0.0006*			*0.0000*	*1.36*
	Size	0.298**		Size	0.214*		1.39
	Age	-0.243***		Engineering - R&D Product	0.168**		1.36
				Engineering - R&D Costs	0.135*		1.29
				Engineering - Production Productivity	0.337***		1.50
Administrative - Flexible organization			*NS*			*0.0000*	*1.33*
				R&D intensity	-0.325*		1.40
				Entrepreneurial - Costs	-0.159**		1.39
				Engineering - R&D Process	0.145*		1.36
				Engineering - R&D Market	0.182**		1.28
				Engineering - R&D Product	0.194**		1.34
				Engineering - Production Flexibility	0.387***		1.22
				Engineering - Production Productivity	0.232***		1.58

Notes [a] Only significant relations at p < 0.1 are reported
[b] Based on factor analysis of strategy characteristics
* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

9.1.5. Appendix 1.5: Interrelations - Innovation attributes

Table 5.1: Intercorrelations between innovation behavior attributes

Intercorrelations among innovation behavior characteristics [a]

		Innovation behavior characteristics [b]							
Innovation behavior characteristics b		*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	Sustained	1.000							
2	Disruptive	0.251***	1.000						
3	Technology-based	0.221***	0.266***	1.000					
4	Market-based	0.282***	0.271***		1.000				
5	Organizational	0.162**	0.132*	0.217***	0.137*	1.000			
6	Process			0.201***			1.000		
7	Marketing	0.204***						1.000	
8	Product	0.205***	0.309***	0.285***	0.221***				1.000

Notes

[a] Only significant correlations at $p < 0.1$ are reported

[b] Based on factor analysis of innovation characteristics

* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 5.2: Regressions between innovation behavior attributes – Nature of innovation

Significant regressions [a] - Innovation behavior characteristics - Innovation nature [b]

Innovation behavior characteristics: Nature	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + innovation variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Sustained			*0.0397*			*0.0002*	*1.23*
				Turnover	0.227**		1.38
				Market-based	0.200**		1.23
				Marketing	0.185*		1.08
Disruptive			*0.0787*			*0.0000*	*1.23*
	R&D intensity	0.575**		Technology-based	0.171**		1.25
				Market-based	0.323***		1.18
				Product	0.272*		1.34

Notes: [a] Only significant relations at $p < 0.1$ are reported
[b] Based on factor analysis of innovation characteristics
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 5.3: Regressions between innovation behavior attributes – Source of innovation

Significant regressions [a] - Innovation behavior characteristics - innovation source [b]

Innovation behavior characteristics: Source	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + innovation variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Technology-based			*0.0179*			*0.0003*	*1.23*
	R&D intensity	0.694***		Disruptive	0.184**		1.29
	Age	-0.327**		Organizational	0.229*		1.13
				Process	0.384***		1.07
Market-based			*NS*			*0.0003*	*1.23*
				Age	0.223*		1.11
				Sustained	0.210**		1.23
				Disruptive	0.231***		1.24

Notes: [a] Only significant relations at $p < 0.1$ are reported
[b] Based on factor analysis of innovation characteristics
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 5.4: Regressions between innovation behavior attributes – Activities of innovation

Significant regressions [a] - Innovation behavior characteristics - Innovation activities [b]

Innovation behavior characteristics: Activities	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + innovation variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Organizational			*0.1957*			*0.0561*	*1.25*
	R&D intensity	0.424**		R&D intensity	0.503**		1.35
				Technology-based	0.100*		1.26
				Product	-0.225**		1.33
Process			*0.4153*			*0.0704*	*1.25*
	R&D intensity	-0.305*		R&D intensity	-0.459**		1.36
				Technology-based	0.174***		1.20
Marketing			*0.0818*			*0.2366*	*1.26*
	Industry sector	-0.392**		Industry sector	-0.386**		1.03
				Sustained	0.119*		1.26
Product			*0.0000*			*0.0000*	*1.22*
	R&D intensity	0.747***		R&D intensity	0.678***		1.25
	Turnover	-0.138*		Disruptive	0.093*		1.30
	Age	-0.162*		Organizational	-0.164**		1.11

Notes: [a] Only significant relations at p < 0.1 are reported
[b] Based on factor analysis of innovation characteristics
* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

9.1.6. Appendix 1.6: Interrelations – Strategy and innovation attributes

Table 6.1: Intercorrelations between strategic posture attributes and innovation behavior attributes

Intercorrelations among Strategic Posture and Innovation Behavior characteristics [a]

	Innovation behavior characteristics b							
	Sustained	Disruptive	Techno-based	Market-based	Organizational	Process	Marketing	Product
Strategic posture characteristics b	1	2	3	4	5	6	7	8
1 Entrepreneurial - Differentiation orientation	0.376***	0.166**	0.148**	0.131*			0.184***	0.227***
2 Entrepreneurial - broad product/market Scope			0.178**	0.142**	0.246***	0.203***		0.161**
3 Entrepreneurial - Cost orientation	0.130*	0.175**						
4 Entrepreneurial - product/market Stability	0.192***			0.195***				
5 Engineering - R&D Process oriented	0.380***		0.186**			0.150**	0.197**	
6 Engineering - R&D Market oriented				0.136*	0.181**	0.356***	0.326***	
7 Engineering - R&D Product oriented	0.247***	0.431***	0.287***	0.259***	0.138*		0.155*	0.506***
8 Engineering - R&D Costs oriented	0.147**		0.248***		0.179**			
9 Engineering - Production Flexibility oriented	0.134*		0.185***	0.234***		0.240***		
10 Engineering - Production Productivity oriented	0.237***	0.126*	0.283***		0.287***	0.225***		
11 Administrative - Formal organization	0.339***	0.174**	0.385***	0.178**	0.462***			0.152*
12 Administrative - Flexible organization	0.145*	0.265***	0.247***	0.302***	0.238***	0.254***		

Notes

[a] Only significant correlations at $p < 0.1$ are reported

[b] Based on factor analysis of strategy and innovation characteristics

* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 6.2: Regressions between innovation and strategic attributes – Nature of innovation

Significant regressions [a] - Innovation behavior and Strategic Posture characteristics [b]

Innovation behavior characteristics: Nature	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + independent variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Sustained			*NS*			*0.0000*	*1.39*
				Turnover	0.188*		1.50
				Entrepreneurial - Differentiation	0.249**		1.35
				Engineering - R&D Process	0.375***		1.40
				Engineering - R&D Market	0.181*		1.34
				Engineering - R&D Product	0.274**		1.41
Disruptive			*NS*			*0.0000*	*1.39*
				Entrepreneurial - Costs	0.361***		1.43
				Engineering - R&D Market	0.324**		1.34
				Engineering - R&D Product	0.637***		1.41

Notes: [a] Only significant correlations at $p < 0.1$ are reported
[b] Based on factor analysis of innovation and strategy characteristics
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 6.3: Regressions between innovation and strategic attributes – Source of innovation

Significant regressions [a] - Innovation behavior and strategic posture characteristics [b]

Innovation behavior characteristics: Source	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + independent variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Technology-based			*0.0179*			*0.0000*	*1.39*
	R&D intensity	0.694***		Engineering - R&D Process	0.237*		1.41
	Age	-0.327**		Engineering - R&D Product	0.318**		1.41
				Engineering - R&D Costs	0.291**		1.43
				Administrative - Formal	0.370**		1.51
Market-based			*NS*			*0.0002*	*1.39*
				Size	0.305*		1.42
				Entrepreneurial - Costs	0.248**		1.43
				Engineering - R&D Product	0.221*		1.41
				Engineering - Production Productivity	-0.289**		1.66
				Administrative - Flexible	0.414***		1.66

