

LISELORE BERGHMAN

Strategic Innovation Capacity

**A Mixed Method Study on
Deliberate Strategic Learning Mechanisms**



STRATEGIC INNOVATION CAPACITY

**A MIXED METHOD STUDY ON
DELIBERATE STRATEGIC LEARNING MECHANISMS**

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A Mixed Method Study on
Deliberate Strategic Learning Mechanisms

**Strategische-innovatiecapaciteit:
een mixed-method studie naar
doelbewust opgezette mechanismen voor strategisch leren**

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And strangely all of a sudden, what always seemed like an ultimate purpose starts to melt away. Six years have passed by. Years of doubt, despair, solitude and perseverance. Years of enthusiasm, discovery, euphoria and maturation even so. The ‘ultimate purpose’ has gradually started to transform itself, and new land is looming up.

Still, this PhD project lives on through the scientific baggage, experience and curiosity that I have gained over the past years, and it makes me prepared and thrilled to start off on a new trip with fresh and different goals.

Enjoying this privileged position is however far from solely my personal merit.

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Liselore Berghman

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INTRODUCTION

PROBLEM STATEMENT

Forces of globalization and technological innovation may allow for frequent shifts in the industry structure. Lower industry barriers, making room for aggressive new entrants (e.g., McNamara et al., 2003; Hamel & Välikangas, 2003), may make gentlemanly agreements among incumbents erode progressively (D'Aveni, 1995a). Firms, in their struggle for control and short-term profits are inclined to all seek solace in the same weapons, in order to take away market share from each other (Markides, 1999a). Their similar strategies of incremental improvements in cost, quality or both (Thomas, 1996) trigger fierce price competition (Larsen et al., 2003). Accordingly, in many industrial sectors, margins and profits are squeezed (D'Aveni & Gunther, 1994, Hamel & Prahalad, 1996), and companies approach (or bounce into) a perfect competition state (D'Aveni, 1999). Furthermore, the arrival of just one hostile new entrant, an exogenous chock or an aggressive strategy of an incumbent is enough to spin this wheel of 'hypercompetition' (McNamara et al., 2003).

In less globalized, less high-tech and less competitive industries, pressures for strategic convergence may be powerful as well. Due to their bounded rationality, managers seek for ways to make their environmental field more lucid and structured (Porac & Thomas, 1990). Empirics have shown how firms in a specific industry gradually develop shared core beliefs about the relevant set of competitors and *the* appropriate ways to compete (e.g. Huff, 1982; Spender, 1989; Sutcliffe & Huber, 1998). These beliefs limit the range of strategic possibilities an individual firm considers and hence restrict its capacity to change its strategy (Abrahamson & Fombrun, 1994; Johnson & Hoopes, 2003; Porac et al., 1989). Furthermore, in many industries, suppliers face a growing threat of product/service commoditization (Rangan & Bowman, 1992). Commoditization effects restrict the potential value of incremental product innovations (Rangan & Bowman, 1992; Vandenbosch & Dawar, 2002), which forces suppliers to look for fundamentally new ways to differentiate themselves (Styles & Goddard, 2004; Day & Montgomery, 1999).

Observations of these tendencies (and their mutual reinforcement) have raised scholars' interest in innovations of a more disruptive nature (e.g., Christensen et al., 2002). More specifically, authors have recommended firms to hedge against the above mentioned threats by introducing 'new ways of playing the game' (Govindarajan & Gupta, 2001). Still, a new way of playing the game is unlikely to produce economic rents unless it better meets the needs of customers (Miller & Chen, 1996). Hence, firms are also advised to found these innovative strategies on the creation of new and substantially superior value for their customers.

Such type of innovation has gone under the name of 'strategic innovation' (e.g., Markides, 1997, 1998).

Scientific research on strategic innovation is however still in its infancy and so far, academics lack insight into the specifics of strategic innovation. Inspired by Walsh' (1995: 286) assertion that "challenges should stimulate investigation, not serve as a rationale for a

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research moratorium”, we accepted the conceptual and empirical challenge to study strategic innovation.

In fact, we study strategic innovation *capacity*. We do so because authors have shed doubt on the sustainable advantage firms can derive from a ‘one-shot’ strategic innovation and advocate *continuous* strategic innovation over time (Govindarajan & Gupta, 2001; Kim & Mauborgne, 2004). In addition, to increase chances of successful strategic innovation and to keep under control the risks associated with it, the value of portfolios of low-scale experiments has been touted (Govindarajan & Trimble, 2004). We call such experiments ‘strategic innovation initiatives’. We then denote the capacity an organization has to systematically create such strategic innovation initiatives by ‘strategic innovation capacity’.

Our study is motivated by the quest for any mechanisms firms can deliberately use to foster their strategic innovation capacity. In this respect, we follow recent research on entrepreneurship, which has broadened from traditional questions of entry to management processes used to have the organization act entrepreneurially (Matsuno et al., 2002). Furthermore, management theorists’ understanding of proactive managerial actions vis-à-vis the environment is still tiny (Rajagopalan & Spreitzer, 1996). More specifically, we are interested in the effectiveness of such mechanisms given specific organizational and supply chain characteristics.

In sum, we study *deliberate, strategic learning mechanisms firms can use to foster their strategic innovation capacity*.

This PhD study reflects our belief in the value of strategic innovation in specific circumstances. Larsen et al. (2002) indeed demonstrated that strategic innovation does not only produce profits on a company level. Their findings moreover show that on an industry level as well, strategic innovators are capable of increasing average firm profitability (i.e., industry profitability) and in this way, may rejuvenate the entire industry. Yet, these findings need further corroboration. Hence, we would like to stress that this study on strategic innovation capacity implies by no means we are laid astray to pronounce any normative judgment upon the omni-appropriateness of this kind of innovation.

METHODOLOGY

Given the nascent status of research on strategic innovation capacity, let alone on mechanisms useful to foster it, we explicitly chose for the application of a ‘mixed method’ empirical research design (Tashakkori & Teddlie, 1998). First, a combination of multiple empirical research methods has potential to generate broader, deeper and more valid insights than mono-method research (Rocco et al., 2003; Podsakoff & Dalton, 1987). We furthermore share King & Tucci’s (2002) viewpoint that the application of a mixed method design is especially useful in research on the complex organizational phenomena traditionally explored in strategic management research. Curral & Towler (2003) moreover claim that a mixed method design is especially suitable when research questions tackle innovation issues.

In addition to our mixed method design, we adopted Orton’s (1997) iterative research process, in which on the one hand empirical data collection and analysis, and on the other

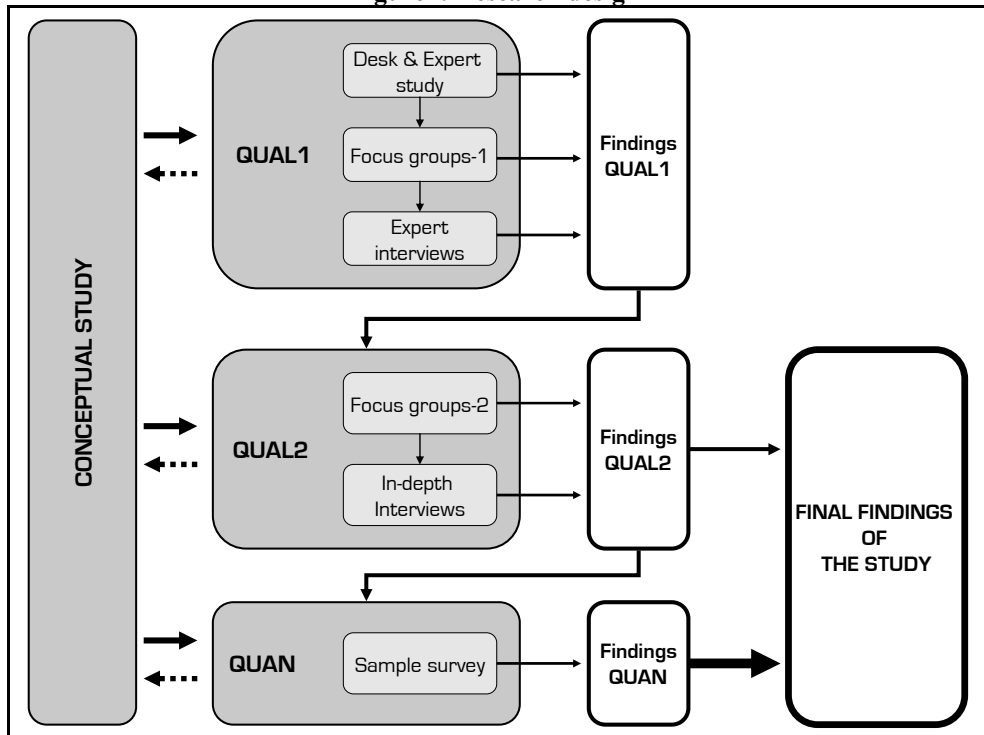
theoretical insights mutually influence, inform and drive each other. We hence continuously cycled back and forth between theory and empirics (cfr. Eisenhardt, 1989b).

The conceptual part of the study rests on extant contributions on strategic innovation, and related concepts born in the managerial literature (such as value innovation, Kim & Mauborgne, 1997, 1999b) and scientific literature (strategic renewal). We furthermore build upon the insights scholars have developed on dynamic capabilities, absorptive capacity, sensemaking and routines.

The empirical part of the study targets Dutch industrial firms. It rests on a mixed method sequential 'QUAL→QUAN' design (e.g., Tashakkori & Teddlie, 2003a), where we attach 'equal status' to both phases.

Figure i shows a simplified version of our research design.

Figure i: Research design



The qualitative phase is split into two subsequent parts: QUAL1 and QUAL2. Both phases are engrafted onto a study of five Dutch industrial sectors: Energy (limited to electricity), Functional Foods, Traffic Management Systems, Trucks & Trailers and Graphics Printing.

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QUAL1 rests on a desk & expert study, 5 focus groups and 28 expert interviews. The level of analysis is the industry. The findings of QUAL1 lead to the identification of industry recipes and to the identification of 'real' strategic innovation initiatives and strategic innovators (business units or companies with a high level of strategic innovation capacity).

The QUAL1-study centers on the following research questions:

RQ1: What are the specific industry recipes in each of the industries selected?

RQ2: Given these industry recipes, what are interesting and 'real' strategic innovation initiatives in these industries?

RQ3: Given these 'real' strategic innovation initiatives, what organizations are 'real' strategic innovators in these industries?

In **QUAL2**, these strategic innovation initiatives and strategic innovators are further scrutinized by means of 5 additional focus groups and 18 in-depth interviews. The level of analysis shifts from the industry to the business unit (or firm for single-unit firms). Based on the QUAL2-findings we attempt to answer the following research questions:

RQ1: Do deliberate, strategic learning mechanisms in the areas of recognition, assimilation and transformation foster a business unit's strategic innovation capacity? (relevance of the basic constructs)

RQ2: What are relevant path-breaking focus areas these mechanisms target? (subdimensions of the constructs)

RQ3: How do deliberate strategic learning mechanisms in the areas of recognition, assimilation and transformation foster a business unit's strategic innovation capacity? (relationships among the constructs)

RQ4: Which internal and external characteristics may exert a critical influence on the effectiveness of deliberate strategic learning mechanisms? (relevant moderators)

Overall, QUAL2 serves a) to identify and refine relevant constructs (incl. construct dimensions), b) to specify an emergent theoretical model, and c) to develop quantitative measurement instruments.

Finally, the model is statistically tested in a quantitative study (**QUAN**). Partial-least squares analyses are performed on a sample of all Dutch industrial companies. The interpretation of the QUAN-findings is facilitated and enriched by a re-inspection of the QUAL2-data. Research questions we attempt to answer during the quantitative study are:

RQ1: Which of the path-breaking focus areas that deliberate strategic learning mechanisms target are critical a business unit's strategic innovation capacity?

RQ2: What (partial) mediating effects can be detected among deliberate strategic learning mechanisms for recognition, assimilation and transformation on a business unit's strategic innovation capacity?

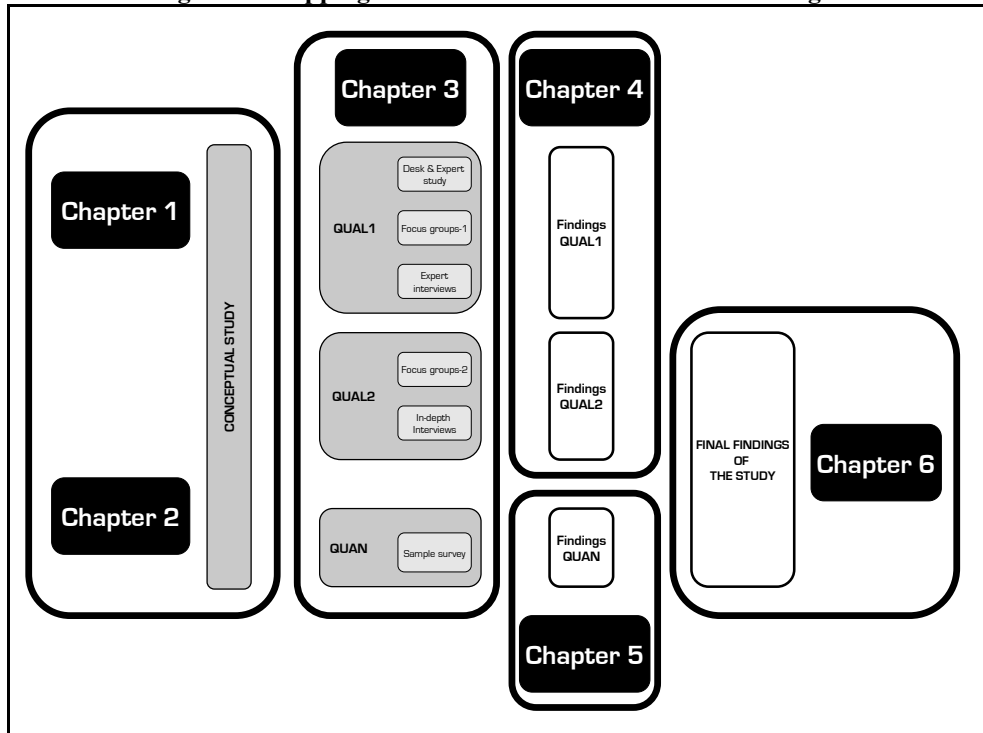
RQ3: What moderating effects of organizational and supply chain factors can be detected on the relationships between deliberate strategic learning mechanisms for recognition, assimilation and transformation and a business unit's strategic innovation capacity?

STRUCTURE OF THE THESIS

Despite the application of Orton's (1997) iterative research process, for reasons of clarity this PhD thesis essentially marks out the conceptual and empirical phases in separate chapters.

Figure ii shows how the different chapters can be mapped onto the research design.

Figure ii: Mapping of the structure onto the research design



Due to the theoretical underdevelopment of the concept of strategic innovation, the study commences with a conceptual delineation of the concepts of strategic innovation and strategic innovation capacity. **Chapter 1** is based on a thorough literature review on strategic innovation and related concepts. We distinguish the fundamental aspects of strategic innovation and gradually develop a definition of strategic innovation and strategic innovation capacity.

Chapter 2 takes the conceptual discussion one step further. We conceptually integrate the concepts of strategic innovation capacity, dynamic capabilities and absorptive capacity. In addition, the literature on strategic innovation is enriched by insights from the extant sensemaking literature to identify preliminary path-breaking focus areas in the different absorptive capacity-dimensions. We argue that, to foster strategic innovation capacity, managerial mechanisms should essentially target these focus areas. Recent insights on the form and effects of routines enable us to finally come to the concept of 'deliberate strategic learning mechanisms'.

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In **chapter 3**, we justify our choice for a mixed method design. Furthermore, we provide the methodological specifics of each phase in terms of research questions & level of analysis, design, and analysis.

The empirical part of the study starts off with **chapter 4**. There, findings of the QUAL1- and QUAL2-research phases are reported. Results are furthermore mirrored against the conceptual insights of chapter 2, in order to identify path-breaking focus areas and to formulate three hypotheses regarding partial mediation effects among the three independent variables. In addition, we formulate research questions concerning the effects organizational and supply chain characteristics may produce.

Chapter 5 details the quantitative analyses in a technical way and reports the straight results of the quantitative study. More specifically, formative indicators are studied, a partial-mediation model is pored over, and the occurrence of moderated mediation effects is explored.

The findings of chapter 5 are interpreted in **chapter 6**. For the interpretation, we do not exclusively rely on the literature, but the findings of QUAL2 (chapter 4) are re-inspected as well. In chapter 6 the real character of mixed method research reveals itself.

This PhD thesis rounds off with general **conclusions** on a more abstract level. We synthesize our study and its findings, and elaborate on its contributions to theory and practice. Finally, the limitations of this study are discussed and we provide routes we think most promising for further study.

CHAPTER 1

THE CONCEPT OF STRATEGIC INNOVATION CAPACITY

The notion of ‘strategic innovation capacity’ needs first sharpening before instruments of analysis can be developed. In order to define this concept, the concept of ‘strategic innovation’ is to be clarified first. The purpose of this chapter is hence to delineate the concept of strategic innovation (capacity) by an extensive literature study. We will begin by an overview of strategic innovation contributions, revealing fundamental aspects of strategic innovation. These findings will be enriched by relating them to insights from familiar concepts to strategic innovation (e.g., value innovation, disruptive innovation), principally developed in managerially focused contributions. Then, these insights will be further embedded among theoretical concepts that have been treated in scientific publications, more specifically the concepts of ‘strategic change’ and ‘strategic renewal’. In this way, we aim to conceptually ground the concept of strategic innovation in a more robust way. Finally, a definition of strategic innovation capacity is developed.