Notes: [a] Only significant correlations at $p < 0.1$ are reported
[b] Based on factor analysis of innovation and strategy characteristics
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 6.4: Regressions between innovation and strategic attributes – Activities of innovation

Significant regressions [a] - Innovation behavior and Strategic Posture characteristics [b]

Innovation behavior characteristics: Activities	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + independent variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Organizational			*0.1957*			*0.0000*	*1.39*
	R&D intensity	0.424**		Administrative - Formal	0.452***		1.45
				Administrative - Flexible	0.165*		1.68
Process			*0.4153*			*0.0006*	*1.39*
	R&D intensity	-0.305*		R&D intensity	-0.461**		1.47
				Engineering - R&D Process	0.227**		1.44
				Engineering - R&D Market	0.312***		1.38
Marketing			*0.0818*			*0.0000*	*1.39*
	Industry sector	-0.392**		Industry sector	-0.419**		1.08
				Turnover	0.186**		1.47
				Age	-0.207**		1.23
				Entrepreneurial - Scope	-0.195**		1.27
				Engineering - R&D Process	0.197**		1.44
				Engineering - R&D Market	0.500***		1.38
				Engineering - R&D Product	0.203**		1.43
Product			*0.0000*			*0.0000*	*1.39*
	R&D intensity	0.747***		R&D intensity	0.626***		1.47
	Turnover	-0.138*		Turnover	-0.137*		1.47
	Age	-0.162*		Entrepreneurial - Differentiation	0.174*		1.38
				Engineering - R&D Product	0.371***		1.43

Notes: [a] Only significant correlations at p < 0.1 are reported

[b] Based on factor analysis of innovation and strategy characteristics

* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

9.2. Appendices – 2nd essay : “Strategic posture and innovation behavior in SMEs: The impact of industry and firm contingencies on type and relationship”

9.2.1. Appendix 2.1: Descriptive statistics

Table 1.1: Firm size in number of employees

Firm size (nb of employees)

Size	Freq.	Percent	Cum.
<10	13	7.22	7.22
10-49	133	73.89	81.11
50-99	17	9.44	90.56
100-249	17	9.44	100.00
Total	180	100.00	

Table 1.2: Firm industry sectors

Firm industry sectors

Sectors	Freq.	Percent	Cum.
Food	18	10.11	10.11
Textile & wearing	11	6.18	16.29
Wood & paper	10	5.62	21.91
Printing	7	3.93	25.84
Chemicals & pharmaceuticals	14	7.87	33.71
Rubber & plastics	18	10.11	43.82
Metals	35	19.66	63.48
Electricals & electronics	18	10.11	73.60
Machinary & equipments NEC	14	7.87	81.46
Automotive & transport	5	2.81	84.27
Furniture	6	3.37	87.64
Other manufacturing	9	5.06	92.70
Reparing	10	5.62	98.31
Others	3	1.69	100.00
Total	178	100.00	

Table 1.3: Firm R&D intensity in percentage of R&D expenses on turnover

Firm R&D intensity (% of turnover)

R&D intensity	Freq.	Percent	Cum.
<2,5%	113	62.78	62.78
>2,5%	67	37.22	100.00
Total	180	100.00	

Table 2.4: Firm turnover in thousands Euros

Firm turnover (000 €)

Turnover	Freq.	Percent	Cum.
<500	13	7.22	7.22
500-999	16	8.89	16.11
1000-4999	92	51.11	67.22
5000-14999	35	19.44	86.67
15000-50000	19	10.56	97.22
>50000	5	2.78	100.00
Total	180	100.00	

Table 1.5: Firm age characterized as date of creation

Firm age (date of creation)

Age	Freq.	Percent	Cum.
Before 1960	7	3.89	3.89
1960-1989	48	26.67	30.56
1989-2006	79	43.89	74.44
after 2006	46	25.56	100.00
Total	180	100.00	

9.2.2. Appendix 2.2: Constructs validation

Table 2.1: Factor analysis – Identification of strategic posture constructs

Factor Analysis - Strategic posture constructs

Constructs	*Measures*	*First order loadings* [a]	*Cronbach's alpha*
Entrepreneurial - Differentiation			0.501
	Quality of offering to clients	0.831	
	Novelty of offering to clients	0.721	
Entrepreneurial - Scope			0.426
	New markets opportunities	0.752	
	Scope of product-market domains	0.734	
Entrepreneurial - Costs			0.352
	Cost competitiveness	0.768	
	Market penetration and consolidation	0.730	
Entrepreneurial - Stability			1.000
	Product-market domain stability	0.972	
Engineering - R&D Process			0.705
	R&D focus on quality of offering	0.870	
	R&D focus on improvement of existing offering	0.723	
	R&D focus on production and logistics efficiency	0.710	
Engineering - R&D Market			0.691
	R&D focus on new market opportunities	0.861	
	R&D focus on new business models	0.809	
Engineering - R&D Product			0.713
	R&D focus on new products	0.873	
	R&D focus on new applications for products	0.727	
Engineering - R&D Costs			1.000
	R&D focus on cost leadership	0.956	
Engineering - Production Flexibility			0.654
	Versatility and flexibility of production staff	0.873	
	Flexibility of production equipment and processes	0.840	
Engineering - Production Productivity			0.532
	Specialization of production staff	0.843	
	Specialization of production processes	0.800	
Administrative - Formal organization			0.662
	Strict monitoring of planning	0.772	
	Formalized job description	0.687	
	Strict adherence to procedures	0.644	
	Management through planification of tasks	0.643	
Administrative - Flexible organization			0.545
	Management through adaptation to contingencies	0.785	
	Job flexibility	0.708	
	Setting of vision and generic directions	0.624	
	Management by project	0.440	

Notes [a] all factor loadings significant at $p < 0.01$

Table 2.2: Factor analysis – Identification of innovation activities constructs

Factor Analysis - Innovation behavior constructs

Constructs	*Measures*	*First order loadings* [a]	*Cronbach's alpha*
Organizational innovation			0.779
	New operational management methods	0.811	
	New practices of business networking	0.692	
	New practices of cooperation with external R&D units	0.689	
	New practices of cooperation with clients or suppliers	0.680	
	New practices of organizing the firm's workplace	0.598	
Process innovation			0.759
	New production methods	0.772	
	New logistics methods	0.692	
	New engineering methods	0.624	
	New costing methods	0.603	
Marketing innovation			0.762
	New product design	0.794	
	New product packaging	0.774	
	New sales and product placement methods	0.632	
Product innovation			0.598
	New technological features of products	0.805	
	New use of products	0.596	

Notes [a] all factor loadings significant at $p < 0.01$

Table 2.3: Factor analysis – Identification of industry contingencies constructs

Factor Analysis - Firm contingencies constructs

Constructs	*Measures*	*First order loadings* [a]	*Cronbach's alpha*
Firm Management			0.831
	Strategic planning	0.865	
	Communicated strategy	0.823	
	Formulated strategy	0.780	
	Strategy monitoring	0.699	
	Overall qualification of staff	0.651	
	Firm attractiveness for applicants	0.590	
Firm Sales			0.854
	Access to distribution networks	0.940	
	Control of sales or distribution channels	0.919	
	Overall knowledge of market key success factors	0.691	
	Sales force capabilities	0.671	
Firm CRM			0.738
	Stability of clients portfolio	0.867	
	Quality of customer relationship	0.863	
Firm Technical expertise			0.842
	Technological capacities	0.857	
	Quality of technical equipment	0.850	
	Productivity	0.799	
	Technical expertise	0.754	
	Economies of scales	0.649	
Firm Intermediaries			0.924
	Cooperation with innovation agencies	0.950	
	Awareness of financial support for innovation	0.939	
	Cooperation with external R&D centers	0.905	

Notes [a] all factor loadings significant at $p < 0.01$

Table 2.4: Factor analysis – Identification of firm contingencies constructs

Factor Analysis - Industry contingencies constructs

Constructs	*Measures*	*First order loadings* [a]	*Cronbach's alpha*
Industry Rivalry			0.759
	Sales rivalry	0.852	
	Price rivalry	0.832	
	Product rivalry	0.791	
	Promotion rivalry	0.562	
Industry Barriers			0.753
	Technological barriers	0.886	
	Legal barriers	0.841	
	Financial barriers	0.725	
Industry Clients			0.598
	Clients pressure on price	0.827	
	Clients preferred position due to loyalty	0.762	
	Dependence on mainstream clients	0.639	
Industry Suppliers			0.781
	Contribution to quality of final product	0.886	
	Scarcity of suppliers	0.814	
	Dependence due to preferred pricing conditions obtained	0.800	
Industry Substitutes			0.798
	Product novelty	0.906	
	Price competitiveness	0.854	
	Superior service	0.770	

Notes a all factor loadings significant at $p < 0.01$

9.2.3. Appendix 2.3: Control variables - ANOVA results

Table 3.1: ANOVA results on correlations between control variables and strategic posture attributes

Control variables and strategic posture characteristics : ANOVA results [a] (F test reported)

	Control variables																						
	Size					*Metal sector*			*R&D Intensity*			*Turnover*							*Age*				
Strategic posture characteristics [b]	<10	10-49	50-99	100-249	F test	Y	N	F test	< 2.5	> 2.5	F test	< 500	500-999	1000-4999	5000-14999	15000-50000	> 50000	F test	Historic	Ancient	Mature	New	F test
Entrepreneurial - Differentiation																							
Entrepreneurial - Scope												-0.162	0.203	0.115	-0.204	0.364	0.938	0.0929					
Entrepreneurial - Costs									0.111	-0.197	0.0528												
Entrepreneurial - Stability	-0.042	-0.079	0.382	0.426	0.0594																		
Engineering - R&D Process									-0.141	0.259	0.0107								0.323	0.275	-0.18	0.004	0.0841
Engineering - R&D Market																							
Engineering - R&D Product									-0.166	0.368	0.0008												
Engineering - R&D Costs																							
Engineering - Production Flexibility																							
Engineering - Production Productivity						-0.073	0.411	0.0080				0.135	-0.388	0.11	-0.362	0.365	0.185	0.0653					
Administrative - Formal organization	-0.763	-0.033	0.361	0.539	0.0040				-0.138	0.249	0.0182	-0.077	-0.696	0.028	-0.0747	0.651	-0.028	0.0137					
Administrative - Flexible organization	0.057	0.126	0.004	-0.625	0.0547																		

Notes a Only significant results at p < 0.1 are reported

[b] Based on factor analysis of strategy characteristics

Table 3.2: ANOVA results on correlations between control variables and innovation behavior attributes

Control variables and innovation behavior characteristics : ANOVA results [a (F test reported)]

	Control variables																						
	Size					*Metal sector*			*R&D Intensity*			*Turnover*							*Age*				
Innovation behavior characteristics	<10	10-49	50-99	100-249	F test	Y	N	F test	< 2.5	> 2.5	F test	< 500	500-999	1000-4999	5000-14999	15000-50000	> 50000	F test	Historic	Ancient	Mature	New	F test
Sustained (scale 1-7)	4.769	5.611	5.823	5.977	0.0744				5.462	5.845	0.0625												
Disruptive (scale 1-7)									4.076	4.618	0.0268												
Technology-based (scale 1-7)									4.352	5.068	0.0040	4.538	4.375	4.812	3.886	5.03	5.6	0.0346					
Market-based (scale 1-7)																							
Organizational [b]									-0.136	0.274	0.0165												
Process [b]									0.109	-0.220	0.0545												
Marketing [b]						0.063	-0.356	0.02200															
Product [b]									-0.327	0.489	0.0000								0.943	0.113	-0.08	-0.215	0.0404

Notes a Only significant results at p < 0.1 are reported

[b] Based on factor analysis of innovation characteristics

Table 3.3: ANOVA results on correlations between control variables and contingencies attributes

Control variables and contingencies : ANOVA results [a (F test reported)]

	Control variables																						
	Size					*Metal sector*			*R&D Intensity*			*Turnover*							*Age*				
Contingencies characteristics [b]	<10	10-49	50-99	100-249	F test	Y	N	F test	< 2.5	> 2.5	F test	< 500	500-999	1000-4999	5000-14999	15000-50000	> 50000	F test	Historic	Ancient	Mature	New	F test
Industry - Rivalry																							
Industry - Barriers																							
Industry - Clients	-0.333	0.071	-0.604	0.137	0.0738				0.148	-0.292	0.0101												
Industry - Suppliers																							
Industry - Substitutes																							
Firm - Management																							
Firm - Sales	-0.440	-0.584	0.549	0.231	0.0711							-0.169	-0.113	-0.232	0.171	0.869	0.521	0.0032					
Firm - CRM																							
Firm - Technical expert.												-0.177	-0.392	-0.046	-0.162	0.494	1.709	0.0023					
Firm - Intermediaries									-0.243	0.417	0.0001												

Notes a Only significant results at p < 0.1 are reported

[b] Based on factor analysis of industry and firm contingencies characteristics

9.2.4. Appendix 2.4: Interrelations – Strategy, innovation and contingencies

Table 4.1: Intercorrelations between strategic posture attributes and contingencies attributes

Intercorrelations among strategic posture and contingencies characteristics [a]

	Contingencies characteristics [b]									
Strategic posture characteristics [b]	*Industry Rivalry*	*Industry Barriers*	*Industry Clients*	*Industry Suppliers*	*Industry Substutures*	*Firm Management*	*Firm Sales*	*Firm CRM*	*Firm Technical expertise*	*Firm Intermediaries*
Entrepreneurial - Differentiation orientation						0,182***	0,158**	0,157**	0,231***	
Entrepreneurial - broad product/market Scope	0,156***	-0,160**	-0,125*							
Entrepreneurial - Cost orientation			0,178***	0,152**						-0,140**
Entrepreneurial - product/market Stability					-0,130**					
Engineering - R&D Process oriented								0,158**	0,211***	
Engineering - R&D Market oriented	0,169***					0,137**		0,186***		
Engineering - R&D Product oriented				-0,167**		0,212***			0,141**	0,175***
Engineering - R&D Costs oriented	0,154**		0,202***		0,124*					
Engineering - Production Flexibility oriented	-0,118*									-0,207***
Engineering - Production Productivity oriented	0,131**		0,170***			0,131**			0,212***	
Administrative - Formal organization			0,120*			0,206***			0,164**	0,176***
Administrative - Flexible organization		-0,136								

Notes

[a] Only significant correlations at $p < 0,1$ are reported

[b] Based on factor analysis of strategy and contingencies characteristics

* denotes $p < 0,1$; ** denotes $p < 0,05$; *** denotes $p < 0,01$

Table 4.2: Intercorrelations between innovation behavior attributes and contingencies attributes

Intercorrelations among innovation behavior and contingencies characteristics [a]