1. 1 THE ‘DYNAMIC RESOUC-E-BASED VIEW’

The strategic management debate has traditionally been centered on the question of how differences in firm performance can be explained (Bowman & Ambrosini, 2000). Although it is neither feasible, nor useful to provide a comprehensive literature review here, a few highlights nonetheless warrant extraction for they help to frame the concept of strategic innovation within existing theoretical paradigms.

For a long time, ideas from classical industrial organization economics have prevailed in explaining firm performance differences as being determined by structural conditions of the industry (McNamara et al., 2003). This so-called ‘Structure-Conduct-Performance’ school (Thomas, 1996) restricted strategy analysis to choice of industry and choice of market positioning within the industry (Baden-Fuller, 1995). It is within this thrust that for example Porter’s (1979, 1980) ‘Five Forces framework’ can be positioned. It could indeed be used by companies in their attempts to manipulate market structure and execute market power by precluding or removing disturbing competitive forces in the industry (D’Aveni, 1999).

This rather static approach on competition (Thomas, 1996) and its corresponding fit-enhancing strategic analysis became however less meaningful since increasing market dynamism made market structure into a constant state of flux (Grant, 1996; Chakravarthy, 1997; Hamel, 1998b). Furthermore, empirics had demonstrated that very competitive and hostile environments did not prevent firms from being successful (e.g., Hamel, 1999). This observation was in line with findings that increasing rivalry had moved the source of success internal to the firm (Thomas, 1996), such that firm effects strongly outweigh industry effects in explaining firm profitability (e.g., Rumelt, 1991; Baden-Fuller &

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Stopford, 1994). Emphasis consequently shifted from a demand-side to a supply-side approach and made room for the ‘resource-based view of the firm’¹ (e.g., Barney, 1991; Wernerfelt, 1984). According to this resource-based view, sustainable differences in firm performance stem from firm-specific configurations of VRIN (valuable, rare, inimitable, non-substitutable) resources (Barney, 1991). Hence, not external strategic positioning but internal firm-specific resources were considered as a more stable basis for (sustained) competitive advantage.

Yet, in recent years the resource-based view has not gone unchallenged. It has been extensively critiqued (e.g., Priem & Butler, 2001; Eisenhardt & Martin, 2000) for being tautological and static, and for its exclusive internal focus. Indeed, the influence of external factors has traditionally been fully ignored (Aragón-Correa & Sharma, 2003). Furthermore, the growing notion and assumption of ever-increasing competition and market turbulence in strategic management research (e.g., D’Aveni, 1994; Eisenhardt, 2002; Thomas, 1996; Volberda, 1996) have reduced the belief in achieving Peteraf’s (1993) necessary (‘rents’-) conditions for resource-based sustained competitive advantages (Martinsons, 1993).

These beliefs have gradually, albeit only recently, led to a more dynamic resource-based perspective that stresses the dynamic aspects of, in particular, intangible (or ‘operant’, see Vargo & Lusch, 2004) resources. Scholars have come to link the resource-based view to industry conditions and to innovation (Hoopes et al., 2003) and incorporate the impact of environmental characteristics on the effectiveness and development of resources (see e.g., ‘the contingent resource-based view’ in Aragón-Correa & Sharma, 2003; Eisenhardt & Martin, 2000; Kraatz & Zajac, 2001; Teece et al., 1997).

In this way inside-out and outside-in approaches to strategy research have gradually become reconciled (Baden-Fuller, 1995). This ‘enriched’ resource-based view has even become equated with the ‘hypercompetition perspective’ (McNamara et al., 2003). It borrows its name from D’Aveni’s (1994) research on ‘hypercompetition’ since many contributions in this stream of literature have been built on the central tenets of, in particular, his work.

The dynamic resource-based view, or hypercompetition perspective, departs from the belief that technological revolutions and globalization forces (Hitt et al., 1998; Eisenhardt, 2002) have intensified the, endogenous (e.g., pace of innovation) and exogenous (e.g., deregulation), triggers of environmental turbulence in terms of scope, speed and duration (Bogner & Barr, 2000). As such, many markets have become ‘hypercompetitive’ (D’Aveni, 1994) or ‘high-velocity markets’ (Eisenhardt, 1989a), that have in turn nurtured a high level of industry dynamism since lowered entry and exit barriers allow for frequent shifts in the industry structure (McNamara et al., 2003; Hamel & Välikangas, 2003).

Hypercompetitive environments are characterized by blurred industry boundaries (Floyd & Lane, 2000), ambiguous consumer demands, shortened product design and life cycles (Slywotsky & Wise, 2004; Krinsky & Jenkins, 1997; Vandenbosch & Dawar, 2002), and a shift in competitive rules (Chakravarthy, 1997, Eisenhardt & Martin, 2000, Brown & Eisenhardt, 1997; D’Aveni, 1994, 1995a,b; Thomas, 1996; Styles & Goddard, 2004).

¹ For a collection of recent contributions, see the *Strategic Management Journal*, October 2003, Special Issue and the *Journal of Management*, 2001, issue 6.

The persistent competence-destroying change limits the duration of competitive advantage even more and meanwhile attracts new entrants that may in turn further change the market. Consequently, the characteristic trait of hypercompetitive environments is that firms, in their struggle for control and temporary competitive advantage, continuously create temporary disequilibria themselves (Volberda, 1996; D'Aveni, 1995). Eisenhardt (2002:89) denotes this phenomenon by the term 'guerilla warfare'. In this sense, firms may even contribute themselves to the perpetuation (Bogner & Barr, 2000) or intensification of competitive turbulence (D'Aveni, 1999).

Even though D'Aveni (1995a) claimed the omnipresence of hypercompetition, i.e. not limited to fast-moving, high-tech industries, he nevertheless identified several industry attributes that make one industry more susceptible to hypercompetition than others (D'Aveni, 1994). Thomas (1996), elaborating on his and other industrial economists' ideas, empirically verified the influence of three areas: transactor dynamism (growth rate and inelasticity of demand, technical sophistication of suppliers), entry conditions (decrease in industry concentration), and in particular, the dynamism and depth of the industry knowledge base (percentage of workforce that is professional, industry productivity growth). He found that, even though the influence of all three factors was discerned, the industry's knowledge base was by far the largest trigger for hypercompetition.

Still, McNamara et al. (2003) found that a large part of the total variance in business profitability can *always* be attributed to unstable factors. Furthermore, they posit that cognitive 'hindsight' biases create a belief in increasing turbulence since they lead to managerial perceptions of a stable, logical past and a turbulent present and future. This means that also in more stable environments, companies should be able to cope with hypercompetitive issues. Furthermore, the arrival of one aggressive new entrant, an exogenous chock or an aggressive strategy of an incumbent is enough to spin the wheel of hypercompetition. For this reason, companies should always be prepared or should be able to disrupt if they want to.

Therefore, McNamara et al. (2003) argue that the "management of dynamic environments and innovative capabilities remains important to any explanation of persistent performance differences among businesses, and continues to merit substantial academic attention" (: 273).

This academic attention is indeed reflected in the existence of a substantial body of work on the strategic behavior of firms that are affected by turbulent environmental conditions. Authors have accordingly prescribed organizational conditions and strategies to better deal with hypercompetition (e.g. Hamel, 1999; Hamel & Välikangas, 2003; Eisenhardt & Martin, 2000). There exists a general consensus that an exclusive reliance either on stable industry structures, either on idiosyncratic resources does apparently not suffice (McNamara et al., 2003). Fundamental changes in a firm's environment may devalue its key resources so that, without undertaking appropriate action, such environments can turn a firm's core competences into 'core rigidities' (Leonard-Barton, 1992) and induce a 'competence trap' (Levinthal & March, 1993). Hypercompetitive pressures have hence shifted the internal organization of firms from thorough exploitation and defense of given strategic assets toward new organizational forms that favor exploration (e.g., Thomas, 1996; Volberda, 1996). Characteristics of high-velocity environments place a premium on

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dynamic organizations having the ability to engage in rapid, relentless, or continuous change (Eisenhardt, 1989a; Brown & Eisenhardt, 1997). Hypercompetition hence requires the infliction of pre-emptive strategies (Evans, 1991) and a firm's capacity to constantly reestablish its role in changing markets (see e.g., D'Aveni, 1994; Hamel & Välikangas, 2003).

In other words, the dynamic resource-based view of the firm has turned the issue of strategically innovating to the centre stage (Baden-Fuller, 1995).

1.2 THE BASIC TRAITS OF STRATEGIC INNOVATION

A study of the literature (see Appendix I.A) revealed that the plea for creating *new* competitive advantages and disruptive strategies put forward in the hypercompetition view (e.g., D'Aveni, 1999; Thomas, 1996) bears much in common to the central tenets of the strategic innovation (SI) literature. Some authors have argued that the need to strategically innovate directly flows from the characteristic traits of the hypercompetition phenomenon itself (e.g., Baden-Fuller, 1995; Hamel & Välikangas, 2003). Forces such as globalization and technological innovation may lower industry barriers (e.g. the appearance of a foreign or nimble disruptive challenger) and make gentlemanly agreements among incumbents consequently erode (D'Aveni, 1995a). In this context of increased rivalry, following similar strategies to rivals in an attempt to take away market share from them (Markides, 1999a) ends in simply outperforming them on the basis of incremental improvements in cost, quality or both (Thomas, 1996). The fight over increasingly smaller industry spaces eventually leads to fierce price competition. The intra-industry performance variance will be small since firms all have similar experience in the same areas and hence compete with the same weapons (Thomas, 1996). Basically, in their attempts to out-compete each other companies approach (or bounce into) a perfect competition state (D'Aveni, 1999). The only way companies can escape the perfect-competition scenario and achieve above-normal profits is by creating *new* competitive advantages (e.g., D'Aveni, 1999). This rivalry is moreover rewarded because disruptive strategies can stimulate demand by responding to advanced customer needs (Thomas, 1996). In this way, differences between winners and losers will be larger (Thomas, 1996).

Yet, not all authors on SI have taken hypercompetition as the starting point of their discussions. Markides (1997), for example, points out that the issue of strategic innovation is not new, neither is it becoming more important because of increasing environmental turbulence. He argues that eventually, *all industries mature* since competitors all tend to focus on a small number of narrow 'industry spaces', i.e. customer segments, products/services, and manufacturing and distributions methods. Implicit assumptions about how to compete are widely shared among industry players (Styles & Goddard, 2004). Different theoretical rationales have been developed to explain these imitation driving forces (for an overview, see Larsen et al., 2003). Basically, the more an industry matures, the more companies tend towards strategy convergence. Miller & Chen (1996) indeed showed that firms are more inclined to pursue unconventional strategies during periods of market growth. This is because in periods of market stagnation, a shortage of resources makes firms more susceptible to institutional pressures imposed by powerful actors (Dimaggio & Powell, 1983). As a consequence, when the need to strategically

innovate is the highest, companies seek refuge in strategy convergence. Since strategy convergence narrows competition down to a small competitive space, competition becomes fiercer. In this way, firms themselves contribute to a further erosion of the industry's profit potential. Markides (1997) and Larsen et al. (2003) hence argue that not so much hypercompetition but these imitation driving forces produce strategy convergence. It is exactly the latter that largely leads to increased rivalry among industry players, which will eventually evoke price competition. Lower prices drive down excess profits onto the competitive equilibrium, at which consumer welfare is maximized (Scherer, 1992). Larsen et al. (2002, 2003) empirically demonstrated that not so much new entry but this inter-organizational strategy convergence will eventually erode above normal profits in an industry.

In sum, underlying the literature on SI is always the premise that the specific *types* of innovation firms compete with affect their competitive position (Sheremata, 2004; Henderson & Clark, 1990). The basic tenet of SI is however that the occurrence of price competition in small industry spaces does by no means imply that the industry has lost all of its profit potential; it is just what Styles & Goddard (2004) call a 'maturity trap'. Not only get attractive positions imitated but new –often neglected– strategic positions keep emerging as well (Markides, 1999b): the so-called 'unexploited pockets of profitability' in the industry (Larsen et al., 2002). Thus, "strategic innovation focuses on changing firm-level strategy over time to identify unexploited positions in the industry ahead of rival firms" (Larsen et al., 2002: H1). In his 1998-article Markides notes that the unexploited gaps in the industry positioning that have to be identified for SI may stem from changing market and industry conditions. Discontinuities may thus contain innovation potential (Hamel & Getz, 2004). In other words, turbulence is not regarded as an external threat that should be responded to, but more as "generating new opportunities and the potential for new ground rules" (Markides, 1999a: 60). Apart from its response capacity a company's pro-active behavior is hence largely emphasized (Markides, 1997; Hamel & Prahalad, 1994; Hamel & Välikangas, 2003). Contrary to the product life-cycle paradigm of birth-growth-maturity-decline, industries (and some of their incumbents too) possess possibilities for industry 'de-maturity' (Abernathy & Clark, 1985). Larsen et al. (2002) indeed demonstrated that SI does not only produce profits on a company level. Also on an industry level, strategic innovators are capable of increasing average firm profitability (i.e., industry profitability) and in this way, may rejuvenate the entire industry.

In this respect, SI insights build further on strategic choice theories, by refuting the assertion of environmental determinism (Volberda et al., 2001a,b; Kim & Mauborgne, 2004). As proactive strategic behavior is considered related to managerial intentionality (Van den Bosch et al., 2003), not environmental forces but managerial action and choice are deemed as *the* driver of firm performance (Baden-Fuller & Stopford, 1994). Following this logic, SI can originate from the organizational competencies giving rise to new opportunities and new ways to play the game (e.g., Greenwood & Suddaby, 2006; Hamel, 1996; Govindarajan & Gupta, 2001). The consequences for marketing have been expressed by Dickson (1996: 102) as follows: "[...] marketing is the art and science of creating change (disequilibrium) in markets in such a way that the change benefits the firm (or an alliance of firms) and, consequently, comparatively "disadvantages" rivals. If a market is in equilibrium, marketers are not doing their job".

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Accordingly, the central idea of SI is one contra strategy convergence (e.g., Markides, 1997; Larsen et al., 2002), whether produced by hypercompetition or not. Strategic divergence implies that the nature of competition is changed (Schlegelmilch et al., 2003): firms deviate from, or even actively alter, the industry rules of the game (Baden-Fuller, 1995). Accepted industry assumptions about how to compete are challenged and overturned (Styles & Goddard, 2004) by introducing a ‘a new way of playing the game’ (Markides, 1998, 1999b). “A strategic innovation is a creative and significant departure from historical practice” (Govindarajan & Trimble, 2004: 69). Introducing the concept of *disruptive* SI, Charitou & Markides (2003) take an even more radical standpoint by asserting that not only a different, *new* way of playing the game is required, but also one that *conflicts with* the existing way.

Secondly, the ultimate strength of SI lies not so much in the act of rule changing in se but in its potential to produce dramatic value improvements for customers (Schlegelmilch et al., 2003). In many industries, suppliers face a growing threat of commoditization (Rangan & Bowman, 1992). Demanding customers in business-to-business markets rationalize their supplier bases and ask their remaining suppliers for dramatical value improvements (Day & Montgomery, 1999). In order to beat the ‘commodity magnet’ (Vandenbosch & Dawar, 2002) firms need to find new ways to differentiate themselves. Hence, not only hypercompetition tendencies and strategy convergence, but also product and service commoditization may tighten the profit squeeze. Therefore, strategic innovators are doing something genuinely different that customers like and reward (Styles & Goddard, 2004). Since SI implies to offer something new that customers largely value, and/or do this in a better way than rivals have ever done before, it has been argued that the success of SI largely depends on a deep understanding of customers’ needs and priorities (Markides, 1997). Schlegelmilch et al. (2003) advise firms to be customer-oriented and not product-oriented: customers should feature at the center of strategic thinking. In some publications (Markides, 1998; Charitou & Markides, 2003), it is even argued that the new market spaces should “grow to capture a large share of the established market”. Whereas Markides (1997, 1998, 1999a,b) originally focused on disrupting the rules of the game, i.e. stressing foremost the disruptive effect SI has on competitors, with the introduction of ‘radical innovation’ in his most recent articles (Markides, 2004; Markides & Geroski, 2004), his attention has shifted towards the disruption SI can produce on customer behavior and habits as well. He posits that radical innovations require “major new value propositions” (Markides, 2004: 36). Likewise, Govindarajan & Gupta (2001) and Govindarajan & Trimble (2004) have suggested firms to reinvent and reconceptualize delivered customer value. SI hence implies that the product and service boundaries of the sector are altered (Baden-Fuller, 1995).

In general, scholars (e.g., Govindarajan & Trimble, 2005; Govindarajan & Gupta, 2001; Markides, 1997; Schlegelmilch et al., 2003) share the view that new customer value can be created by either delivering a fundamentally new offering to existing customers (e.g. IBM’s shift from selling hardware to selling a total solution), or by shifting the customer base, the so-called “reshaping of existing markets” (Schlegelmilch et al., 2003). The latter strategy implies that a new or previously unserved customer segment is uncovered (e.g., Canon’s focus from the corporate to the household and SME market for copiers).

In conclusion, a deviation from the industry rules of the game with the view of offering new and substantially superior customer value can be regarded as the central notion of SI. This notion builds around two elementary aspects of SI, i.e. industry rule deviation and superior customer value creation.