	Contingencies characteristics [b]									
Innovation behavior characteristics [b]	*Industry Rivalry*	*Industry Barriers*	*Industry Clients*	*Industry Suppliers*	*Industry Substitutes*	*Firm Management*	*Firm Sales*	*Firm CRM*	*Firm Technical expertise*	*Firm Intermediaries*
Sustained	0,130**					0,141**	0,162**	0,123*	0,271***	
Disruptive			-0,124*			0,135**		0,125*		
Technology-based						0,175***			0,194***	
Market-based					0,110*	0,133**		0,146**		0,144**
Organizational						0,347***		0,123*	0,156**	0,163**
Process					0,208***	0,127*		0,130**	0,127*	
Marketing	0,130**	0,155**					0,146**			-0,109*
Product					0,112*	0,163**				0,324***

Notes

[a] Only significant correlations at p < 0,1 are reported

[b] Based on factor analysis of innovation and contingencies characteristics

* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

Table 4.3: Regressions - Strategic posture and contingencies attributes: Entrepreneurial

Significant regressions [a] - Strategic posture and contingencies characteristics: Entrepreneurial choice [b]

Strategic posture characteristics: Entrepreneurial	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + contingencies variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Entrepreneurial - Differentiation			*NS*			*0,0113*	*1,31*
				Industry - Suppliers	-0,136**		1,19
				Firm - Sales	0,157**		1,59
				Firm - CRM	0,125*		1,20
				Firm - Technical expertise	0,152**		1,59
Entrepreneurial - product/market Scope			*NS*			*0,0351*	*1,31*
				Industry - Rivalry	0,199***		1,20
				Industry - Barriers	-0,172**		1,10
				Industry - Clients	-0,186***		1,24
Entrepreneurial - Costs			*0,0597*			*0,0296*	*1,31*
	R&D intensity	-0,381**		Age	-0,243**		1,08
	Age	-0,215**		Firm - Technical expertise	0,170**		1,59
Entrepreneurial - product/market Stability			*NS*			*NS*	

Notes [a] Only significant relations at p < 0,1 are reported

[b] Based on factor analysis of strategy and contingencies characteristics

* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

Table 4.4: Regressions - Strategic posture and contingencies attributes: Engineering R&D

Significant regressions [a] - Strategic posture and contingencies characteristics - Engineering R&D choice [b]

Strategic posture characteristics: Engineering R&D	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + contingencies variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Engineering - R&D Process oriented			*0,0623*			*0,0283*	*1,31*
	R&D intensity	0,331**		R&D intensity	0,314*		1,32
				Age	-0,171*		1,08
				Industry - Suppliers	0,134*		1,19
				Firm - Technical expertise	0,213***		1,59
Engineering - R&D Market oriented			*NS*			*0,0044*	*1,31*
	Age	0,198**		Industry - Rivalry	0,248***		1,20
				Firm - CRM	0,183**		1,20
Engineering - R&D Product oriented			*0,0146*			*0,0028*	*1,31*
	R&D intensity	0,536***		R&D intensity	0,370**		1,32
				Industry - Suppliers	-0,183**		1,19
				Industry - Substitutes	0,171**		1,18
Engineering - R&D Costs oriented			*NS*			*0,0731*	*1,31*
				Industry - Clients	0,167**		1,24

Notes [a] Only significant relations at p < 0,1 are reported
[b] Based on factor analysis of strategy and contingencies characteristics
* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

Table 4.5: Regressions - Strategic posture and contingencies attributes: Engineering Production

Significant regressions [a] - Strategic posture and contingencies characteristics - Engineering production choice [b]

Strategic posture characteristics: Engineering Production	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + contingencies variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Engineering - Production Flexibility oriented			*NS*			*0,0544*	*1,31*
				Industry - Rivalry	-0,157**		1,20
				Firm - Technical expertise	0,171**		1,59
				Firm - Intermediaries	-0,220***		1,26
Engineering - Production Productivity oriented			*0,0108*			*0,0012*	*1,31*
	Industry sector	0,496***		Industry sector	0,489***		
	Age	-0,227**		Age	-0,244***		1,08
				Firm - Technical expertise	0,241***		1,59

Notes [a] Only significant relations at p < 0,1 are reported
[b] Based on factor analysis of strategy and contingencies characteristics
* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

Table 4.6: Regressions - Strategic posture and contingencies attributes: Administrative

Significant regressions [a] - Strategic posture and contingencies characteristics - Administrative choice [b]

Strategic posture characteristics: Administrative	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + contingencies variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Administrative - Formal organization			*0,0008*			*0,0007*	*1,31*
	Size	0,318***		Size	0,333***		1,32
	Age	-0,199**		Age	-0,183*		1,08
				Industry - Barriers	-0,133**		1,10
				Industry - Clients	0,123*		1,24
Administrative - Flexible organization			*NS*			*NS*	

Notes [a] Only significant relations at p < 0,1 are reported
[b] Based on factor analysis of strategy and contingencies characteristics
* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

Table 4.7: Regressions - Innovation behavior and contingencies attributes: Nature

Significant regressions [a] - Innovation behavior and contingencies characteristics - Innovation nature [b]

Innovation behavior characteristics: Nature	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + contingencies variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Sustained			*0,0388*			*0,0031*	*1,31*
	Turnover	0,171*		Size	0,289*		1,32
				Age	-0,235**		1,08
				Firm - Technical expertise	0,325***		1,59
Disruptive			*0,0751*			*0,1000*	*1,31*
	R&D intensity	0,559**		Age	-0,292**		1,08
				Fim - Management	0,234*		1,83

Notes: [a] Only significant relations at p < 0,1 are reported

[b] Based on factor analysis of innovation and contingencies characteristics

* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

Table 4.8: Regressions - Innovation behavior and contingencies attributes: Source

Significant regressions [a] - Innovation behavior and contingencies characteristics - Innovation source [b]

Innovation behavior characteristics: Source	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + contingencies variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Technology-based			*0,0173*			*0,0140*	*1,31*
	R&D intensity	0,679***		R&D intensity	0,545**		1,32
	Age	-0,327**		Age	-0,320**		1,08
				Industry - Barriers	-0,224**		1,10
				Firm - Technical expertise	0,335***		1,59
Market-based			*NS*			*NS*	

Notes: [a] Only significant relations at p < 0,1 are reported

[b] Based on factor analysis of innovation and contingencies characteristics

* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

Table 4.9: Regressions - Innovation behavior and contingencies attributes: Activities

Significant regressions [a] - Innovation behavior and contingencies characteristics - Innovation activities [b]

Innovation behavior characteristics: Activities	Regression 1			Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*Control + contingencies variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Organizational			*0,2754*			*0,0064*	*1,31*
	R&D intensity	0,402**		Firm - Management	0,362***		1,83
Process			*0,3621*			*0,0332*	*1,31*
	R&D intensity	-0,308*		R&D intensity	-0,340*		1,32
				Turnover	-0,165*		1,50
				Industry - Substitutes	0,233***		1,18
Marketing			*0,2355*			*0,0444*	*1,31*
	Industry sector	-0,377*		Industry sector	-0,354*		1,05
				Industry - Barriers	0,124*		1,10
				Firm - Sales	0,157*		1,59
				Firm - Intermediaries	-0,139*		1,26
Product			*0,0000*			*0,0000*	*1,31*
	R&D intensity	0,856***		R&D intensity	0,66***		1,32
	Turnover	-0,130*		Age	-0,187**		1,08
	Age	-0,188**		Industry - Substitutes	0,155**		1,18
				Firm - Intermediaries	0,193***		1,26

Notes: [a] Only significant relations at p < 0,1 are reported

[b] Based on factor analysis of innovation and contingencies characteristics

* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

9.2.5. Appendix 2.5: Strategy and contingencies influence on innovation

Table 5.1: Regressions - Innovation behavior and strategic posture and contingencies attributes: Nature of innovation