Our intention to study both these aspects of SI has brought us to different concepts (see Appendix I.B), with a so-called ‘family resemblance’ (Evans, 1991) to SI. Kim & Mauborgne (1997, 1999, 2000) introduced the concept of ‘value innovation’ and ‘blue ocean strategy’ (2004). Hamel talked about ‘industry revolution’, ‘revolutionary strategies’ (1996, 1998a), and ‘strategy innovation’ (1998b, 1999). Christensen et al. (2000, 2002), for their part, studied ‘disruptive innovation’, and Normann & Ramirez (1993) stressed issues of value reinvention and value constellations. Not only management authors’, but also marketing scholars’ interest in this strategic phenomenon was aroused. Accordingly, the concept of ‘market-driving organizations’ was introduced (Jaworski et al., 2000; Kumar et al., 2000; Tuominen et al., 2004; Carrillat et al., 2004). A common denominator in all these publications over time, is their initial (end-90s) focus on both the environmental drivers and contents of this new kind of innovation, towards (from 2002 onwards) a –logical follow-up– discussion of organizational prerequisites (with a strong emphasis on incumbents and established companies) to develop the capacity to strategically innovate. Insights from these literature streams (see Appendix I.B) can shed further light on the two central elements of SI previously mentioned. Moreover, the study of these cognate concepts may fill the conceptual (and empirical) lacunae shown in the SI literature. Largely stemming from a managerially-oriented research tradition, the majority of contributions on SI predominantly lack scientific rigor, despite their promising ideas and instruments. Schlegelmilch et al. (2003: 129) contend that “Research on strategic innovation has progressed substantially in the last few years, yet it is still a field where the big picture is only beginning to take shape. It is neither clear how many puzzle pieces comprise the picture nor what these pieces actually look like”.

In order to capture the essence of the various definitions/ conceptualizations encountered, each was considered in relation to the two elementary aspects we derived. We will treat the deviance from the industry rules of the game, and the creation of new and substantially superior customer value, consecutively.

1.3 THE FUNDAMENTAL ASPECTS OF STRATEGIC INNOVATION

1.3.1 Deviance from traditional industry assumptions and conventions

Kim & Mauborgne share Markides’ belief that eventually all strategies decay, and not because of hypercompetition alone. The fight over increasingly smaller industry spaces eventually leads to fierce price competition, or a so-called ‘competitive trap’ (Kim & Mauborgne, 1999a). Hamel & Välikangas (2003) further add that a decline in strategic strength may indeed be grounded in convergence (Markides, 1997), but that in addition, strategies can also be supplanted by better ones, can get exhausted when markets become saturated or can get eviscerated because of an altered balance of power in the industry. Slywotzky (1996) has depicted this phenomenon by the term ‘value migration’, indicating

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that in established markets market value may be captured by firms that establish ‘innovative business designs’, using new go-to-market mechanisms, differentiated offerings, and superior customer selection by (re)configuring resources to capture value in the market space. Therefore, even in non-hypercompetitive industries breaking industry rules may be a necessary condition to increase (or maintain) performance (Markides, 1999a; Mitchell & Singh, 1993 concerning technological innovations).

Still, in contrast to his original 1997-contribution, Markides (in Mang, 2000) later adds that even though SI may always be required, the new economic scene may intensify this need all the more (see also, Govindarajan & Gupta, 2001; Hamel, 1998a,b, 1999). Likewise, Hamel (1998a) argues that the new economic landscape puts an end to strategic ‘incrementalism’. Several authors share the view that the move from an industrial to an information age welcomes industry revolutionaries just as it punishes complacent incumbents all the more. This has made scholars turn the following phrases: “all businesses are living on the precipice” (Hamel, 1998a: 20), “it’s no longer safe to be safe” (Styles & Goddard, 2004: 72), or “more risk can be prudent” (Sheremata, 2004: 374).

Authors posit that real opportunities for profit and growth lie specifically in “innovation outside the conventional context” (Kim & Mauborgne, 1999). “Shackled neither by convention nor by respect for the precedent, these companies [rule breakers] are intent on overturning the industrial order [...] rule breakers set out to redefine the industry, to invent the new by challenging the old” (Hamel, 1996: 70-71). Industry structures may be altered in order to change the roles and relationships performed by various industry parties (Jaworski et al., 2000), and to reshape the power balance (Baden-Fuller, 1995).

Govindarajan & Trimble (2004) share Kim & Mauborgne’s (1997, 1999) emphasis on the distinction of SI with mere product or technological innovation. They argue that product innovation is often incremental and may lack strategic significance. Likewise, Slywotsky & Wise (2004) maintain that a high level of strategic discontinuities (Hitt et al., 1998), and the rapid strategic maneuvering among global and new market players (D’Aveni, 1995a) reduce the potential of mere product-innovation growth moves. Lynn et al. (1996) however posit that continuous, incremental product line extensions remain useful to maintain success, but only after they have first been established by means of innovations of a more radical and discontinuous kind. New technologies, in their turn, do not necessarily produce enhanced/ new customer value. As Abernathy & Clark (1985) put it: “Novelty and scientific advance may have little to do with an innovation’s competitive significance” (: 7), and further: “An innovation of the most unique and unduplicative sort will only have great significance for competition and the evolution of industry when effectively linked to market needs” (: 13). Hence, Kim & Mauborgne (1999) assert that even though technology innovators may indeed create value in macro-economic terms, only few of them are capable of eventually realizing their innovations in financial terms. As technological pioneers seldom end up dominating the market (Markides & Geroski, 2003a), Markides & Charitou (2004), they too warn for a mere technological focus.

It is however (product and process) innovations resulting from intensive R&D-efforts that have received the most attention in the value creation literature (Mizik & Jacobson, 2003). Yet, some firms have succeeded through innovative strategies, based neither on innovative technologies, nor on new products and/or services (Govindarajan & Trimble, 2004).

Instead of a singular focus on technological and product innovation, strategic innovators invented a new game that truly differs from the game industry rivals play (Styles & Goddard, 2004). Miller & Chen (1996) speak of ‘iconoclasts’ that compete in non-conventional ways, adopting competitive practices that deviate from industry norms. They avoid actions frequently used by competitors and undertake market-oriented ploys that rivals rarely use. This aspect highlights the resemblance to Schumpeter’s catch phrase of “creative destruction”; innovation provides superior offerings but in doing so also carries with it the inherent characteristic of undermining market positions of established firms following the more traditional rules of the game. Schumpeter (1942: 84-85) hence writes: “[...] in capitalist reality [...] it is not [price] competition which counts but [...] competition [...] which strikes not at the margins of the profits and the outputs of the existing firms but *at their foundations and their very lives*. This kind of competition is as much more effective than the other as a bombardment is in comparison with forcing a door” (in Scherer, 1992: 1418, italics added to original). Following this line of argument, Christensen et al. (2000) point to the need of “the entrenched powers get out of the way” (: 104), arguing that incumbents may consciously hold back disruptive innovation in the industry since this may undermine the fundamentals on which once their success was built. Yet, the underlying sources of competitive advantage are perishable over time, such that often opposite factors are considered as sources of competitive advantage at different points in industries’ histories. Compare for example the eighties’ vertical integration mantra to the current belief in the value of nonintegrated business models à la Dell (Christensen, 2001). Instead of blindly following an industry’s rules of the game, companies need to develop an insight into the underlying factors of why and under what conditions a specific practice leads to an advantage (Christensen, 2001).

The simple ‘strategy divergence’ may sound, the difficult it is in reality. Pressures for strategy convergence and herd behavior are powerful and pervasive, and companies tend to share world views and assumptions about how to compete (Styles & Goddard, 2004). The underlying rationale for strategy convergence is hence to be found in theories on managerial cognition. More specifically, strategic choice theories (e.g., Child, 1972), on which the SI concept rests, brought the issue of managers’ ability to influence firm value to the forefront of strategic discussions. Formulating strategies is however based on managers’ understanding of their environment. Theories on managerial cognition provide insight into the social-psychological factors that influence managers in framing their competitive milieu (Porac & Thomas, 1990).

These ideas essentially extend the work of neo-institutional theorists, positing a homogenizing tendency in organizational fields (e.g., an industry). These scholars argue that homogenization is not entirely grounded in rational economic motives (competitive isomorphism), i.e. pressures toward similarity resulting from market competition (e.g. Hannan & Freeman’s (1984) population ecology). In addition, homogenization is also due to actors’ social relationships (Miller & Chen, 1996) giving rise to socially constructed beliefs influencing firms’ actions.

Dimaggio & Powell’s (1983) contribution is an often-cited example of this theoretical stream. Dimaggio & Powell (1983) argue that individual efforts to deal with uncertainty lead to structuration. So in their attempts to change their organizations, individuals make them more similar. This process of homogenization is called ‘institutional isomorphism’. It

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is based upon the assumption that firms not only compete for customers and resources, but need political power and institutional legitimacy as well. Three isomorphic processes lay the foundations for this tendency. In reality these three processes may be intermingled. First of all, other organizations and society in general (e.g., a common legal environment) may exert pressures on a firm that eventually lead to similarity among industry players. 'Coercive isomorphism' hence results from political influence and the search for legitimacy. Secondly, faced with uncertainty, organizations tend to model themselves on other organizations that they perceive as more legitimate or successful. 'Mimetic isomorphism' thus stems from standard ways to deal with uncertainty. Consequently, DiMaggio & Powell (1983) hypothesize that the higher the uncertainty and ambiguity an organization has to cope with, the stronger its inclination to imitation (their hypotheses A-3 and B-4). Following their line of argument, imitation driving forces will be even higher in hypercompetitive environments. The modeling proclivity resulting from mimetic isomorphism may however not only originate from a firm's deliberate attempts to better control uncertainty, but may also stem unintentionally from employee transfers, trade associations or consulting firms preaching and spreading a limited number of organizational models (see also, Abrahamson, 1991). As Hamel (1998a: 22) wrote: "Hawking their studies of "best practices", consultants carry orthodoxies, like a deadly virus, across companies". Finally, 'normative isomorphism' can be attributed to professionalization. Academic education and the existence of professional networks across firm boundaries are important hotbeds of professional norms. Moreover, common hiring and promotion criteria and practices across firms may stimulate normative isomorphism all the more. What is most remarkable is that these isomorphic pressures may proceed, without producing any added value in terms of increased internal organizational efficiency. Furthermore, these imitative tendencies make mental models of rivals become more similar over time and produce group level beliefs about how and with whom to compete in the marketplace (Porac et al., 1989; Huff, 1982).

Among the three mechanisms of institutional isomorphism cited by DiMaggio & Powell (1983), it is especially the second, 'mimetic isomorphism', that has received most attention in the academic literature (Mizruchi & Fein, 1999). Especially the work on industry recipes, emphasizing the homogenizing effects cognitive decision-making processes can have on an industry level (Mizruchi & Fein, 1999), is built upon the belief that a firm's interactions with other actors have an important impact on its competitive beliefs and moves.

In essence, it is argued that due to managers' bounded rationality organizations make their competitive field more manageable by reducing their number of competitors. This reduced set of competitors then functions as a benchmark for strategic ideas and competitive actions (Huff, 1982). Porac & Thomas (1990) argue that the mental models of a competitive environment managers base their strategy formulation on are taxonomic. Managers simplify their environmental scanning activities by drawing up some cognitive taxonomies of organizational forms, i.e. by grouping individual organizations with similar attributes. Positioning the focal organization within a specific taxonomy also implies demarcating what the firm is, what business it is in and who its rivals are. This fixation on specific competitive boundaries carries the risk of ignoring 'interspecies' competition (i.e. from rivals in a different class) since it orients managers towards similar, rather than dissimilar sources of rivalry. It may further create 'competitive blind spots' when

environmental changes outdate the mental models used. Since this focused attention on nearby competitors is reciprocal, the biased estimates firms have about their competitive environment correlate with those of nearby firms (Johnson & Hoopes, 2003). As Porac and colleagues' (1989) study of Scottish knitwear manufacturers indicated, the mutual enactment of socially-constructed beliefs among industry partners press toward a shared mental model. Hence, in an industry a strategic frame is gradually developed that determines common perceptions among industry competitors (Huff, 1982). Spender (1989) accordingly defines an 'industry recipe' as a "shared knowledge base that those socialized in an industry take as familiar professional common sense" (: 69). The industry recipe contains core beliefs about the relevant set of competitors and the 'appropriate' way to compete. In this way, firm-level and group-level competitive activities become linked and the range of strategic possibilities considered by an individual firm in the industry becomes limited (Porac et al., 1989). Sutcliffe & Huber's (1998) empirical findings indeed showed that top managers' perceptions of the environment are more similar within than across industries. These perceptions reflect common beliefs about appropriate strategies and, as such, restrict strategic choices of individual firms. Research has indeed demonstrated that organizations that are less ingrained in the industry recipe are more likely to focus upon radical innovations combining practices and ideas from *different* macrocultures (Abrahamson & Fombrun, 1994).

In conclusion, industry recipes supply the industry rules of the game. The stickiness of these rules of the game tends to lead to strategic convergence, inertia and a lack of strategic change among competitors (Porac et al., 1989; Johnson & Hoopes, 2003) and among all parties in an industry's supply chain (Abrahamson & Fombrun, 1994). If SI implies strategic divergence, by breaking the rules of the game, SI will thus entail a deviation from the industry recipe. In other words, it requires a deviance from traditional industry assumptions and conventions. Some scholars (e.g., Baden-Fuller, 1995) have argued that SI can even *alter* the industry rules of the game.

Although the change of industry recipes has only marginally been treated in the literature, agreement seems to be reached on that the source of change can be either exogenous or endogenous (Walsh, 1995). Industry recipes change when the industry's social, technological, cultural, or economic context changes (Spender, 1989). Barr et al. (1992) found indeed that group mental models may change in response to environmental changes. In addition to these external 'jolts', recent research on institutional entrepreneurship advocates the possibilities of endogenous institutional change as well. Industry recipes may hence change because of an innovation by an incumbent in the industry (Abrahamson & Fombrun, 1994). In this way, attempts have been made to solve the 'paradox of embedded agency' inherent to institutional theory. For example, Greenwood & Suddaby's (2006) results show that large, central, elite organizations can actively change the mature institutional structure in which they themselves are embedded. These findings imply that industry incumbents can deviate from traditional industry conventions and assumptions and can in this respect initiate SI. The major challenge of the creation of SI hence lies in ensuring that the new strategy does not reflect managers' biases, likely rooted in the industry recipe (Bogner & Barr, 2000).

Yet, a deviance from the industry rules of the game in and of itself is unlikely to produce economic rents unless it better meets the needs of customers (Miller & Chen, 1996). This brings us to the second fundamental aspect of SI.

1.3.2 Creation of new and substantially superior customer value

Even though the strategy literature has conceptualized ‘value’ as a three-fold concept, consisting of shareholder, stakeholder and customer value, it has been argued that, in the end, it is customer value that lays the foundations of both the other value categories (Khalifa, 2004). Inspired by particularly the market orientation literature (e.g., Kohli & Jaworski, 1990; Narver & Slater, 1990) recent contributions in marketing as well as strategy research have hence emphasized the central role superior customer value plays in the creation of competitive advantage and long-term success (e.g., Day, 2000; Lindgreen & Wynstra, 2005; Bowman & Ambrosini, 2000; Slywotzky, 1996). A general assumption is that firms create value for themselves by seeking value for customers (Sheramata, 2004).

Authors on SI unanimously agree with this proposition. Innovation without customer value may be too wild or too technology-driven (Kim & Mauborgne, 1999). Especially Hamel (1998b) asserts that the goal of SI is not so much cost cutting and to have earnings exceed costs, but to capture a disproportionate share of the industry wealth creation (i.e. share of the total market capitalization of all firms in a particular competitive domain). He argues that companies should hence focus their strategic attention on revenue growth by creating superior customer value, and not on mere cost cutting. In his view, optimization (retrenchment and operational efficiency) tactics should clearly serve the goal of SI; an opposite logic leads back to incrementalism. In other words, optimization may not become the guiding paradigm in and of itself (Hamel & Välikangas, 2003).

In the same vein, Kim & Mauborgne (1997, 1999a,b, 2000) posit that innovation should be anchored with buyer value. The competition should be made irrelevant by offering fundamentally new and superior buyer value. They even use phrases such as “a quantum leap in buyer value to create new markets” (1999: 43), and the creation of ‘uncontested market space’ (Kim & Mauborgne, 2004).

Despite the popularity of ‘customer value’ in marketing and strategy literature, there is no clear conceptual consensus about it (Flint et al., 2002; Payne & Holt, 2001). The concept of customer value “...is one of the most overused and misused concepts in social sciences in general and in management literature in particular” (Khalifa, 2004: 646); “it has neither defined common status nor common use” (Woodall, 2003: 1). In Woodall (2003) and Khalifa (2004) extensive literature reviews are provided. Both these authors made attempts to integrate various viewpoints on the subject in order to provide some coherent representation of customer value. In general, four characteristics of customer value recur in publications: 1) customer value is a subjective concept, 2) it is conceptualized as a trade-off between benefits and costs, 3) these benefits and costs are multi-faceted (e.g. use value, price), and 4) value perceptions are relative to competition (Ulaga, 2003).

In contrast to much marketing literature, the management literature, and contributions on SI and related concepts alike, focuses on the creation and delivery of customer value, more than on the customer’s valuation process. In this way, a more strategic, supplier-focused perspective on customer value is followed, stressing foremost the creation of an offering’s intrinsic value (e.g., Normann & Ramírez, 1993; Kim & Mauborgne, 1997). This intrinsic value comprises the offering’s total benefits, i.e. its attributes as well as its consequences in terms of use. For example, Bowman & Ambrosini’s (2000) discussion relates value creation to the creation of use value (value appropriation is in turn determined by exchange

value). They further posit that this focus on use value and internal value creation has been typical for a resource-based view of the firm. Sharma et al. (2001) have argued that business-to-business marketers need to further focus and compete on the in-use value of an offering.

We believe especially Khalifa's (2004) insights may prove a useful contribution to the literature on SI. More specifically, Khalifa (2004) developed a multidimensional configuration of customer value that integrates three complementary viewpoints on customer value: the 'value exchange model', the 'value buildup model', and the 'dynamics of customer value'.

First, the 'value exchange model' is a benefits-costs model; it considers customer value as the difference between total (psychic and utility) benefits and total (customer ownership) costs.

Second, the 'value buildup model' restricts attention to the benefits side of the customer value equation. According to this perspective, total customer value is affected by four factors: whether the customer is treated by the supplier as a mere customer or as a person, whether the relationship with the supplier is a simple transaction or involves genuine interaction, whether the customer needs that the supplier intends to satisfy are of a utility or a psychic nature, and whether customer benefits are tangible or intangible. Customer value accumulates always through the latter option of these four dimensions. In this way customer value can take four distinct forms, going from functionality (product) to solution (support features), to experience (adding intangibles), to meaning (philosophical or emotional connection, self-esteem needs).

Finally, the 'dynamics of customer value' facet in Khalifa's model describes how customers evaluate a supplier's total offering. Product/service and delivery attributes determine the customer's (dis)satisfaction. The presence or absence of basic features, and of implicitly and explicitly expected product/service features all affect a customer's *level* of satisfaction. Finally, value magnifiers and destroyers are interaction features that focus on the customer as a person, i.e. the way the customer is treated by the supplier. They can even destroy or magnify the value created by the product/service attributes.

His discussion undoubtedly reflects a supplier's perspective. He argues that these three customer value angles complement each other in the sense that "to be able to offer customers superior value for exchange [i.e. the overarching, value exchange model], a firm should understand how to generate and accumulate value for customers, what forms customer value may take, and what factors influence the accumulation of value [i.e. the value buildup model] [...] in order to build up value, it is essential to know what elements or components may create or destroy value [dynamics of customer value]" (Khalifa, 2004:660). In this way, Woodall's (1994) viewpoint also subscribes to the central assumption of the SI literature that the creation of *value to the customer* will eventually produce *value to the firm*; i.e. it also focuses on the value *outcomes* of customer value creation and delivery.

Within a discussion on SI, Khalifa's (2004) conception contributes in three respects.

First, it pinpoints the importance of adding additional benefits to customers; a claim also made by the strategic marketing literature in general. Total solutions (e.g., van der Haar et al., 2001), experience and meaning (e.g., Vandenbosch & Dawar, 2002) have been frequently suggested as value enhancers. The stress the SI-concept puts on the offering's

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intrinsic value (Woodall, 2003) emphasizes that customer value creation entails more than just increasing a customer's net benefit; it is about *enhancing, or even innovating the benefits*, not just lowering the price (Kim & Mauborgne, 1999). Ulaga (2003) developed a 'value drivers wheel', which suppliers can use to differentiate themselves on other value drivers than just price. Simpson et al. (2001) argue that many customers are becoming less interested in mere products or services, but require total solutions. Hence, suppliers should be able to bundle products and services (Normann & Ramírez, 1993; Vargo & Lusch, 2004; Kim & Mauborgne, 1997). Since an offering only has value to the degree the customer can use it to leverage his own value creation, the offering should moreover increase the customer's own value creating potential (Normann & Ramírez, 1993). Hence, for business-to-business customers the evaluation of the value proposition will have a highly pragmatic and business results-oriented emphasis (Woodall, 2003). The procurer should be convinced that the offering will contribute to the firm's profitability (Bowman & Ambrosini, 2000). The literature on value creation has been critiqued for exactly this lack of integration between a supplier's value chain and a customer's value chain (Payne & Holt, 2001). Woodruff's (1997) value hierarchy model that links attributes of the offering to a customer's own goals and purposes could provide useful insights in this respect.

Secondly, Khalifa's (2004) model embeds the concept of customer value within a more modern perspective of relationship marketing, instead of a pure transactional context (Payne & Holt, 2000). This view is echoed in Ulaga (2003) who critiques extant research on customer value for focusing too much on product-related issues instead of on the relational dimension of customer-perceived value. He moreover pleads for a better incorporation of the multidimensional character of relationship value. Prahalad (2004) even announces a new value creation model, one that is moving away from a transaction-based value creation model towards the full co-creation of value and the embeddedness of value in personalized experience. In similar vein, Ramírez (1999) makes a plea for 'value co-production'. Services included should expand in order to contribute to a total and *individually tailored* meaningful customer 'experience' (Sharma et al., 2001; Khalifa, 2004). The tailoring of offers to individual customers is however not a new idea; it has been well developed in the literature on one-to-one marketing. Simonson (2005) moreover indicates that in many business-to-business and service contexts it has gradually become the standard practice. In a business-to-business context business relationships have been attributed with both economic value (fulfilling economics needs at a minimum cost) and social value (satisfaction with the relationship) (Gassenheimer et al., 1998).

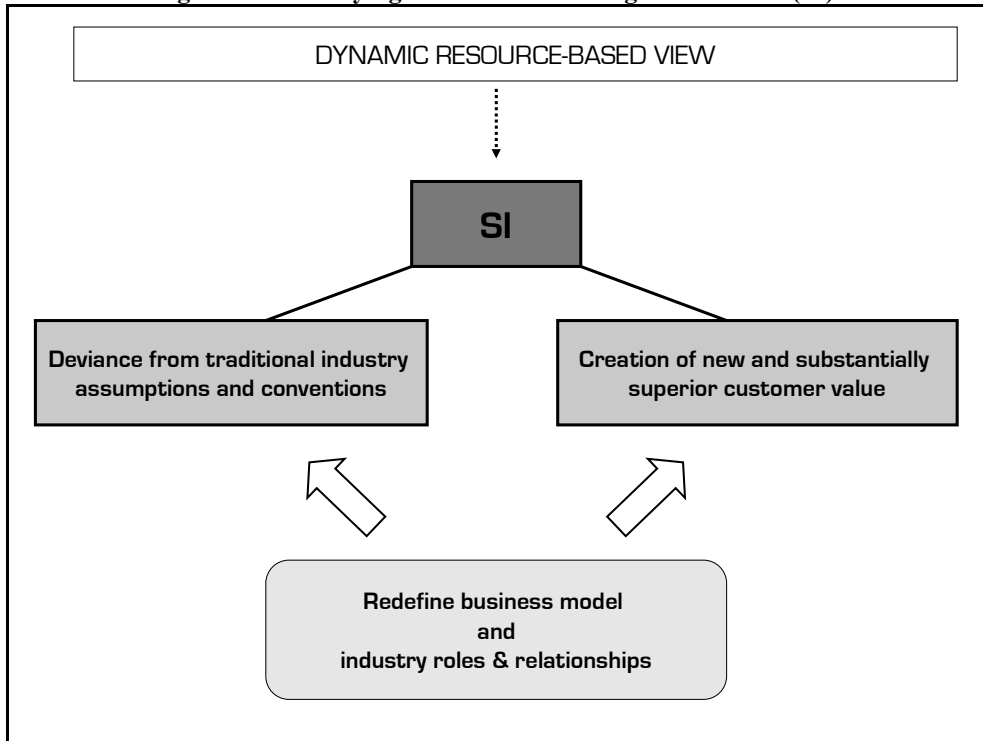
Thirdly, Khalifa's (2004) focus on the dynamic character of value creation stresses the *continuous* need to add additional and *new* value attributes. Webster et al. (2005) consider this a clear break with the past 'short-termism' of marketing literature. Within their pleas for superior customer value creation and the establishment of new markets, SI scholars have emphasized a 'redefinition of the market space' (Hamel, 1996) and the *innovation* of customer value. Slywotsky & Wise (2004) speak of 'demand innovation'. Also Kim & Mauborgne's (1997, 1999) use of the term 'value innovation' leaves no doubt. They (1999) indicate that the difference between value innovation and value creation is that the latter covers a much broader arena of strategic maneuvers (e.g., price cutting), and leaves room for value creation on an incremental scale (e.g., incremental product innovation). In the same vein, Normann & Ramírez (1993) argue that, especially in the present volatile

economic environment, strategy is no longer a problem of positioning (products, markets, supply chain) but involves a *reinvention* of value. Offerings should hence deliver customer value that is good enough in terms of the old attributes, but that exceeds performance in new attributes (Markides & Charitou, 2002). In addition, the offering could include elements that have not yet been considered as essential in the traditional meaning (Khalifa, 2004). In this respect, suppliers do have to pay attention to customers' desired value changes as well (Flint et al., 2002). Value propositions should moreover stretch beyond industry boundaries (Baden-Fuller, 1995; Kim & Mauborgne, 1999; Krinsky & Jenkins, 1997). Authors have proposed that dramatically new value propositions, resting on deviant market compositions and/or behaviors may yield a sustainable competitive advantage (Jaworski et al., 2000). Research on value innovation has indeed demonstrated that business innovations targeting new market spaces account for a much higher profit increase than do incremental line extensions (Kim & Mauborgne, 1997, 1999, 2004). In this way, SI scholars have carried the idea of overturning industry conventions to the field of customer value itself. Especially Christensen has elaborated on this issue.

Generally, in their attempts to outcompete their competitors companies tend to stretch their products and services upmarket by means of 'sustaining innovations'. This is because incumbents operate within a specific 'value network'. This means a context where customer problems and systems of use are defined in specific performance attributes (e.g., high speed and low cost per copy for Xerox; simplicity, low machine cost, small size, ease of use for Canon) that consequently appeal to a specific type of customers. Firms tend to implement innovations that are valued by their markets; innovations that address customer needs within their established value network. "It is difficult for established firms to marshal resources behind innovations that do not address the needs of known, present and powerful customers" (Christensen & Rosenbloom, 1995: 255-256). Christensen & Rosenbloom, (1995) argue that many incumbents do not *redefine* their systems of use, since this involves far more poorly defined and risky commercial opportunities and the establishment of new value networks and new markets. New and more-advanced product-line extensions are hence introduced in order to target the most-sophisticated, high-end (and hence high-profit) customers within this value network. In doing so, companies overshoot the needs of most customers. Instead, neglected customer segments or neglected customer needs may be targeted (Styles & Goddard, 2004; Markides, 1997) and customer expectations and behaviors may be changed (Hamel & Getz, 2004; Jaworski et al., 2000; Kumar et al., 2000). Still, the latter view contests the idea widely shared in marketing literature that customer *retention* (by better serving existing customers) increases chances for long term success (Payne & Holt, 2001).

Departing from the two fundamental aspects of SI, many authors have centered their discussions on proposing various approaches companies can follow to achieve SI. The creation of a new business model, a redefinition of roles and (power) relationships in the industry inclusive, has been suggested as an expedient tactic (see Figure 1.1).

Figure 1.1: Clarifying the notion of strategic innovation (SI)



1.4 THE CONCRETE APPROACH TO STRATEGIC INNOVATION

Deviating from the industry rules of competition and creating substantially superior customer value almost logically imply adjustments to the business model. In current turbulent times, Hamel & Välikangas (2003) argue, mere reliance on momentum (regulatory protection, stable product paradigms, high-entry barriers, etc.) does not sustain success. Instead, new ‘who-what-how’ combinations (Govindarajan & Gupta, 2001; Govindarajan & Trimble, 2004, 2005; Markides, 1998, 1999a) should be introduced, which impose changes in terms of the product or service offering, pricing, distribution methods, market approach, customer service, or a combination of these (Styles & Goddard, 2004).

Accordingly several authors have stressed that, ultimately, SI originates from the invention of a new business model (Styles & Goddard, 2004) or a fundamental reconceptualization of the existing business model (Markides & Charitou, 2004; Charitou & Markides, 2003; Schlegelmilch et al., 2003). Others have called this ‘a redesign of the end-to-end value chain’ (Govindarajan & Gupta, 2001; Govindarajan & Trimble, 2004). According to Hamel (1998a,b; 1999; Hamel & Välikangas, 2003), the invention of an entirely new business model or the radical redesign of existing business models is hence the *only* way companies can grow and wealth can be created in ‘the present economic environment’.

Some scholars have even operationalized their study of SI as an analysis in terms of business models. For example, Styles & Goddard (2004) and Markides & Charitou (2002) constructed an exploratory measure of SI, largely based upon Slywotsky's (1996) and Day's (1990) work on business models.

While, especially in recent publications, Markides, Hamel and Govindarajan take a 'fundamentally different business model' as a *defining* element of SI, the starting point of Kim & Mauborgne's and Christensen's discussions are more centered on the issue of customer value creation. Their articles are punctuated with phrases such as 'new product and service offering' (Kim & Mauborgne, 1997; Christensen & Overdorf, 2000), 'quantum leap in buyer value' (Kim & Mauborgne, 1999), 'fundamentally different value curve' (Kim & Mauborgne, 2002), 'buyer utility map' (Kim & Mauborgne, 2000), and 'the creation of entirely new markets' (Christensen et al., 2002).

However, they too, call attention to the value of the business model. Since customer value comes from utility and price and company value comes from cost and price, cost should be driven down while simultaneously customer utility is enhanced (Kim & Mauborgne, 2000, 2004). The alignment of the entire system of price, cost and utility (Kim & Mauborgne, 2004) often requires a different cost structure, and different distribution and operating processes (Christensen et al., 2002). A redefinition of the business model is hence required (Christensen et al., 2000; 2002).

Other scholars carry the discussion even one step further. In their view, value creation stretches outside the focal firm to involve customers and suppliers (Baden-Fuller, 1995), or other actors in the supply chain. This view is consistent with the stress Khalifa (2004) has put on relationship marketing. Normann & Ramirez (1993) even advocate a reinvention of the entire value-creating system. They argue that in order to create new value companies should surpass the barriers of the firm or industry, and conceive entirely new value constellations (involving suppliers, customers, allies, etc.). New value is then invented by means of an integrated business system that optimally fits together the various competencies of all parties. Firms can direct this system by occupying a position at the nexus of different suppliers and customers (Vandenbosch & Dawar, 2002). This viewpoint matches the idea put forward by the IMP-group (e.g. Ford et al., 1998), that a firm is no isolated entity but embedded within a network of relationships. Changing the firm's business model will hence automatically produce effects on external parties as well.

To create SI, the entire value creating system has to be redesigned, roles and relationships should be reconfigured and different players should be mobilized.

This assertion can in fact be backed by our previous discussion on industry recipes.

The Porac et al.'s (1989) study previously mentioned indicated the complex interweaving of technical and cognitive factors in a transactional network. A business definition requires a choice of specific business model and transactional network (e.g., the use of distributors). "Reciprocally, each choice reinforces this definition by narrowing the range of informal channels through which relevant market information flows. The result is a competitive arena defined by symmetrical mental models throughout the value chain" (: 410). Decision makers' perception of the marketplace remains thus limited to the one determining, and determined by, the existing business definition. In a similar vein, Abrahamson & Fombrun (1994) assert that value-added networks shape macrocultures,

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which in turn determine managers' competitive attention, interpretation, strategic action and, hence, the value-added network. A value-added network engenders a macroculture that secures and even fortifies the network's own *raison d'être*. They hence share Porac et al.'s (1989) point of view about the circular influence between the structure of a value-added network (e.g. a supply chain) and macrocultural competitive beliefs. The mutual reinforcement between a macroculture and a transactional network may lead to dense or even suffocating macrocultures, and to value networks that may make member organizations collectively vulnerable to exogenous shocks to the network structure, producing collective strategic failure (Abrahamson & Fombrun, 1994). In other words, it is the continuity of social interaction over time, established in a structured value-added network, that produces convention. Or, as Miller & Chen (1996: 1213) say: "The passage of time [...] brings with it mutual mimesis and the mantle of tradition". Assuming that exchange networks correspond to networks of social ties (Abrahamson & Fombrun, 1994), one could argue that only different value-added networks will lead to different social networks, different strategic core beliefs, and different strategic actions. Alternatively, different strategic assumptions and perceptions may lead to different actions, which will in turn affect the value-added network required.

The work of Normann & Ramírez (1993) hence draws attention to the role of additional, non-customer stakeholders in the entire value-creation process. These same ideas have been reflected in the work by Jaworski et al. (2000) who stressed the value of changing the entire market structure in order to improve customer value and/or the performance of the focal business. Low value-adding players in the supply chain can be eliminated (e.g. disintermediation of the supply chain to eliminate distribution parties by e-commerce channels, Sharma et al., 2001), new players can be added (e.g. add complementary service providers), or the functions different players in the market perform can be modified (e.g. forward or backward integration).

Furthermore, given the complexities it takes to drive markets, pooling capabilities and resources across different organizations in order to jointly change markets might prove more effective than when a single organization undertakes this venture on its own (Jaworski et al., 2000; Hitt et al., 1998). Indeed, the benefits of networks for renewal have been largely documented (Ford et al., 1998; Malhotra et al., 2005; Baden-Fuller & Volberda, 1997; Håkansson et al., 1999). Criticizing the sequential character of value creation, inherent to the traditional concept of a supply chain, Ramírez (1999) makes a plea for 'value co-production', and a reconceptualization of value creation as "synchronic and interactive, not linear and transitive" (: 50). The shift from linear sequential supply chains to the establishment of value webs and alliances is, according to Prahalad (2004), a logical consequence of the shift in the underlying value creation model from product-innovation to the innovation of customer experience. In his view, changing a linear supply chain toward a web model of joint value creation is especially useful since industry boundaries are becoming customer-driven, making traditional industry boundaries extend towards other industries. Authors have hence asserted that strategic innovation hence implies the meta-competence to leverage and bundle the value-creating activities of different parties into one system of "interconnected, co-productive offerings" (Normann & Ramírez, 1993: 77). This highlights the importance of partnerships and alliances with parties inside or outside the traditional industry (van der Zande, 2001; Normann & Ramírez, 1993; Vandenbosch &

Dawar, 2002) when pursuing an exploration-oriented strategy. Although strategic alliances and partnerships are often established for specific strategic purposes, their value can well extend beyond these initial motives. Empirics demonstrated that the exchange of experience among partners can challenge partners' dominant logic and market interpretation (Holmqvist, 2004). Strategic relations with other firms hence provide an invaluable source of new ideas and opportunities for strategic innovation (Shimizu & Hitt, 2004). Accordingly, value innovators have been found to often use a network of partners to provide them with complementary assets, capabilities, products and services (Kim & Mauborgne, 1999).