Significant regressions [a] - Innovation behavior and strategic posture and contingencies characteristics [b]

Innovation behavior characteristics: Nature	Regression 1				Regression 2			
	Control + strategy variables	*Coef.*	*Model Sig. Prob > F*	*VIF*	*Control + contingencies + strategy variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Sustained			*0,0000*	*1,33*			*0,0000*	*1,49*
	Entrepreneurial - Differentiation	0,202*		1,40	Industry - Rivalry	0,154*		1,46
	Engineering - R&D Process	0,411***		1,41	Engineering - R&D Process	0,399***		1,54
	Engineering - R&D Market	0,169*		1,33	Engineering - R&D Product	0,193**		1,50
	Engineering - R&D Product	0,257***		1,34	Administrative - Formal	0,172*		1,64
Disruptive			*0,0000*	*1,33*			*0,0000*	*1,49*
	Entrepreneurial - Costs	0,344***		1,33	Firm - Technical expertise	-0,213*		1,90
	Engineering - R&D Market	0,292**		1,33	Entrepreneurial - Costs	0,374***		1,36
	Engineering - R&D Product	0,589***		1,34	Engineering - R&D Market	0,214*		1,58
	Administrative - Flexible	0,248**		1,46	Engineering - R&D Product	0,545***		1,50
					Administrative - Flexible	0,242**		1,58

Notes: [a] Only significant correlations at p < 0,1 are reported
[b] Based on factor analysis of innovation and strategy and contingencies characteristics
* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

Table 5.2: Regressions - Innovation behavior and strategic posture and contingencies attributes: Source of innovation

Significant regressions [a] - Innovation behavior and strategic posture and contingencies characteristics [b]

Innovation behavior characteristics: Source	Regression 1				Regression 2			
	Control + strategy variables	*Coef.*	*Model Sig. Prob > F*	*VIF*	*Control + contingencies + strategy variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Technology-based			*0,0000*	*1,33*			*0,0000*	*1,49*
	R&D intensity	0,526**		1,34	Engineering - R&D Costs	0,332***		1,36
	Engineering - R&D Product	0,198*		1,34	Administrative - Formal	0,253**		1,64
	Engineering - R&D Costs	0,307***		1,23	Administrative - Flexible	0,228*		1,58
	Administrative - Formal	0,267**		1,49				
	Administrative - Flexible	0,222*		1,46				
Market-based			*0,0000*	*1,33*			*0,0001*	*1,49*
	Size	0,283*		1,40	Size	0,296*		1,48
	Age	0,208*		1,18	Age	0,201*		1,24
	Entrepreneurial - Costs	0,166*		1,33	Firm - Intermediaries	0,22**		1,46
	Engineering - R&D Product	0,3***		1,34	Entrepreneurial - Costs	0,191*		1,41
	Administrative - Flexible	0,263**		1,46	Entrepreneurial - Stability	0,197*		1,21
					Engineering - R&D Product	0,272***		1,50
					Production - Flexibility	0,208*		1,54
					Administrative - Flexible	0,249**		1,58

Notes: [a] Only significant correlations at p < 0,1 are reported

[b] Based on factor analysis of innovation and strategy and contingencies characteristics

* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

Table 5.3: Regressions - Innovation behavior and strategic posture and contingencies attributes: Activities of innovation

Significant regressions [a] - Innovation behavior and strategic posture and contingencies characteristics [b]

Innovation behavior characteristics: Activities	Regression 1				Regression 2			
	Control + strategy variables	*Coef.*	*Model Sig. Prob > F*	*VIF*	*Control + contingencies + strategy variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Organizational			*0,0000*	*1,33*			*0,0000*	*1,49*
	R&D intensity	0,303*		1,34	Industry - Rivalry	-0,161**		1,46
	Entrepreneurial - Scope	0,151*		1,29	Firm - Management	0,234***		2,04
	Entrepreneurial - Stability	-0,159*		1,13	Entrepreneurial - Scope	0,19**		1,50
	Administrative - Formal	0,472***		1,49	Entrepreneurial - Stability	-0,061*		1,21
	Administrative - Flexible	0,167**		1,46	Administrative - Formal	0,432***		1,64
Process			*0,0003*	*1,33*			*0,0010*	*1,49*
	R&D intensity	-0,317*		1,34	R&D intensity	-0,339*		1,49
	Turnover	-0,145*		1,35	Turnover	-0,186**		1,56
	Engineering - R&D Process	0,238***		1,41	Industry - Substitutes	0,220***		1,28
	Engineering - R&D Market	0,219***		1,33	Engineering - R&D Process	0,233**		1,54
					Engineering - R&D Market	0,214**		1,58

Notes: [a] Only significant correlations at p < 0,1 are reported

[b] Based on factor analysis of innovation and strategy and contingencies characteristics

* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

Table 5.4: Regressions - Innovation behavior and strategic posture and contingencies attributes: Activities of innovation (cont.)

Significant regressions [a] - Innovation behavior and strategic posture and contingencies characteristics [b]

Innovation behavior characteristics: Activities	Regression 1				Regression 2			
	Control + strategy variables	*Coef.*	*Model Sig. Prob > F*	*VIF*	*Control + contingencies + strategy variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Marketing			*0,0000*	*1,33*			*0,0000*	*1,49*
	Industry sector	-0,332*		1,09	Industry sector	-0,341*		1,13
	Turnover	0,143*		1,35	Firm - Sales	0,137*		1,71
	Entrepreneurial - Scope	-0,171**		1,29	Firm - CRM	-0,196***		1,31
	Engineering - R&D Process	0,167**		1,41	Entrepreneurial - Scope	-0,191**		1,50
	Engineering - R&D Market	0,507***		1,33	Engineering - R&D Process	0,206**		1,54
	Engineering - R&D Product	0,217***		1,34	Engineering - R&D Market	0,536***		1,58
					Engineering - R&D Product	0,23***		1,50
Product			*0,0000*	*1,33*			*0,0000*	*1,49*
	R&D intensity	0,505***		1,34	R&D intensity	0,435***		1,49
	Turnover	-0,127*		1,35	Firm - Intermediaries	0,179***		1,46
	Entrepreneurial - Differentiation	0,167**		1,40	Entrepreneurial - Differentiation	0,183**		1,55
	Engineering - R&D Product	0,437***		1,34	Entrepreneurial - Stability	0,131*		1,21
	Engineering - R&D Costs	0,129*		1,23	Engineering - R&D Market	-0,130*		1,58
					Engineering - R&D Product	0,386***		1,50

Notes: [a] Only significant correlations at p < 0,1 are reported
[b] Based on factor analysis of innovation and strategy and contingencies characteristics
* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

9.3. Appendices – 3rd essay: "Strategic posture and innovation behavior in SMEs: Fit, performance, and contingencies"

9.3.1. Appendix 3.1: Descriptive statistics

Table 1.1: Firm size in number of employees

Firm size (nb of employees)

Size	Freq.	Percent	Cum.
<10	13	7.22	7.22
10-49	133	73.89	81.11
50-99	17	9.44	90.56
100-249	17	9.44	100.00
Total	180	100.00	

Table 1.2: Firm industry sectors

Firm industry sectors

Sectors	Freq.	Percent	Cum.
Food	18	10.11	10.11
Textile & wearing	11	6.18	16.29
Wood & paper	10	5.62	21.91
Printing	7	3.93	25.84
Chemicals & pharmaceuticals	14	7.87	33.71
Rubber & plastics	18	10.11	43.82
Metals	35	19.66	63.48
Electricals & electronics	18	10.11	73.60
Machinary & equipments NEC	14	7.87	81.46
Automotive & transport	5	2.81	84.27
Furniture	6	3.37	87.64
Other manufacturing	9	5.06	92.70
Reparing	10	5.62	98.31
Others	3	1.69	100.00
Total	178	100.00	