Hence, strategic innovation requires both a redefinition of the business model and of the roles and relationships in the industry.

1.5 A FINAL CONCEPTUAL DELINEATION AND DEFINITION

A study of the literature on SI has resulted in a first demarcation as to the contents of, and approach to SI. The inherent notion of *change* on a *strategic* level makes however a further comparison to existing, related concepts of 'strategic change' and 'strategic renewal' inevitable. It is furthermore impossible to imagine recent scientific management literature, especially contributions tackling issues of hypercompetition and environmental dynamism, without the concepts of strategic change and renewal.

In addition, contrasting SI to related concepts will only help delineating the concept of SI even further. In other words, we first have followed Bagozzi's (1984) advice to develop conceptual meaning within theory construction through 'attributional definition'. This means we compared the different statements of SI characteristics put forward in the literature on SI and closely related managerial concepts. The process of attributional definition has revealed much of the nature of SI. Still, for reasons of completeness we will apply an additional method for conceptual development, this of 'dispositional definition' (Bagozzi, 1984). This method consists of identifying associations and relationships with other related concepts, in this case concepts of strategic change and strategic renewal. This process will finally result in a definition of SI.

However, neither the concept of strategic change, neither this of strategic renewal have been conceptualized as monomorphous constructs. Both the contributions on strategic change and strategic renewal show much diversity in terms of research questions answered, theoretical frameworks used, definition (incl. the definition of the concept of strategic change and renewal in itself) and operationalization of key variables, and methodology used (Rajagopalan & Spreitzer, 1996). Still, despite its diversity, some underlying patterns of general consensus can be discerned, particularly in the literature on strategic renewal. Since the concept of strategic renewal has gradually begun to replace the concept of strategic change (Huff et al., 1992), we will especially focus on strategic renewal.

A study of the literature reveals that accents between SI and strategic renewal differ chiefly along the following dimensions: contents (locus and degree) and process (see Figure 1.2). We will treat them successively. We would however like to stress that differences mentioned describe distinctions between these two literature streams *in general*. This does

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not alter the fact that, given the plethora of contributions, some specific authors may slightly dissociate their viewpoints from the general tendencies indicated here.

Figure 1.2: SI versus strategic renewal: Main distinctions

	STRATEGIC RENEWAL	STRATEGIC INNOVATION
Contents: Locus	Internal: competences	External: market, industry
Contents: Degree	Vaguely defined Covers entire spectrum (competence exploitation → competence development) Depth of change in relation to effects on subject firm (cfr. locus)	Well specified Limited to mid/ right of spectrum (rule breaking → rule changing) Depth of change in relation to effects on industry (cfr. locus)
Process	Extensively treated: 'renewal journeys' Gradualist change perspective Focus on large, established firms (much attention for explor.-exploit tension)	Marginally treated: org. side conditions No clear perspective (assumption: gradualist) Start-ups vs established companies (growing attention for explor.-exploit tension)

1.5.1 Contents: locus

In contrast to the organizational change literature, merely treating process aspects of change, content issues have been treated explicitly in strategic renewal contributions (Baden-Fuller & Volberda, 1997). However, content issues have been described in broad and vague terms, and authors have clearly been inspired by a strong inwardly-focused, competence-based research tradition. In almost all definitions the term 'competences' does literally appear (e.g., Flier et al., 2003). 'Renewal' is hence defined from the perspective of the firm undergoing the change, not the industry. Little attention is paid to the differential effects of these changes on competitors, or other parties in the supply chain.

Scholars on SI take up a contrasting standpoint; the path-breaking character of SI has no internal but an external reference point (Baden-Fuller, 1995). In other words, its innovativeness lies specifically in that it deviates from *industry* rules of the game (e.g., Markides, 1998, 1999b). In this respect, the effects of SI may also surpass the boundaries of the change-undertaking organization towards the industry level, in that it may even alter the industry rules of the game (Baden-Fuller, 1995). As already mentioned, the latter

meaning bears resemblance to Schumpeter's (1934) concept of 'creative destruction' in the field of technological innovation, in that it redefines the sources of competitive advantage in an existing industry. As such, SI can, in its most extreme form, even create entirely different industries (Abernathy & Clark, 1985).

The external focus of the SI concept also carries with it a strong notion of market-linking activities (Johnson et al., 2003). Whereas strategic renewal's focus on internal competence deployment or creation does, by definition, not imply a dramatic increase in customer value, or a fundamentally new value proposition, it is exactly the latter aspect that is a defining element of SI. To use Abernathy & Clark's (1985) vocabulary, SI stresses the 'market transilience' of an innovation, i.e. the capacity of an innovation to influence the established systems of marketing. Accordingly, in SI literature marketing aspects have been given a far more crucial role in strategy contents. This is also exemplified by marketing scholars' interest into this specific type of innovation (e.g., Jaworski et al., 2000). SI literature thus endorses the viewpoint of modern perspectives on marketing that it is the mission of marketing to actively influence markets and to create disequilibrium (Dickson, 1996). In conclusion, SI is in comparison to strategic renewal more externally-focused, both in terms of reference point and in terms of effects.

1.5.2 Contents: degree

Defining the locus of renewal as primarily internal to the organization, scholars on strategic renewal also consider the depth of change relative to the existing organizational competence base. Accordingly, also the distinction between incremental and transformational change is drawn from the perspective of the subject firm, without much regard to the effect on the environment.

Moreover, although strategic renewal clearly distinguishes between the different degrees of change, it still covers the entire spectrum from competence deployment to competence definition (Floyd & Lane, 2000), or from competence reordering to competence revitalization (Baden-Fuller & Volberda, 1997). In this respect, the literature on strategic renewal bears much resemblance to the literature on strategic change. Critiquing the latter's vagueness, Rajagopalan & Spreitzer (1996) mention that while it is clear from the literature that strategic change should result in a change in the contents of a firm's strategy, there is however no indication how deep this change should be. It may result in major, or minor changes in a firm's strategy, incremental or transformational, involving a major shift in the underlying knowledge structure, cause maps and ideologies, or not.

Innovation is however no unequivocal concept; it has many dimensions. Fundamental differences across different innovation types hence preclude universal innovation theories. Therefore, Sheremata (2004) argues that research should far more explicitly distinguish between innovations of a more radical and a more incremental type in order to improve insights into the competitive consequences of innovation.

This call has however been better responded by SI scholars. This literature is much clearer about the degree of change required for SI. More specifically, the depth or degree of innovation depicts a continuum from incremental (rule-following, -enhancing) over rule-deviating, up to rule-changing on an industry level. SI is limited to only the mid/mid-right of this innovation continuum.

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In conclusion, strategic renewal covers the entire continuum of (internal) competence change. Although some authors do indeed mention the various external effects (or motives) specific types of renewal can have (e.g., Floyd & Lane, 2000 mention changes in a firm's product-market domain), it is not their main concern. For example, Volberda et al. (2001a) indicate types of strategic renewal that follow industry rules ('emergent' and 'directed renewal'), whereas 'facilitated' and 'transformational renewal' influence or even change industry rules of the game. Still, these authors focus on the different renewal *trajectories* firms develop over time, fixing their attention merely on the internal aspects of renewal and leaving less thought for market consequences of these strategies. The pivotal issue in contributions on strategic renewal is consequently the study of process aspects of incremental versus frame-breaking strategic renewal trajectories. This frame-breaking character is moreover considered primarily vis-à-vis the existing competence base, and not in relation to the industry rules of the game. Yet, change inside the organization does not necessarily imply innovation in market terms (Baden-Fuller, 1995). Kim & Mauborgne (1999: 49) also critique this prevalent resource-based view of the firm by stating that: "An inwardly driven focus on capabilities within a company, however, significantly limits a company's opportunity horizon and introduces resistance to change if the market is evolving away from a company's forte".

Likewise, SI-scholars' focus on external effects has often distracted their attention from the internal consequences of change. Although SI may require –fundamental– internal organizational changes, this issue tends to fade into the background of SI discourses. The fact whether competences need developing, changing, stretching, reconfiguring or mere exploiting is often considered as only a matter of secondary importance, and has certainly not yet been explored in depth. Even though some authors on SI have warned for an overly emphasis on either an inside-out, either an outside-in perspective on SI (e.g., Markides, 1998, 2000) their actual viewpoints and discussions are inclined towards the latter. Baden-Fuller (1995) notes that this separation of the inside-out (prevalent in strategic renewal literature) and outside-in perspective (prevalent in SI literature) has been characteristic for strategic management research. Even though the separated development of both approaches initially served the development of the field, it has gradually become more of an impediment. He points out that especially the concept of SI could unify both views by following a more dynamic resource-based theory of the firm. The outside-in (or market selection and positioning) perspective and the inside-out (or internal change) view are ultimately intertwined. After all, "Although they differ in time horizon, these two sources of competitive advantage [core competences and strategic position] are linked, because core competencies develop through [...] interactions with factor and product markets as the firm seeks distinctive ways to create customer value or to deliver value efficiently" (Floyd & Lane, 2000:155). Therefore exactly, we positioned SI within the theoretical stream of the dynamic resource-based perspective.

In conclusion, researchers of strategic renewal on the one hand and of SI on the other seem to complement each other well in terms of fort and weakness. Although SI contributions have highlighted external aspects of innovation, at least, this external focus should be complemented with an internal focus on developing an overall internal organizational capacity to create SI (Carrillat et al., 2004).

1.5.3 Process

Although scholars have explicitly stressed the three-dimensional character of the concept of strategic renewal (content, process, context) (Volberda et al., 2001b), their attention largely fixes on process aspects. The stress on competence redefinition (or better in the active form: ‘redefining’) is a corollary in this literature. This has logically focused research on renewal ‘*journeys*’ (Volberda et al., 2001a) of large, established firms. Consequently, also the exploration-exploitation tension, which is so typical for this kind of companies, has extensively been treated in this literature (Crossan & Berdrow, 2003; Floyd & Lane, 2000; Baden-Fuller & Volberda, 1997).

The traditional notion of punctuated change patterns (e.g. Tushman et al. 1986) has prevailed for a long time in the strategic change management literature (Rajagopalan & Spreitzer, 1996; Genus, 1995). Tushman et al. (1986), for example, describe organizational evolution as long periods of ‘convergence’ (small, incremental changes), punctuated by ‘upheaval’ (painful and risky revolutions involving discontinuous, system-wide changes). In contrast, the strategic renewal literature follows a more gradualist and long-term perspective on change journeys (Leavy, 1997; Ravasi & Lojacono, 2005). The evolutionary (Floyd & Lane, 2000; Crossan & Berdrow, 2003), iterative, continuous (Huff et al., 1992), though purposeful (Ravasi & Lojacono, 2005) character of strategic renewal processes is emphasized. Accordingly, Volberda et al. (2001a: 160-161) define strategic renewal as “an ongoing journey instead of a shift from one state to the other”. Huff et al. (1992) even assert that it is especially this belief that has made the concept of strategic renewal replace the concept of ‘one-off’ strategic change.

The more process aspects have been tackled in strategic renewal literature, the more SI scholars have ignored them. SI scholars’ predisposition towards content issues of SI has clearly diverted their attention from process aspects. Yet, whereas seminal SI writings exclusively treated content aspects (Markides, 1998; Govindarajan & Gupta, 2001, Styles & Goddard, 2004; Christensen et al., 2002; all publications by Kim & Mauborgne), other authors, especially in later publications, have extended their discussion towards ideas regarding process issues. For example, Baden-Fuller (1995) mentions the need to build an organizational capacity for SI, largely embedded within corporate entrepreneurship. Larsen et al.’s (2002) empirical findings pointed to the beneficial company and industry effects of *continuous* SI, and Hamel & Välikangas (2003) plea for the creation of ‘strategic resilience’.

The assumption underlying these publications is that SI is not a non-recurrent need. Hamel & Välikangas (2003) even literally stress that SI is no turnaround; “it should be continuous and opportunity-driven, rather than episodic and crisis-driven” because a turnaround is a “transformation tragically delayed” (: 54). Likewise, Govindarajan & Gupta (2001) posit that the quest for changing the rules of the game is a never-ending process, and Christensen et al. (2002) argue that managers should already embark on new business projects when the business is still going well. Although one could argue that these authors are inclined to a more gradualist approach, overall, most SI scholars have restricted their discussions to an indication of general organizational side-conditions and tools, without further specifying the exact SI-process. For example, Markides’ (1999a) advice to build a ‘reinforcing organizational mosaic’, Kim & Mauborgne’s (2002) ‘strategy canvas’,

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and the ‘strategy wheel’ put forward by Styles & Goddard (2004). Overall, readers are kept dangling whether a one-off, turnaround, or gradualist approach is to be preferred in the context of SI.

Furthermore, strategic renewal scholars’ exclusive focus on large, established incumbent companies is less apparent within SI discussions. Where prior SI-articles made abstraction as to whether new start-ups or established companies were best fit for SI, later publications made room for much debate on this issue (e.g., Markides & Geroski, 2003a,b; cfr. *infra*). Consequently, discussions on the management of dual business models (and exploitation-exploration trade-offs) that have been so prevalent in strategic renewal articles, became explicitly treated in later SI-literature as well, e.g. by Markides & Charitou (2004).

Apart from the differences in contents and process we discerned in the literature review, a more subtle difference on ‘motive’ needs further explanation.

Even a superficial reading of the SI-literature draws attention to statements, such as ‘*reshape* the rules of competition’ (Baden-Fuller, 1995), ‘*proactively* break the rules’ (Markides, 1999a), ‘*introduce* major new value propositions’ (Markides, 2004a,b), and ‘*alter* the business’ (Govindarajan & Trimble, 2005). Hamel & Välinkangas (2003: 54) stress: “the capacity to change before the case for change becomes desperately obvious”. These phrases all have rather proactive connotations. Our discussion on the basic traits of SI and on herd behavior and the industry recipe elucidates that strategic innovation casts off industrial conventions in a proactive way (Hamel, 1996). Proactive moves transcend the competitive structure or market preferences (Johnson et al., 2003). Proactivity means that firms initiate change, or even actively influence the external environment (Evans, 1991; Sandberg, 2002). Yet, proactivity may also have a less drastic connotation. It might imply that firms act before they are forced to react to environmental threats and opportunities. In this sense, although SI is not a pure reaction to environmental changes, it can still be a reaction to the symptoms of coming change (Sandberg, 2002).

In contrast, in definitions of strategic renewal phrases such as ‘align the organization with a changing environment’ are prominently present (e.g., van der Zande, 2001; Huff et al., 1992). Although some scholars even speak of “*adjust* to environmental shocks”, “*adjust* to competition” (Baden-Fuller & Volberda, 1997:96) and “*adaptation* to broad environmental shocks” (Ravasi & Lojacono, 2005: 52), emphasizing a reactive, ex-post behavior, other publications also mention more ex ante, protective moves (i.e., hedging in view of expected environmental shifts) (Evans, 1991). Volberda et al. (2001a), even discern renewal journeys aimed at influencing or even changing industry rules. Furthermore, scholars on strategic renewal do not adhere to the idea of strict environmental determinism, which considers the environment as completely immutable and managerial actions as a ‘black-box’ (cfr. the rational lens perspective on strategic change, Rajagopalan & Spreitzer, 1996). Explicit room is indeed left for managerial action and initiative. For example, Flier et al. (2003) stress managerial intentionality and speak of strategic renewal as *managerial actions* to align competencies with the environment.

So even though one might argue that the concept of SI distinguishes itself from strategic renewal by its larger emphasis on proactivity, some authors have associated proactivity with strategic renewal as well. As differences in motive between SI and strategic renewal are unclear and subtle, we therefore did not explicitly incorporate ‘motive’ as a fourth main distinction between the two concepts (see Figure 1.2).

Based on the literature study of contributions on SI, related managerial concepts and the concept of strategic renewal, we are finally able to define SI.

Strategic innovation entails the creation of new and substantially superior customer value by a new and fundamentally different way of playing the game in an existing industry. It implies the deviance from traditional industry assumptions and conventions and, as such, has the potential of altering the rules of the game in an industry. Strategic innovation can be achieved by redefining the business model and the roles and (power) relationships in the industry

This definition of SI enables us to further define the concept of ‘strategic innovation capacity’. As already mentioned, empirics demonstrated that sustained competitive advantage does not so much originate from entry, imitation or mobility barriers, but from *continuous* SI (Larsen et al., 2002, 2003). What is important in the long run is hence the capacity to *systematically* create SI (Baden-Fuller, 1995).

Following this line of argument, the literature of SI has extensively drawn attention to the need to develop a portfolio of SI experiments.

1.6 STRATEGIC INNOVATION CAPACITY

In an emerging business, estimates for market potential and expenditure levels are, to say the least, prone to poor judgments (Leifer et al., 2001). For the success of an initiative can only be evaluated with hindsight (Markides, 1999a), Baden-Fuller & Stopford (1996) maintain that every initiative with the potential to create a growing and satisfied customer base should seriously be taken into consideration, even though not all SIs will turn out to be successful (Baden-Fuller, 1995). Initial expectations can enhance through trial and error (Govindarajan & Trimble, 2004; Hamel & Getz, 2004; cfr. the learning lens perspective on strategic change, Rajagopalan & Spreitzer, 1996). Successful SI consequently comes from ‘portfolios of options’ (Shimizu & Hitt, 2004), taking “multiple, well-informed bets” by implementing “parallel innovation streams” (Pitt, 1998:559). The latter is what scholars have called ‘the probe and learn process’ (Lynn et al., 1996) or ‘theory-focused planning’ (Govindarajan & Trimble, 2004). It has hence been argued that the more creative a firm is in the process of strategic idea generation (i.e. new ‘who-what-how’ combinations), the higher its chances to end up with an innovative, rule-breaking strategy (Markides, 1999b; in Mang, 2000). This viewpoint can be also embedded within Burgelman’s framework (1991), which maps ideas from population ecology to the organizational level. According to Burgelman (1991), the only way organizations can escape the forces of environmental selection is by the creation of an internal selection environment that produces a wide variety of strategic initiatives (cfr. Floyd & Lane, 2000). Such variety can in turn originate through trial and error or through a formal planning process (Markides in Mang, 2000).

Ideally, experiments are small-scale to limit risks (Baden-Fuller & Stopford, 1996), while being broad-based enough to accommodate a variety of potential perturbations (Hamel & Välikangas, 2003). Organizations can hence ‘de-risk’ big opportunities by low-cost

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experimentation that is rapidly deployed (Hamel & Getz, 2004). Especially when untraditional initiatives are taken at the periphery of the business, a portfolio of options is far more useful than placing one big bet (Day & Schoemaker, 2004b). In similar vein, Markides (1997) has stressed the value of low-scale and high-scope experimenting to reduce the risks of SI. In fact, risk is hedged over different initiatives; the goal is not to totally avoid unsuccessful ones, but to increase chances of ‘one big winner’ and to maximize the entire portfolio’s pay-off (Hamel, 1999). In smaller, less-resourceful organizations, the use of small trials can furthermore be an alternative to the set-up of entire parallel innovation projects (Shimizu & Hitt, 2004).

Successful strategic innovators purposefully create internal variety and allow the outside market decide the winners and losers (Stringer, 2000; Markides, 1998). This is why strategic experiments are to be conducted in live commercial settings in order to learn how customers interact with and react to the initiative (Hamel & Getz, 2004; Lynn et al., 1996). In addition, SI experiments are not limited to new-product pipelines but should also embrace experiments in areas such as pricing, distribution, advertising and customer service (Hamel & Välikangas, 2003).

SI hence proceeds with a plethora of strategic experiments to test the commercial viability of new business ideas (Govindarajan & Trimble, 2004, 2005; Hamel, 1998b; Hamel & Välikangas, 2003). We call such strategic experiments ‘strategic innovation initiatives’ (SIinitiatives).

A portfolio of initiatives does not only increase chances of a successful SI or decrease the risks of SI, but is furthermore required in the longer term. For example, Hamel & Välikangas (2003) argue that strategic resilience builds on variety.

Following neo-classical economics, a one-shot strategic innovation may only lead to *temporary* advantages through exploiting monopoly positions during competitors’ response lag. In fact, the possibility to exploit a monopoly position will be ended by imitation, which will eventually erode margins (Kim & Mauborgne, 1997; Govindarajan & Gupta, 2001). Alternatively, disruptors may fall prey to disruption themselves (Christensen et al., 2002; Charitou & Markides, 2003). At this time the firm should exit and embark on a new (kind of) innovation (MacMillan et al., 1985; Abernathy & Clark, 1985). Larsen et al. (2002) found empirical evidence that *continuously* targeting new industry gaps, or continuous SI, can help sustain excess profits in the industry *indefinitely*. This stands in sharp contrast to traditional economic theory (e.g., Schumpeter’s theory on creative destruction) predicting the return of temporary excess profits to a competitive equilibrium state (Scherer, 1992). In this same vein, Dickson (1996) argues that comparative advantage is associated with the rate-of-change of suppliers (i.e. their higher-order learning); as long as a single supplier is learning more rapidly than its rivals, there will be heterogeneity in supplier and buyer behavior, and consequently “the market is *never* in a state of supply and demand equilibrium” (: 105). Authors have accordingly advised firms to have a strategy that is forever morphing (Hamel & Välikangas, 2003); companies need to constantly assess and redesign their value constellation (Normann & Ramírez, 1993). Johnson et al. (2003) argue that this is especially the case in the context of high environmental turbulence: having options available increases the likelihood that over time, a company can shape the market and stay ahead of it.

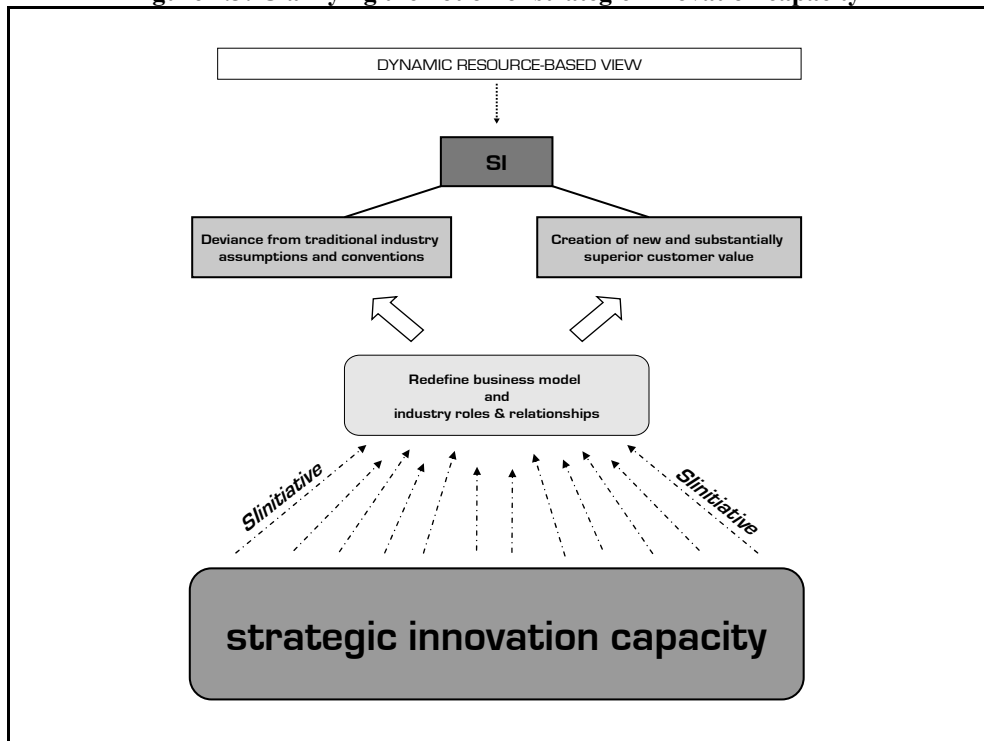
The concept of strategic innovation capacity

Consequently, in terms of *sustained* competitive advantage studies have demonstrated the beneficial effects of a *continous* innovation cycle (Larsen et al., 2002). As the quest for changing the rules of the game is a never-ending process (Govindarajan & Gupta, 2001), companies need to develop the capacity to *continuously* strategically innovate over time (Kim & Mauborgne, 2004). Therefore, we focus on ‘strategic innovation *capacity*’ (SIcap).

We define strategic innovation capacity as *an organization’s capacity to systematically create SI initiatives*

Figure 1.3 shows how the notion of SIcap can be embedded in the previous conceptual analysis.

Figure 1.3: Clarifying the notion of strategic innovation capacity



SIcap is treated as the dependent variable of our study. This focus on SIcap brings *process* aspects to the forefront of the discussion, in contrast to the stress traditional SI contributions have laid on *content* aspects. By stressing the portfolio aspects of SIcap, a more gradualist than punctualist perspective on renewal journeys (Leavy, 1997) is supported. In this respect we follow the strategic renewal literature (cfr. section 1.5.3). Moreover, taking SIcap as the dependent variable in our study implies we answer the long-

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standing need to operationalize the concept of SI (e.g., Baden-Fuller, 1995). Every medal has however its reverse: restricting ourselves to the concept of SIcap implies that success variables of SIinitiatives are not incorporated in our framework. Furthermore, we do not focus our study on organizational outcome variables (e.g., financial outcomes such as profit).

CHAPTER 2

DELIBERATE STRATEGIC LEARNING MECHANISMS

Having defined strategic innovation capacity in chapter 1, we are basically interested in any explanations that shed further light on the development of strategic innovation capacity. Empirical studies have shown that the type of innovation, and the level of its novelty, influences the determinants of innovative performance (Laursen & Salter, 2006; Damanpour, 1991). This implies that different kinds of innovations require different organizational contexts and different managerial interventions (Abernathy & Clark, 1985). However, much research that did focus on revolutionary strategic change (vis-à-vis the industry rules of the game) did so from an industry level perspective (see e.g., Abernathy & Clark, 1985). As indicated in the previous chapter (section 1.5.3), considerably less attention has been paid to more micro-level implications in terms of managerial practices and important organizational and external side conditions (Leifer et al., 2001). Even though the latter issues are increasingly being treated in research on product development, the inherent different nature of product development and SI may prove results nontransferable from one field to the other (Lynn et al., 1996). Therefore, in this chapter we rely on a conceptual study in order to find organizational mechanisms that firms may use in order to foster their level of strategic innovation capacity.

2.1 DYNAMIC CAPABILITIES AND STRATEGIC INNOVATION CAPACITY

2.1.1 Dynamic capabilities

We take Winter's (2000: 983) view upon a capability as "[...] a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type". Winter (2003) later refers to these as 'zero-level' capabilities: the capabilities that enable a firm to 'keep earning a living now' by producing and selling the same outputs to the same customers over time. High-level routines, or zero-order capabilities, are thus the managerial and organizational processes that reflect patterns of current practice and learning (Teece & Pisano, 1994). In other words, they refer to the organization's ability to perform a coordinated set of tasks while utilizing resources (i.e. tangible or intangible assets or production inputs) in order to produce a specific result, such as manufacturing a specific product (Helfat & Peteraf, 2003).

In the previous chapter we defined SI *as the creation of new and substantially superior customer value by a new and fundamentally different way of playing the game in an existing industry. It implies the deviance from traditional industry assumptions and conventions and, as such, has the potential of altering the rules of the game in an industry. SI can be achieved by redefining the business model and the roles and (power) relationships in the industry.* Following this definition, SI implies a change in outputs and/or customers (Winter, 2003), and hence in the patterns of current practice and learning

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(Teece & Pisano, 1994). In other words, SI implies a change in zero-order capabilities. Such a capabilities change can occur by means of ‘firefighting’; in an ad hoc fashion, due to environmental pressures, or as a result of serendipity (Winter, 2003).

This approach contrasts however sharply with our definition of SIcap as *an organization’s capacity to systematically create SI initiatives* (see chapter 1). It is thus the *systematic* character of SIcap that calls for a more patterned and stable type of behavior. As mentioned in chapter 1, contributions on strategic renewal could complement the SI literature by their belief in gradual, continuous and purposeful change processes (Floyd & Lane, 2000; Crossan & Berdrow, 2003; Huff et al., 1992; Barr et al., 1992). Scholars have indeed argued that organizations cannot just choose strategic innovations, but rather have to build a trajectory. For example, Baden-Fuller (1995 : S11) asserts that “If innovating new strategies which involves new routines and new procedures is itself a competence (akin to learning) then innovating new strategies is likely to be a skill which has to be developed” (Baden-Fuller, 1995: S11). So, innovation in and of itself should be made a systemic organizational capability (Liedtka, 2000; Hamel, 1998a). Christensen et al. (2002) speak of the importance of building an organizational ‘innovation engine’: a robust and repeatable process to create and nurture new business initiatives over time.

Linking this insight to Winter’s (2003) definition of zero-order capabilities hence means that organizations that want to develop SIcap should develop the capability (in itself a high-level routine) to constantly revise and redefine its existing capabilities (Zott, 2000). In other words, stimulating SIcap requires the ‘capability to systematically adjust capabilities’. This higher-order kind of capabilities, more specifically those that “operate to extend, modify, or create ordinary capabilities” have been called ‘dynamic capabilities’ (Winter, 2003: 991). This is why an exploration into the organizational antecedents of SIcap brings the concept of dynamic capabilities to the center of discussion.

Dynamic capabilities were originally defined by Teece et al. (1997: 516) as “the firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments”. Galunic & Eisenhardt (2001: 1229) use a similar formulation: “Dynamic capabilities are the organizational and strategic processes by which managers manipulate resources into new productive assets in the context of changing markets”. A more recent definition, stressing the market disruption dynamic capabilities can produce, can be found in Eisenhardt & Martin (2000: 1107): “The firm’s processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match and even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die”.

As such, the dynamic capability concept addresses both the ‘dynamic’, or ‘outside’ character of SI (i.e. renew and change in a shifting environment, deviate from the rule of the game) and the inside-out aspect of ‘capabilities’ strategists should dispose of in coordinating, reconfiguring and adapting internal and external resources and competences (Teece & Pisano, 1994; Teece et al., 1997; Tranfield & Smith, 1998; Winter, 2003). Regarding the first critical aspect, just as SI, the dynamic capabilities concept fits within the dynamic resource-based view of the firm (Helfat & Peteraf, 2003) or hypercompetition perspective (Eisenhardt & Martin, 2000; Rindova & Kotha, 2001), focusing mainly on a

Schumpeterian premise of innovation-based competition (Teece et al., 1997). Concerning the second aspect, the concept stresses internal organizational processes, more than Schumpeterians, and SI scholars alike, have done (Teece & Pisano, 1994), and could in this respect enrich the SI literature. More specifically, dynamic capabilities emphasize how organizational processes may be deployed and redeployed in changing or new markets (Teece et al., 1997). Moreover, dynamic capabilities do not only generate change inside the firm, they may also produce market change, which suggests the interaction between micro- and macro-environments (Jarzabkowski, 2004) stressed in the SI literature.

As noted, dynamic capabilities can be considered as high-level routines, capable of changing other organizational (configurations of) routines, resources and capabilities (Zott, 2003; Winter, 2003). Dynamic capabilities are in fact the ‘antecedent’ routines by which managers alter their firm’s resource base with the view of new value-creating strategies (Eisenhardt & Martin, 2000). As Winter (2000: 993) writes: “For a performance improvement to register at a given level of the hierarchy [i.e. dynamic capabilities, capabilities, routines, subroutines, etc.], there generally has to be improvement in some of the constituent processes at a lower level”. This means that the influence strategic aspirations have on a certain hierarchical level of routines always tends to be diffused to lower levels in a trickle-down way. In other words, if a change in dynamic capabilities is envisioned, this will impact capabilities and operating routines as well. Hence “a dynamic capability is a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness” (Zollo & Winter, 2002: 340).

Winter (2000) illustrates the concept by the example of Nucor, a steel company that learned the capability to produce steel by means of a new technique. The pace at which Nucor reached this learning depended on persistent organizational features that provided Nucor with a dynamic capability for innovation. The output of this dynamic capability is not steel, but new capabilities for making steel, Winter (2003) argues.

The strategic decision making process, product development routines, knowledge creation routines, alliance and acquisition routines, etc. could be considered as such dynamic capabilities (Eisenhardt & Martin, 2000). Hence, despite their first-order level, dynamic capabilities are embedded in a firm’s processes (Teece & Pisano, 1994).

Dynamic capabilities are in fact close to what have been called ‘search routines’ in evolutionary theory (Nelson & Winter, 1982); search routines “represent a body of wisdom regarding any potential modification of its [the firm’s] business practices” (Zott, 2003: 105). These bundles of ‘first-order’ routines have also been called ‘learning’ routines (Rindova & Kotha, 2001), ‘meta-routines’ (Adler et al., 1999; Tranfield & Smith, 1998), or ‘transformational experience’ (King & Tucci, 2002).

In sum, the strategy literature starts to show conceptual consensus that “dynamic capabilities are embedded in routine organizational processes aimed at affecting change” (Zott, 2003: 120). Dynamic capabilities are meta-routines that change existing routines, establish new ones and thus systematize the creative process (Adler et al., 1999). The routine character of dynamic capabilities implies that as firms develop experience (gradually embedded in routines) for the development of capabilities, the costs associated with it tend to decrease over time (Zahra & George, 2002). Dynamic capabilities can hence

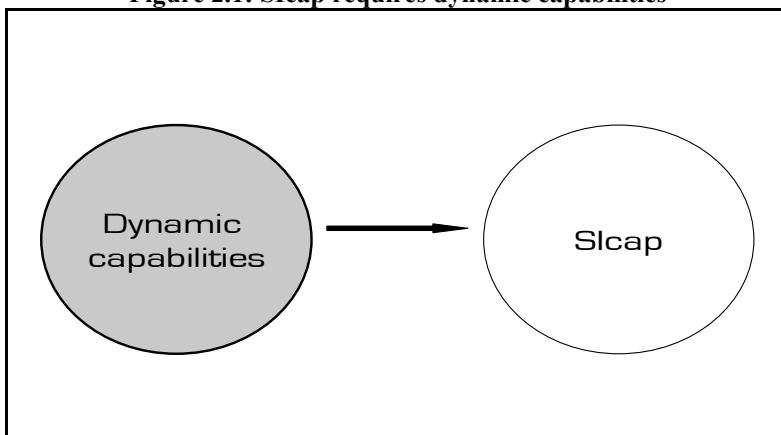
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make firms become more efficient in their capability generation, and “The routinization of activity constitutes one of the most important aspects of a firm’s potential competitive advantage” (Baden-Fuller & Volberda, 1997: 101).