Table 1.3: Firm R&D intensity in percentage of R&D expenses on turnover

Firm R&D intensity (% of turnover)

R&D intensity	Freq.	Percent	Cum.
<2,5%	113	62.78	62.78
>2,5%	67	37.22	100.00
Total	180	100.00	

Table 1.4: Firm turnover in thousands Euros

Firm turnover (000 €)			
Turnover	Freq.	Percent	Cum.
<500	13	7.22	7.22
500-999	16	8.89	16.11
1000-4999	92	51.11	67.22
5000-14999	35	19.44	86.67
15000-50000	19	10.56	97.22
>50000	5	2.78	100.00
Total	180	100.00	

Table 1.5: Firm age characterized as date of creation

Firm age (date of creation)			
Age	Freq.	Percent	Cum.
Before 1960	7	3.89	3.89
1960-1989	48	26.67	30.56
1989-2006	79	43.89	74.44
after 2006	46	25.56	100.00
Total	180	100.00	

9.3.2. Appendix 3.2: Constructs validation

Table 2.1: Factor analysis – Identification of strategic posture constructs

Factor Analysis - Strategic posture constructs

Constructs	*Measures*	*First order loadings [a]*	*Cronbach's alpha*
Entrepreneurial - Differentiation			0,501
	Quality of offering to clients	0,831	
	Novelty of offering to clients	0,721	
Entrepreneurial - Scope			0,426
	New markets opportunities	0,752	
	Scope of product-market domains	0,734	
Entrepreneurial - Costs			0,352
	Cost competitiveness	0,768	
	Market penetration and consolidation	0,730	
Entrepreneurial - Stability			1,000
	Product-market domain stability	0,972	
Engineering - R&D Process			0,705
	R&D focus on quality of offering	0,870	
	R&D focus on improvement of existing offering	0,723	
	R&D focus on production and logistics efficiency	0,710	
Engineering - R&D Market			0,691
	R&D focus on new market opportunities	0,861	
	R&D focus on new business models	0,809	
Engineering - R&D Product			0,713
	R&D focus on new products	0,873	
	R&D focus on new applications for products	0,727	
Engineering - R&D Costs			1,000
	R&D focus on cost leadership	0,956	
Engineering - Production Flexibility			0,654
	Versatility and flexibility of production staff	0,873	
	Flexibility of production equipment and processes	0,840	
Engineering - Production Productivity			0,532
	Specialization of production staff	0,843	
	Specialization of production processes	0,800	
Administrative - Formal organization			0,662
	Strict monitoring of planning	0,772	
	Formalized job description	0,687	
	Strict adherence to procedures	0,644	
	Management through planification of tasks	0,643	
Administrative - Flexible organization			0,545
	Management through adaptation to contingencies	0,785	
	Job flexibility	0,708	
	Setting of vision and generic directions	0,624	
	Management by project	0,440	

Notes [a] all factor loadings significant at $p < 0,01$

Table 2.2: Factor analysis – Identification of innovation activities constructs

Factor Analysis - Innovation behavior constructs

Constructs	*Measures*	*First order loadings* [a]	*Cronbach's alpha*
Organizational innovation			0,779
	New operational management methods	0,811	
	New practices of business networking	0,692	
	New practices of cooperation with external R&D units	0,689	
	New practices of cooperation with clients or suppliers	0,680	
	New practices of organizing the firm's workplace	0,598	
Process innovation			0,759
	New production methods	0,772	
	New logistics methods	0,692	
	New engineering methods	0,624	
	New costing methods	0,603	
Marketing innovation			0,762
	New product design	0,794	
	New product packaging	0,774	
	New sales and product placement methods	0,632	
Product innovation			0,598
	New technological features of products	0,805	
	New use of products	0,596	

Notes [a] all factor loadings significant at $p < 0,01$

Table 2.3: Factor analysis – Identification of performance constructs

Q: Please indicate for each of the following, your perception of your firm's performance relative to competition for the last three years (1: much below the average….7: much above the average)

Factor Analysis - Performance constructs

Constructs	*Measures*	*First order loadings* [a]	*Cronbach's alpha*
Firm Growth			0.881
	Sales growth	0.872	
	Market share growth	0.863	
	Market share	0.853	
	Sales volume	0.846	
Firm Profitability			0.945
	Return On Sales (ROS)	0.954	
	Return On Investment (ROI)	0.953	
	Return On Equity	0.940	

Notes [a] all factor loadings significant at $p < 0.01$

Table 2.4: Factor analysis – Identification of industry contingencies constructs

Factor Analysis - Industry contingencies constructs			
Constructs	*Measures*	*First order loadings* [a]	*Cronbach's alpha*
Industry Rivalry			0,759
	Sales rivalry	0,852	
	Price rivalry	0,832	
	Product rivalry	0,791	
	Promotion rivalry	0,562	
Industry Barriers			0,753
	Technological barriers	0,886	
	Legal barriers	0,841	
	Financial barriers	0,725	
Industry Clients			0,598
	Clients pressure on price	0,827	
	Clients preferred position due to loyalty	0,762	
	Dependence on mainstream clients	0,639	
Industry Suppliers			0,781
	Contribution to quality of final product	0,886	
	Scarcity of suppliers	0,814	
	Dependence due to preferred pricing conditions obtained	0,800	
Industry Substitutes			0,798
	Product novelty	0,906	
	Price competitiveness	0,854	
	Superior service	0,770	

Notes [a] all factor loadings significant at $p < 0,01$

Table 2.5: Factor analysis – Identification of firm contingencies constructs

Factor Analysis - Firm contingencies constructs

Constructs	*Measures*	*First order loadings* [a]	*Cronbach's alpha*
Firm Management			0,831
	Strategic planning	0,865	
	Communicated strategy	0,823	
	Formulated strategy	0,780	
	Strategy monitoring	0,699	
	Overall qualification of staff	0,651	
	Firm attractiveness for applicants	0,590	
Firm Sales			0,854
	Access to distribution networks	0,940	
	Control of sales or distribution channels	0,919	
	Overall knowledge of market key success factors	0,691	
	Sales force capabilities	0,671	
Firm CRM			0,738
	Stability of clients portfolio	0,867	
	Quality of customer relationship	0,863	
Firm Technical expertise			0,842
	Technological capacities	0,857	
	Quality of technical equipment	0,850	
	Productivity	0,799	
	Technical expertise	0,754	
	Economies of scales	0,649	
Firm Intermediaries			0,924
	Cooperation with innovation agencies	0,950	
	Awareness of financial support for innovation	0,939	
	Cooperation with external R&D centers	0,905	

Notes [a] all factor loadings significant at $p < 0,01$

9.3.3. Appendix 3.3: Control variables - ANOVA results

Table 3.1: ANOVA results on correlations between control variables and strategic posture attributes

Control variables and strategic posture characteristics : ANOVA results [a (F test reported)]