The value of dynamic capabilities in the context of SI is manifest since they are specific strategic and organizational processes (Eisenhardt & Martin, 2000) that lead to *new* and *innovative* forms of competitive advantage (Teece et al., 1997). They can smoothen (quicken and improve) processes of capability replication, redeployment and recombination (Helfat & Peteraf, 2003), which are often required for SI. Moreover, the systematic character of dynamic capabilities implies that firms adopting ad hoc, creative but disjointed actions in response to crises do not exert dynamic capabilities (Zollo & Winter, 2002). Dynamic capabilities could hence stimulate SIcap as they are used “to build new resource configurations and to move into new strategic positions using a path-breaking logic of strategic change [...] Here, the goal is a series of temporary competitive advantages” (Eisenhardt & Martin, 2000: 1118).

In conclusion, fostering SIcap entails the development of dynamic capabilities² (see Figure 2.1).

Figure 2.1: SIcap requires dynamic capabilities



This brings us to the question where dynamic capabilities come from and how they develop.

² In our view, dynamic capabilities are a necessary, though insufficient, condition for SIcap. Dynamic capabilities do not automatically lead to SIcap, but SIcap does require dynamic capabilities.

2.1.2 Strategic learning mechanisms

Eisenhardt & Martin (2000) observed that dynamic capabilities show commonalities across firms; basically there exists some industry ‘best practice’. Or, in other words, a dynamic capability in and of itself does not automatically create competitive distinction. In fact, differential firm performance arises only because of different resource and capability bundles applied in the market (Eisenhardt & Martin, 2000). Zott (2003) later confirmed this in a simulation study. This assertion stands in contrast to what was originally suggested by Teece & Pisano (1994).

Eisenhardt & Martin (2000), however, found that “these commonalities imply that dynamic capabilities are equifinal such that firms can develop these capabilities from many starting points and along different paths” (: 1116). They further argue that, as a consequence of this, it is not so much the contents of dynamic capabilities but their idiosyncratic evolution path and its timing aspects by which intra-industry performance differences are determined (see also, Zahra & George, 2002). A similar assertion had already been made by Amit & Schoemaker (1993), arguing that a firm’s processes to develop capabilities are a logical prior to their disposition of capabilities.

The capacity to reconfigure and transform the organization is indeed itself a *learned* organizational skill (Teece & Pisano, 1994). In other words, organizations should *learn* routines that determine the development of subsequent routines (Argyris & Schön, 1978). For example, the capability to experiment could be viewed as a dynamic capability. A firm can then reduce its reconfiguration costs by learning how to experiment in more efficient or effective ways (Zott, 2003). The organizational processes aimed at producing these effects are learning mechanisms for dynamic capabilities.

Consequently, an inquiry into the mechanisms of dynamic capability creation should focus on a company’s underlying learning mechanisms.

Eisenhardt & Martin’s (2000) view has also been echoed in Zollo & Winter (2002) and Winter (2003). Due to environmental dynamism, zero-order capabilities and even first-order dynamic capabilities too, may prove unstable and perishable over time (Winter, 2003; Eisenhardt & Martin, 2000). In fact, dynamic capabilities, just as ordinary, operational capabilities, follow a development cycle of founding, development and maturity (Helfat & Peteraf, 2003). Therefore, it is the learning mechanisms that create and modify dynamic capabilities that may be considered as competitive key (Zollo & Winter, 2002). Furthermore, Zollo & Winter (2002) argue that these learning mechanisms could even reflect a ‘second-order dynamic capability’ in itself if they are systematic in nature, i.e. if the organization’s approach to learning is a dynamic and persistent feature of the organization.

Similar ideas have been postulated in the marketing literature. Making a plea for a theory of *dynamic* competition, Dickson (1996) argues that a firm’s sustainable competitive advantage does not lie within its product cost or value, but within its higher-order learning processes. Higher-order learning processes are then defined as processes and systems instituted within the firm that deterministically (i.e. not accidentally) drive its learning capacity (i.e. innovation and imitation in a market), and in this way determine its supply function over time. Processes for higher-order learning (or deuterolearning) thus improve learning reinforcement processes in themselves; they are used to “learn how to learn”, e.g.

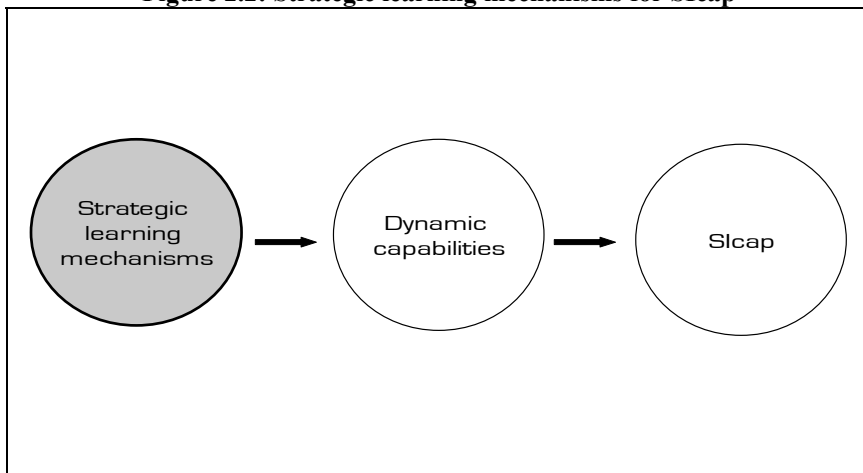
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processes to constantly improve a firm's market orientation (Day, 1994). The underlying logic is that when a firm possesses, manages and sustains its higher-order learning mechanisms better than its rivals, it better controls its learning capacity (leaving less to chance) which may in turn lead to a sustainable competitive advantage (Dickson, 1996). The assumption is that (first-order) learning processes can be readily imitated but that the underlying organizational capacity that determines the rate by which these learning processes improve (relative to competitors' improvements) can not (Dickson, 1996). Indeed, it is especially the pace of the creation of SI which will play a differentiating role; especially in hypercompetitive environments success is often related to speed (D'Aveni, 1994).

In the end firms may face the same goal, but it is the building trajectory in and of itself which is idiosyncratic. It is this learning trajectory that will eventually differentiate winners from losers and may build a competitive advantage (Eisenhardt & Brown, 1997; Volberda et al., 2001b; Flier et al., 2003). Hence, the strategic learning mechanisms by which dynamic capabilities are created seem to be key to the development of SIcap (see Figure 2.2).

We use the term 'strategic' learning mechanisms since "strategic learning aims to generate learning in support of future strategic initiatives" (Thomas et al., 2001: 331). In this respect, strategic learning processes improve (change, renew) a firm's strategic capability and aim at modifying and reconstructing basic assumptions and strategic routines underlying the design process of strategic behaviors (Kuwada, 1998). Since the mechanisms we focus on target the learning of dynamic capabilities, they could, by definition be considered as 'strategic'.

Figure 2.2: Strategic learning mechanisms for SIcap



Following the line of argument we developed in the previous section (section 2.1.1), we aim to find the strategic learning mechanisms that enhance dynamic capability creation. However, what should these strategic learning mechanisms tackle? In other words, can we operationalize this –rather vague– concept better in the context of SI?

In the following section, we argue that the concept of absorptive capacity may in this respect provide a useful enrichment to the dynamic capabilities literature (Van Den Bosch et al., 2003). As such, we use the concept of absorptive capacity (ACAP) as a means to link strategic learning mechanisms to SICap. In this way, we attempt to respond to Ethiraj et al.'s (2005) call to focus research not anymore on whether or not capabilities matter, but more on *why* they matter and *what sort* of capabilities matter.

2.2 DYNAMIC CAPABILITIES, ABSORPTIVE CAPACITY, AND STRATEGIC INNOVATION CAPACITY

Absorptive capacity (ACAP), most widely cited through Cohen & Levinthal's (1990) definition as a firm's "ability to identify, assimilate and exploit knowledge to commercial ends" (: 128), has in recent years gained increasing interest from strategy scholars (Lane et al., 2002). Largely inspired by the basic definition of Cohen & Levinthal (1990), other authors have later reconceptualized and refined the construct. Originally developed within the context of technological innovation, the concept was further tailored to issues such as innovation management in general (e.g., Van den Bosch et al., 1999; Zahra & George, 2002). Lane & Lubatkin (1998) extended the concept even to a supra-organizational, learning-dyad level in the context of strategic alliances. In fact, they introduced the concept of 'relative absorptive capacity' as the ability of a student firm to learn from a teacher firm. Despite these refinements, Van Den Bosch et al. (2003) remark that the speed at which new theoretical and empirical contributions to ACAP are being published is not in line with the speed at which scientific insights into the conceptual and empirical underpinnings of the construct have been developed as yet.

We think however that the way Zahra & George (2002) refined the construct makes a promising avenue.

They define ACAP as "a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability" (Zahra & George, 2002: 186). Zahra & George (2002) thus define ACAP as a more or less sequenced activity involving four distinct stages (Daghfous, 2004)³. According to them, the 'acquisition' dimension refers to a firm's capability to identify and acquire external knowledge. 'Assimilation' refers to analyzing, processing, interpreting and understanding this knowledge. Organizational processes for 'transformation' are in turn geared towards the development of new routines that combine existing knowledge with newly acquired and assimilated knowledge. The last stage, 'exploitation', finally refers to refining, leveraging, or extending existing competencies, or to creating new ones. Zahra & George (2002) made an interesting contribution to the field by dividing ACAP into two subsets: potential ACAP (PACAP) and realized ACAP (RACAP). PACAP consists of the capabilities for the acquisition and assimilation of knowledge, whereas the transformation and exploitation of new knowledge are covered by RACAP. They argue that all dimensions play complementary roles in the realization of organizational outcomes. Consequently, a high level of PACAP alone does not guarantee innovation. In their view,

³ Although they mention the possibility of a multidirectional and nonpatterned development path as the locus of search may be constantly revised.

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the formal introduction of RACAP as a capacity to leverage absorbed knowledge makes the link to competitive advantage more explicit, and in this respect fills the lacunae shown in the literature.

We contend that ACAP can be used as a proxy for dynamic capabilities (see Figure 2.3). Several reasons lay the foundation of this argument.

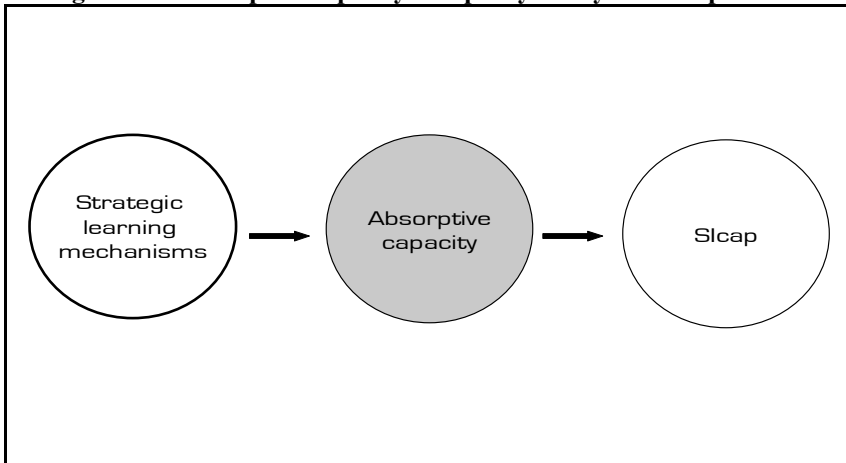
First, both variables have been associated to similar outcome variables (Van Den Bosch et al., 2003). Just as dynamic capabilities (Teece & Pisano, 1994), ACAP has been positively associated with organizational change and innovation (e.g., Tsai, 2001; Szulanski, 1996; Cohen & Levinthal, 1990; Zahra & George, 2002).

Second, Zahra & George (2002) even explicitly equated ACAP with a dynamic capability: “we recognize ACAP as a dynamic capability that influences the nature and sustainability of a firm’s competitive advantage” (: 185), and further, “we broaden the theoretical interpretation of the ACAP construct by presenting it as a dynamic capability that influences the creation of other organizational competencies” (: 186). They argue that ACAP is to be considered as a dynamic capability in itself that enables a company to create and ally that knowledge needed for the development of other capabilities (production, distribution,...). In this way, ACAP is defined as the entire process that explicitly relates knowledge to competitive advantage.

Third, similar to existing views on dynamic capabilities (e.g., Zott, 2003), ACAP is embedded within organizational processes and routines (Zahra & George, 2002).

Finally, the centrality of issues such as organizational learning and external knowledge acquisition, creation and application underlying the ACAP concept is reflected in the literature on dynamic capabilities as well. The evolution of organizational knowledge has for example been explicitly associated with the development of dynamic capabilities (Zollo & Winter, 2002).

Figure 2.3: Absorptive capacity as a proxy for dynamic capabilities



More importantly, we argue that using the concept of ACAP as a proxy for dynamic capabilities is especially appropriate in the context of SI.

The central role of external knowledge absorption and outside-in learning processes have been stressed in the literature on innovation in general, and on SI in particular (e.g., Normann & Ramírez, 1993; Pitt & Clarke, 1999; Almeida et al., 2003). External knowledge may maximize opportunities for competing in ever-changing environments (Almeida et al., 2003; Grant, 1996) and for challenging and deviating from existing heuristics in the organizational knowledge base (Liao et al., 2003). Scholars have hence stressed the importance of new, external knowledge for SI (e.g., Styles & Goddard, 2004) and for reframing a business in general (e.g., Christensen et al., 1998). Pitt (1998) even asserts that the study of knowledge creation and exploitation could in this sense be considered as one of the most fruitful ways to map SI. This means that in order to stimulate Sicap, an organization has to develop a thorough understanding of its own knowledge, of its processes aimed at transforming this knowledge into capabilities and finally, of the capacity of these capabilities to meet environmental demands (Lane & Lubatkin, 1998). The potential SI has to actively influence the rule of the game in an industry (e.g., Baden-Fuller, 1995) may indeed originate from a firm absorbing knowledge from non-traditional domains, commercially exploiting it, and in this way influencing the knowledge environment of its competitors (Van den Bosch et al., 1999).

Furthermore, ACAP has been conceptually and empirically associated with proactive strategic behavior (e.g., Cohen & Levinthal, 1990; Daghfous, 2004). Cohen & Levinthal (1990) assert that firms with higher levels of ACAP will tend to be more proactive. Especially PACAP has been related to strategic flexibility and a firm's capacity to adapt, learn and evolve in high-velocity environments (Zahra & George, 2002). Consequently, the concept of ACAP has also been related to the creation of new knowledge configurations, in the sense of 'architectural innovation' (Henderson & Clarke, 1990). Van den Bosch et al. (1999) mention in this respect the importance of combinative capabilities. As already noted, such issues of proactive behavior and new knowledge and capability configurations buttress SI.

Zahra & George (2002) conceptualized exploitation as the capability to persistently create new outputs such as new ventures, goods or services. Even though transformation is already associated with behavioral change, exploitation thus takes this a step further and further converts knowledge into actual outputs (Zahra & George, 2002). In this sense, Sicap could be considered as one possible operationalization of exploitation. We hence incorporate the dependent variable Sicap in the exploitation dimension of ACAP. Building on ACAP theory (Zahra & George, 2002), we could further hypothesize acquisition, assimilation and transformation capacity as the antecedents to Sicap⁴.

We will however use the term 'recognition' capacity instead of Zahra & George's (2002) 'acquisition', since we feel that in the context of SI 'recognizing' new, external knowledge captures better the essence of this activity than does the term 'acquiring' (see our discussion in section 2.3). Still, we take Zahra & George's (2002) original definitions of these three ACAP dimensions. This means that we define recognition capacity as a firm's

⁴ In contrast to Zahra & George (2002), we add the term 'capacity' to these antecedent dimensions in order to stress the 'stock' character of these variables (see section 2.5). We do however still adopt the meaning Zahra & George (2002) attributed to these dimensions.

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capability to identify and acquire new external information. Being a capability, recognition capacity comprises a firm's routines and processes aimed at recognition. Assimilation capacity comprises a firm's capability (its routines and processes) to analyze, process, interpret and understand acquired external information. Transformation capacity, in turn, refers to a firm's routines and processes to develop new routines that combine existing knowledge with newly acquired and assimilated knowledge.

The previous discussion explains that ACAP can be used as an appropriate proxy to dynamic capabilities in the context of SI. However, one very important thing remains us: that is to incorporate the path-breaking character of SI within the three antecedent ACAP dimensions.

2.2.1 The path-breaking potential of ACAP

Similar to dynamic capabilities (e.g., Teece et al., 1997; Helfat & Peteraf, 2003), absorptive capacity has been argued to be path dependent and to develop cumulatively (e.g., Van den Bosch et al., 1999; Liao et al., 2003). For example, Cohen & Levinthal (1990) argue that a firm's ACAP is largely a function of its level of prior and related knowledge. They found this argument on individual learning theory, which posits that memory develops by associative learning. Zahra & George (2002) also consider experience as an important antecedent of ACAP. Carrying this idea further, Cohen & Levinthal (1990) even argue that a firm's ACAP is in itself a function of the firm's prior level of ACAP: higher levels of ACAP thus in turn facilitate the creation of ACAP.