	Control variables																						
	Size					*Metal sector*			*R&D Intensity*			*Turnover*							*Age*				
Strategic posture characteristics [b]	<10	10-49	50-99	100-249	F test	Y	N	F test	< 2.5	> 2.5	F test	< 500	500-999	1000-4999	5000-14999	15000-50000	> 50000	F test	Historic	Ancient	Mature	New	F test
Entrepreneurial - Differentiation																							
Entrepreneurial - Scope												-0.162	0.203	0.115	-0.204	0.364	0.938	0.0929					
Entrepreneurial - Costs									0.111	-0.197	0.0528												
Entrepreneurial - Stability	-0.042	-0.079	0.382	0.426	0.0594																		
Engineering - R&D Process									-0.141	0.259	0.0107								0.323	0.275	-0.18	0.004	0.0841
Engineering - R&D Market																							
Engineering - R&D Product									-0.166	0.368	0.0008												
Engineering - R&D Costs																							
Engineering - Production Flexibility																							
Engineering - Production Productivity						-0.073	0.411	0.0080				0.135	-0.388	0.11	-0.362	0.365	0.185	0.0653					
Administrative - Formal organization	-0.763	-0.033	0.361	0.539	0.0040				-0.138	0.249	0.0182	-0.077	-0.696	0.028	-0.0747	0.651	-0.028	0.0137					
Administrative - Flexible organization	0.057	0.126	0.004	-0.625	0.0547																		

Notes a Only significant results at p < 0.1 are reported

[b] Based on factor analysis of strategy characteristics

Table 3.2: ANOVA results on correlations between control variables and innovation behavior attributes

Control variables and innovation behavior characteristics : ANOVA results [a] (F test reported)

	Control variables																						
	Size					*Metal sector*			*R&D Intensity*			*Turnover*							*Age*				
Innovation behavior characteristics	<10	10-49	50-99	100-249	F test	Y	N	F test	< 2.5	> 2.5	F test	< 500	500-999	1000-4999	5000-14999	15000-50000	> 50000	F test	Historic	Ancient	Mature	New	F test
Sustained (scale 1-7)	4.769	5.611	5.823	5.977	0.0744				5.462	5.845	0.0625												
Disruptive (scale 1-7)									4.076	4.618	0.0268												
Technology-based (scale 1-7)									4.352	5.068	0.0040	4.538	4.375	4.812	3.886	5.03	5.6	0.0346					
Market-based (scale 1-7)																							
Organizational [b]									-0.136	0.274	0.0165												
Process [b]									0.109	-0.220	0.0545												
Marketing [b]						0.063	-0.356	0.02200															
Product [b]									-0.327	0.489	0.0000								0.943	0.113	-0.08	-0.215	0.0404

Notes a Only significant results at $p < 0.1$ are reported

[b] Based on factor analysis of innovation characteristics

Table 3.3: ANOVA results on correlations between control variables and performance attributes

Control variables and firm performance : ANOVA results [a (F test reported)]

	Control variables																						
	Size					*Metal sector*			*R&D Intensity*			*Turnover*							*Age*				
Firm performance characteristics [b]	<10	10-49	50-99	100-249	F test	Y	N	F test	< 2.5	> 2.5	F test	< 500	500-999	1000-4999	5000-14999	15000-50000	> 50000	F test	Historic	Ancient	Mature	New	F test
Firm Growth									-0.185	0.288	0.0066	-0.159	-0.201	-0.188	0.243	0.476	0.694	0.0703					
Firm Profitability	-0.086	-0.031	0.618	-0.416	0.0559				-0.150	0.225	0.0313												

Notes [a] Only significant results at $p < 0.1$ are reported

[b] Based on factor analysis of firm capabilities characteristics

Table 3.4: ANOVA results on correlations between control variables and contingencies attributes

Control variables and contingencies : ANOVA results [a (F test reported)]

Contingencies characteristics [b]	*Control variables* — *Size* <10	10-49	50-99	100-249	F test	*Metal sector* Y	N	F test	*R&D Intensity* < 2.5	> 2.5	F test	*Turnover* < 500	500-999	1000-4999	5000-14999	15000-50000	> 50000	F test	*Age* Historic	Ancient	Mature	New	F test
Industry - Rivalry																							
Industry - Barriers																							
Industry - Clients	-0.333	0.071	-0.604	0.137	0.0738				0.148	-0.292	0.0101												
Industry - Suppliers																							
Industry - Substitutes																							
Firm - Management																							
Firm - Sales	-0.440	-0.584	0.549	0.231	0.0711							-0.169	-0.113	-0.232	0.171	0.869	0.521	0.0032					
Firm - CRM																							
Firm - Technical expert.												-0.177	-0.392	-0.046	-0.162	0.494	1.709	0.0023					
Firm - Intermediaries									-0.243	0.417	0.0001												

Notes a Only significant results at $p < 0.1$ are reported

[b] Based on factor analysis of industry and firm contingencies characteristics

9.3.4. Appendix 3.4: Interrelations – Strategy, innovation, performance and contingencies

Table 4.1: Intercorrelations between strategic posture attributes and innovation behavior attributes

Intercorrelations among Strategic Posture and Innovation Behavior characteristics [a]

	Innovation behavior characteristics [b]							
Strategic posture characteristics b	Sustained	Disruptive	Techno-based	Market-based	Organizational	Process	Marketing	Product
Entrepreneurial - Differentiation orientation	0,340***	0,141**	0,124*	0,122*	0,111*		0,148**	0,208***
Entrepreneurial - broad product/market Scope			0,160***	0,125*	0,204***	0,154**		
Entrepreneurial - Cost orientation	0,123*	0,162***						
Entrepreneurial - product/market Stability	0,172***			0,169***				
Engineering - R&D Process oriented	0,377***		0,180***	0,130*		0,125*	0,128*	
Engineering - R&D Market oriented				0,128*	0,171***	0,260***	0,347***	-0,126*
Engineering - R&D Product oriented	0,226***	0,392***	0,251***	0,258***	0,134**		0,129**	0,479***
Engineering - R&D Costs oriented	0,166**		0,237***		0,134**			
Engineering - Production Flexibility oriented	0,138**		0,169***	0,225***		0,212***		
Engineering - Production Productivity oriented	0,230***	0,124*	0,273***		0,212***	0,199***	0,116*	
Administrative - Formal organization	0,335***	0,157**	0,346***	0,209***	0,415***			0,151**
Administrative - Flexible organization	0,130**	0,246***	0,244***	0,272***	0,206***	0,195***		

Notes

[a] Only significant correlations at p < 0,1 are reported

[b] Based on factor analysis of strategy and innovation characteristics

* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

Table 4.2: Intercorrelations between strategic posture attributes and performance attributes

Intercorrelations among strategic posture and firm performance characteristics [a]

	Firm performance characteristics [b]	
Strategic posture characteristics [b]	Growth	Profitability
Entrepreneurial - Differentiation orientation	0.205***	0.194***
Entrepreneurial - broad product/market Scope		
Entrepreneurial - Cost orientation		
Entrepreneurial - product/market Stability	0.113*	0.125*
Engineering - R&D Process oriented		
Engineering - R&D Market oriented		
Engineering - R&D Product oriented	0.190***	0.114*
Engineering - R&D Costs oriented		
Engineering - Production Flexibility oriented		0.146**
Engineering - Production Productivity oriented		
Administrative - Formal organization		0.113*
Administrative - Flexible organization		

Notes: [a] Only significant correlations at $p < 0.1$ are reported
[b] Based on factor analysis of strategy and performance characteristics
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 4.3: Intercorrelations between innovation behavior attributes and performance attributes

Intercorrelations among innovation behavior and firm performance characteristics [a]		
	Firm performance characteristics [b]	
	Growth	Profitability
Innovation behavior characteristics [b]		
Sustained	0.210***	0.238***
Disruptive		
Technology-based	0.137**	0.190***
Market-based		
Organizational	0.154**	0.127*
Process	0.126*	
Marketing	0.234***	0.125*
Product	0.111*	

Notes: [a] Only significant correlations at $p < 0.1$ are reported
[b] Based on factor analysis of innovation and performance characteristics
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 4.4: Intercorrelations between strategic posture attributes and contingencies attributes

Intercorrelations among strategic posture and contingencies characteristics [a]

	Contingencies characteristics [b]									
Strategic posture characteristics [b]	*Industry Rivalry*	*Industry Barriers*	*Industry Clients*	*Industry Suppliers*	*Industry Substututes*	*Firm Management*	*Firm Sales*	*Firm CRM*	*Firm Technical expertise*	*Firm Intermediaries*
Entrepreneurial - Differentiation orientation						0,182***	0,158**	0,157**	0,231***	
Entrepreneurial - broad product/market Scope	0,156***	-0,160**	-0,125*							
Entrepreneurial - Cost orientation			0,178***	0,152**						-0,140**
Entrepreneurial - product/market Stability					-0,130**					
Engineering - R&D Process oriented								0,158**	0,211***	
Engineering - R&D Market oriented	0,169***					0,137**		0,186***		
Engineering - R&D Product oriented				-0,167**		0,212***			0,141**	0,175***
Engineering - R&D Costs oriented	0,154**		0,202***		0,124*					
Engineering - Production Flexibility oriented	-0,118*									-0,207***
Engineering - Production Productivity oriented	0,131**		0,170***			0,131**			0,212***	
Administrative - Formal organization			0,120*			0,206***			0,164**	0,176***
Administrative - Flexible organization		-0,136								

Notes

[a] Only significant correlations at $p < 0,1$ are reported

[b] Based on factor analysis of strategy and contingencies characteristics

* denotes $p < 0,1$; ** denotes $p < 0,05$; *** denotes $p < 0,01$

Table 4.5: Intercorrelations between innovation behavior attributes and contingencies attributes

Intercorrelations among innovation behavior and contingencies characteristics [a]

	Contingencies characteristics [b]									
Innovation behavior characteristics [b]	*Industry Rivalry*	*Industry Barriers*	*Industry Clients*	*Industry Suppliers*	*Industry Substitutes*	*Firm Management*	*Firm Sales*	*Firm CRM*	*Firm Technical expertise*	*Firm Intermediaries*
Sustained	0,130**					0,141**	0,162**	0,123*	0,271***	
Disruptive			-0,124*			0,135**		0,125*		
Technology-based						0,175***			0,194***	
Market-based					0,110*	0,133**		0,146**		0,144**
Organizational						0,347***		0,123*	0,156**	0,163**
Process					0,208***	0,127*		0,130**	0,127*	
Marketing	0,130**	0,155**					0,146**			-0,109*
Product					0,112*	0,163**				0,324***

Notes

[a] Only significant correlations at p < 0,1 are reported

[b] Based on factor analysis of innovation and contingencies characteristics

* denotes p < 0,1; ** denotes p < 0,05; *** denotes p < 0,01

Table 4.6: Intercorrelations between contingencies attributes and performance attributes

Intercorrelations among contingencies and Performance [a]		
	Firm performance characteristics [b]	
	Growth	Profitability
Contingencies characteristics [b]		
Industry rivalry		
Industry barriers	-0.120*	
Industry clients	-0.186***	-0.124*
Industry suppliers	-0.116*	
Industry substitutes		
Firm management	0.297***	0.335***
Firm sales	0.461***	0.284***
Firm CRM	0.234***	0.227***
Firm technical expert.	0.312***	0.355***
Firm intermediaries		

Notes: [a] Only significant correlations at $p < 0.1$ are reported

[b] Based on factor analysis of contingencies and performance characteristics

* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 4.7: Regressions - Performance and strategic posture and contingencies attributes

Significant regressions [a] - Performance and strategic posture, contingencies characteristics [b]

Performance	Regression 1				Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*VIF*	*Control + contingencies + strategy + innovation variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Growth			*0.0197*	*1.14*			*0.0000*	*1.49*
	R&D intensity	0.357**		1.08	Industry - Barriers	-0.162**		1.23
	Turnover	0.178**		1.30	Industry - Suppliers	-0.136*		1.36
					Firm - Sales	0.440***		1.71
					Firm - CRM	0.181**		1.31
Profitability			*NS*	*1.14*			*0.0001*	*1.49*
					R&D Intensity	0.320*		1.49
					Firm - Sales	0.183**		1.71
					Firm - Technical expertise	0.185**		1.90
					Entrepreneurial - Stability	0.152*		1.21
					Engineering - R&D Costs	0.162*		1.36
					Engineering - Production Flexibility	0.185**		1.54

Notes: [a] Only significant correlations at $p < 0.1$ are reported
[b] Based on factor analysis of performance. innovation. strategy and contingencies characteristics
* denotes $p < 0.1$; ** denotes $p < 0.05$; *** denotes $p < 0.01$

Table 4.8: Regressions - Performance and innovation behavior and contingencies attributes

Significant regressions [a] - Performance and innovation behavior, contingencies characteristics [b]

Performance	Regression 1				Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*VIF*	*Control + contingencies + strategy + innovation variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Growth			*0.0197*	*1.14*			*0.0000*	*1.66*
	R&D intensity	0.357**		1.08	Industry - Barriers	-0.114*		1.19
	Turnover	0.178**		1.30	Industry - Suppliers	-0.166**		1.22
					Firm - Sales	0.425***		1.70
					Firm - CRM	0.243***		1.27
					Nature - Disruptive	-0.158***		1.39
					Activity - Marketing	0.197***		1.19
Profitability			*NS*	*1.14*			*0.0000*	*1.66*
					R&D Intensity	0.343*		1.55
					Firm - Sales	0.177**		1.70
					Firm - CRM	0.162**		1.27
					Nature - Sustained	0.161**		1.40
					Nature - Disruptive	-0.153***		1.39

Notes: [a] Only significant correlations at p < 0.1 are reported

[b] Based on factor analysis of performance. innovation. strategy and contingencies characteristics

* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01

Table 4.9: Regressions - Performance and strategic posture, innovation behavior and contingencies attributes

Significant regressions [a] - Performance and innovation behavior, strategic posture, contingencies characteristics [b]

Performance	Regression 1				Regression 2			
	Control variables	*Coef.*	*Model Sig. Prob > F*	*VIF*	*Control + contingencies + strategy + innovation variables*	*Coef.*	*Model Sig. Prob > F*	*VIF*
Growth			*0.0197*	*1.14*			*0.0000*	*1.66*
	R&D intensity	0.357**		1.08	R&D intensity	0.298*		1.68
	Turnover	0.178**		1.30	Age	-0.164*		1.30
					Industry - Barriers	-0.130*		1.28
					Industry - Clients	-0.130*		1.52
					Industry - Suppliers	-0.137**		1.40
					Firm - Sales	0.386***		1.82
					Firm - CRM	0.234***		1.40
					Entrepreneurial - Differentiation	0.152*		1.65
					Engineering - R&D Product	0.148*		2.07
					Nature - Disruptive	-0.184***		1.64
					Activity - Marketing	0.235***		1.66
Profitability			*NS*	*1.14*			*0.0000*	*1.66*
					R&D Intensity	0.393**		1.68
					Firm - CRM	0.171**		1.40
					Entrepreneurial - Differentiation	0.185*		1.65
					Entrepreneurial - Stability	0.167*		1.30
					Engineering - R&D Process	-0.193**		1.89
					Engineering - R&D Costs	0.150*		1.49
					Engineering - Production Flexibility	0.154*		1.63
					Nature - Sustained	0.160**		1.73
					Nature - Disruptive	-0.150**		1.64
					Activity - Marketing	0.203**		1.66

Notes: [a] Only significant correlations at p < 0.1 are reported

[b] Based on factor analysis of performance. innovation. strategy and contingencies characteristics

* denotes p < 0.1; ** denotes p < 0.05; *** denotes p < 0.01