However, conceptualizing dynamic capability and ACAP development as *entirely* grounded in experiential learning contrasts with the path-breaking assumption of SI. This viewpoint moreover contrasts with Lyles & Salk's (1996) equation of ACAP with organizational flexibility. Strict path dependency does not allow for any innovation in the strict sense, as all new actions emerge from the knowledge of past actions (Hargadon & Fanelli, 2002). Danneels' (2003) empirics indeed show that experiential learning is 'self-limiting', constraining the range of market information and strategic options considered. Van den Bosch et al. (1999) mention for example the possibility of negative feedback loops between ACAP and organizational knowledge, under the form of competency traps (Levitt & March, 1988). Furthermore, the path-dependent and self-reinforcing cycle of ACAP development several authors hypothesize (e.g., Cohen & Levinthal, 1990) implies that proactive or reactive modes of strategic firm behavior are assumed to be stable and persistent over time. This is however not consistent with observations of actual firm behavior (e.g., Ahuja & Katila, 2004).

Accordingly, other studies have mitigated the influence of the prior organizational knowledge base on an organization's ACAP. For example, Lane et al. (2001) could not detect a significant effect of the prior knowledge international joint ventures inherited from their parents. Furthermore, the development of dynamic capabilities has been explicitly associated with path-breaking change (Karim & Mitchell, 2000; Eisenhardt & Martin, 2000). Hence, following Zahra & George's (2002) assertion to equate ACAP with a dynamic capability implies that the concept of ACAP should actually be made (better) reconcilable with the issue of path-breaking change.

Insights from literature on cognition may prove fruitful in this respect.

Cohen & Levinthal (1990) have explicitly grounded the ACAP concept in theory on cognitive structures, and Van Den Bosch et al. (2003) mention ACAP's theoretical value for research regarding managerial cognition. We share Dijksterhuis et al.'s (1999) view that management logics affect ACAP.

Furthermore, the strategic consequences of cognition, such as the use of resources or the development of strategy, have been indicated more than once. For instance, Tripsas & Gavetti's (2000) detailed study of Polaroid showed that this company had no difficulty in overcoming the path dependencies normally associated with knowledge evolution, i.e. the development of new and unrelated technologies. Empirics of the digital imaging industry indicated that it was foremost organizational cognition that influenced the development of new capabilities. "[...] Polaroid did not experience major difficulties searching in a radically new technological trajectory and developing new technological competencies, largely due to the consistency of this purely exploratory behavior with the belief in the primacy of technology" (: 1158). By restricting and directing learning and search processes, cognition may preserve an outmoded business model, ignoring changes in the competitive landscape (Tripsas & Gavetti, 2000). Nelson & Winter (2002), themselves, later remark that Polaroid's defeat in the digital imaging market seemed not attributable to its mindless, automatic 'routine' response (as would be in line with evolutionary theorizing), but to a systematically incorrect cognition. Tripsas & Gavetti (2000) hence assert that "understanding processes of organizational change thus requires examining not only the central inertial forces associated with developing new capabilities, but also the impact that cognition has on such processes" (: 1149). Likewise, Barr et al.'s (1992) findings suggest that mental models have a crucial impact on directing resource deployment and resource accumulation. Hence, strong links exist between managerial thinking, firm actions and competition (Walsh, 1995). In relating SICap to cognition we furthermore respond to Walsh's (1995) call to management researchers for relating what appears to be an individual-level construct (i.e., managerial mental schemata) to "consequences of substantive organizational importance" (: 282).

Finally, the value cognitive theories may have for ACAP theory is even more manifest, since the three dimensions of ACAP we focus on, show much similarity to the sensemaking process, as conceptualized by cognitive theorists. 'Strategic sensemaking' comprises the cycle of cognition-action processes of environmental scanning, interpretation and associated action (e.g., Thomas et al., 1993). The fundamental ACAP dimensions of recognition, assimilation and transformation as previously defined, hence closely resemble these three key sensemaking processes. The mutual interaction patterns of the three processes of recognition, assimilation and transformation are thus critical to strategic sensemaking activities, and strategic sensemaking is a pivotal element in building ACAP.

2.2.1.1 Sensemaking as an explanation of path-dependent logic

In chapter 1, we outlined how the strategic actions managers initiate in response to environmental stimuli are grounded in the cognitive frameworks they use to make sense of stimuli and cues (Bogner & Barr, 2000). Although cognitive frames are essentially an individual-level construct, because of social interactions, they evolve to supra-individual, or collective, frameworks on a firm and on an industry level (Walsh, 1995; Gioia et al.,

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1994). Organizations too, can hence be considered as interpretation systems (Daft & Weick, 1984).

Since organizations have unique history and learning trajectories that affect the specific nature of the organizational processes they apply (e.g., Nelson & Winter, 1982), different scholars have argued that individuals within organizations come to share a similar world view. This is because interpretations of external information can be verbalized and can thus be shared by several people. Over time, this creates a socially reinforced view of the world (Porac et al., 1989). Empirical data indicated that organizational membership indeed explains significant homogeneity of environmental perceptions (Sutcliffe & Huber, 1998). “Reaching convergence among members characterizes the act of organizing (Weick, 1979) and enables the organization to interpret as a system” (Daft & Weick, 1984: 285). The cognitive mechanisms of individuals give rise to a so-called ‘dominant logic’ at the aggregate, organizational level (von Krogh & Roos, 1996; Bettis & Wong, 2003).

A dominant logic comprises “the way in which managers conceptualize the business and make critical resource allocation decisions” (Prahalad & Bettis, 1986: 490), “a mind set or world view or conceptualization of the business and the administrative tools to accomplish goals and make decisions in that business” (: 491). A commonly held set of beliefs (a shared cognitive map, or a dominant logic, Prahalad & Bettis, 1986) produces a deep structure in organizations. This deep structure determines organizational members’ action, which in turn reinforces this structure (Gomez & Jones, 2000).

The role of a dominant logic in the context of SI goes without saying since it develops through *experience* with a certain business (Prahalad & Bettis, 1986) and manifests itself in an organization’s assumptions about competition and value creation (Prahalad, 2004). It has indeed been demonstrated that different dominant logics lead to different strategic reactions and hence to performance differences (von Krogh et al., 2000). A dominant logic thus influences the strategy development and decision process (Daft & Weick, 1984).

Dominant logics affect the sensemaking process (Daft & Weick, 1984; Barr et al., 1992): noticing information, interpreting it, and taking action.

More specifically, they operate as information *filters*, constraining data categories on what seems relevant in the context of the current dominant logic (Prahalad & Bettis, 1995; Sinkula, 2002).

They can moreover be considered as *lenses* that determine the interpretation systems used to put meaning on this information, influencing how the world is perceived (von Krogh et al., 2000). So, even if important new information is recognized, it may not be perceived as a signal of needed change (Barr et al., 1992). Since these lenses also determine *what specifically* the organization hears when it hears the voice of the customer, they have an important impact on market sensing (Sinkula, 2002).

Dominant logics finally also suggest what kind of *actions* can be considered as ‘appropriate’, i.e. belong to the organization’s accepted repertoire of actions (Sinkula, 2002).

The influence the dominant logic has on the entire sensemaking cycle explains why it has been argued that the ability to evaluate and utilize outside information is dependent upon an organization’s level of prior related knowledge and shared language (Cohen & Levinthal, 1990). The path-dependent nature of ACAP could thus be traced back to the underlying mechanisms of dominant logic. Moreover, as a dominant logic determines the

way a firm applies knowledge a dominant logic also further affects how firms commercially exploit knowledge (Lane & Lubatkin, 1998); it hence also determines SICap.

A dominant logic may increase an organization's efficiency by reducing the set of environmental stimuli and responses (Sinkula, 2002), and thus simplifying and speeding up decision making. Yet, it also carries some 'toxic' rigidity effects with it when environmental conditions change (Prahalad & Bettis, 1995; Bettis & Wong, 2003). Due to cognitive limitations mental maps will always be incomplete, still, their inappropriateness and inconsistency may further intensify when new (hypercompetitive) environmental cues occur (Barr et al., 1992; Bogner & Barr, 2000), or when the meaning of these cues have changed (Bettis & Wong, 2003). Prahalad (2004) even speaks of 'the blinders of dominant logic'.

Indeed, assumptions about 'what works normally' or 'what worked before' do not automatically apply to the management of changed, new or unrelated businesses (Prahalad & Bettis, 1986; Sull, 1999).

Operating as a 'filter' the dominant logic may limit search spaces (Bettis & Wong, 2003) and hence distract attention from emerging opportunities and threats (Prahalad, 2004; Miller, 1993) and radically new strategies (von Krogh et al., 2000). For example, marketing-dominated firms consider customers as key aspects of the environment, whereas quality leaders focus on technological opportunities and cost factors (Miller, 1993).

Furthermore, because of cognitive structures learning tends to be local and 'close in' to previous activities. New cues may thus be wrongly understood. That is since cause-effect relationships are difficult to form in entirely new learning environments (Teece & Pisano, 1994). "If a relation is indeterminant, its nature becomes a matter of belief backed up by confirming experience" (Hall, 1984: 923).

Finally, the strategies a firm chooses to deal with new cues may be inappropriate. Renewal may be hampered since a dominant logic restricts actions to the ones that are consistent with it. Moreover, these actions further reinforce this logic by providing in turn new information that can be interpreted in light of the existing logic (Barr et al., 1992). "While a set of shared beliefs functions as a context for strategic design actions, it is also reproduced in these actions" (Dijksterhuis et al., 1999: 571). Strong feedback and reinforcement loops may hence produce a 'fossilization' process (Bettis & Wong, 2003). For example, a high-tech IT company may exclusively pursue customers who value state-of-the-art technologies. Considering these customers' preferences as direct proof of customers' preference for advanced technologies in general, the firm feels confirmed in the correctness of its strategy.

Even though some authors have argued that mental models may gradually improve when the erroneous actions they lead to are recognized (e.g., Daft & Weick, 1984; Hall, 1984), most scholars agree that an obsolete dominant logic creates strategic path dependencies, may limit innovation potential, and eventually causes strategic problems (von Krogh et al., 2000; Prahalad & Bettis, 1995; Bettis & Wong, 2003). This is because over time, the dominant logic becomes 'condensed' within the organization's structures, processes, systems and procedures (Bettis & Wong, 2003). The entire organization hence becomes a reinforcing system that determines the organization's collective learning (Bettis & Wong, 2003).

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Miller (1993) speaks of the ‘architecture of simplicity’, which ultimately leads successful organizations to their downfall. Simplicity in the subjective form (i.e., narrow managerial lenses) produces simplicity in objective terms (e.g., single strategic activity swallowing up all resources). The cultures, systems, processes, and worldviews of successful organizations will become so monolithic that they prevent them from embracing and adapting to environmental changes.

Similar ideas have been expressed in Levinthal & March’s (1993) well-known contribution on ‘learning myopia’. Levinthal & March’s (1993) concept of learning traps was further refined and operationalized by Ahuja & Lampert (2001) in the context of breakthrough inventions. These researchers observed the existence of three different learning traps: the ‘familiarity trap’, the ‘maturity trap’, and the ‘propinquity trap’. Familiarity traps occur because experience creates opportunities for specialization, and hence for immediate returns. Maturity traps reflect firms’ tendency to prefer what is mature, i.e. what is reliable, well understood, and offers legitimacy, over what is nascent. Finally, firms’ tendencies to search for solutions that are ‘near to’ existing solutions are grounded in their attempts to minimize risk, cognitive effort (bureaucratic convenience) and resources. For example, Kogut & Zander (1992) argued that firms tend to learn in areas closely related to their current practice, because common knowledge facilitates the transfer of knowledge. The latter tendencies become manifested in propinquity traps.

Ahuja & Lampert (2001) found that, paradoxically, and in line with Levinthal & March’s (1993) view, all these traps often increase firms’ immediate benefits, but are detrimental in the longer run. For this reason, Miller (1993) calls this ‘the Icarus paradox’: Icarus’ wax wings allowed him to fly, but also produced his fatal fall. Variance is suppressed (Bettis & Wong, 2003) as the past shapes in fact the mental model for understanding the future (Bogner & Barr, 2000). As such, a dominant logic may impede the development of new capabilities (Bettis & Wong, 2003). As the firm’s problem-solving repertoire is not enriched and existing cause-effect beliefs are not challenged, in the longer run, these traps lead to an absence of novelty and experimentation of new domains and hence restrict opportunities for fundamentally new knowledge and resource reconfigurations.

Furthermore, as highlighted in chapter 1, shared frameworks occur not only between individuals on a firm level but also between firms on an industry level (Bogner & Barr, 2000). Both the latter influence and reinforce each other (Bogner & Barr, 2000; Bettis & Wong, 2003). “If the continuity of industry traditions encourages conformity at the market level, then the continuity of industry experience plays a socializing role at the firm level” (Miller & Chen, 1996: 1212). In other words, the existence of a competitive recipe at the industry level may shimmer through in organizational memory at the firm level and may hence determine the strategic actions managers initiate. It may dampen a firm’s desire to deviate from the industry rules of the game. “When deciding upon a strategy, the group’s dominant logic allows only for decisions that are conform with it, meaning that the basic rules of the business the company is operating in are not questioned for the future” (von Krogh et al., 2000: 85).

As argued in the previous chapter, this questioning of rules is very critical for SI. Hence, not only need interpretation systems be built, they should often be changed too, especially when faced with environmental discontinuities (Barr et al., 1992). In fact, Tranfield &

Smith (1998) empirically verified that cognitive change in the form of a reframing of strategy was the main driver of strategic regeneration and dynamic capabilities development. Likewise Barr et al.'s (1992) study showed that managers' mental models need changing in response to environmental changes, and that delays in this change process may lead to organizational decline. They hence write (1992: 34): "Managers who fail to consider changes in their beliefs during periods of major environmental change may set their firms on a course of a protracted, downward spiral". Bogner & Barr (2000) hence stress managers' need to engage in 'adaptive sensemaking' processes, faced with turbulent environmental conditions.

Organizations have hence been advised to undertake actions to facilitate the unlearning of outdated dominant logics (Prahalad & Bettis, 1995). Accordingly, Prahalad & Bettis (1995: 10) write: "the focus shifts from learning to unlearning in the case of strategic change". Unlearning by broadening the dominant logic ('increasing its bandwidth'), or by replacing old logics and behaviors by new ones ('tune the filter to another band') is hence required (Prahalad & Bettis, 1995). Shifts in dominant logic enable organizations to reassess assumptions about value creation (Prahalad, 2004). Sinkula (2002) even argues that firms adept at unlearning are better able to replace inappropriate routines with ones that will ultimately result in superior customer value.

In this respect, unlearning or 'forgetting' (de Holan & Phillips, 2003) may be considered as a crucial condition to increase Sicap. The stronger the dominant logic, the more effort is required (de Holan & Phillips, 2003). The central issue is hence how different strategic beliefs can be developed and adopted.

2.2.1.2 Sensemaking as an explanation of path-breaking logic

Even though the issue of changing knowledge structures has been barely tackled in research, some evidence suggests that mental frames can indeed change. Exemplary of this is Barr et al.'s (1992) study. Porac & Thomas (1990), in turn, mention that some firms are indeed able to look beyond the borders of a cognitive competitive category. Likewise, Ahuja & Katila's (2004) findings on the chemical industry show that firms do not only embark on path-deepening search, but are indeed able to change directions too. These results all demonstrate that firms may not be as inert as often thought (e.g., Hannan & Freeman, 1989). Ahuja & Lampert (2001) even empirically verified that specific (double-loop learning) strategies do exist, which may assist established companies in circumventing the aforementioned learning traps.

Actually, the discrepant academic views and evidence regarding path-dependent and path-breaking strategic behavior fit in with Hargadon & Fanelli's (2002) complementary approach to organizational knowledge.

They consider organizational knowledge as a dual phenomenon, encompassing both a latent aspect (knowledge as possibility) and an empirical aspect (knowledge as action). These –seemingly contradicting– perspectives explain why organizational knowledge is sometimes considered as enabling, while other times as constraining innovative behavior. Underlying are in fact two different research models with competing assumptions about organizational knowledge: the innovation and the organizational learning model. The former (e.g., Kim & Mauborgne, 1999b; Rindova & Kotha, 2001) considers knowledge as

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possibility, providing the organization with novel ideas and the potential for novel action. '*Knowledge leads to (new) action*'.

In contrast, the organizational learning literature (e.g., Huber, 1991; Levinthal & March, 1993; Cohen & Levinthal, 1990) considers knowledge as prior lessons learnt that have become embedded within routines and organizational memory. The traditional conceptualization of ACAP as a path-dependent phenomenon can be situated within this research stream. In this view, experience leads to knowledge, in other words, '*action leads to knowledge*'. Prior and related knowledge is thus needed for new knowledge absorption (Cohen & Levinthal, 1990). Yet, this prior knowledge may also constrain future behavior (e.g., Miller, 1993; Leonard-Barton, 1992; Levinthal & March, 1993). Path dependencies are thus especially prevalent in the latter research model.

A similar distinction has been made between the 'path-breaking' knowledge management (e.g., Nonaka, 1994) versus the 'path-dependent' evolutionary model (e.g., Nelson & Winter, 1982) (see, Coombs & Hull, 1998).

Basically each model treats half of the story: innovation models stress how knowledge creates innovation, without questioning where this knowledge originated from in the first place; whereas organizational learning theories study how organizational knowledge bases are built over time, ignoring much of how they may lead to *novel* action (see also, Child, 1997). Hargadon & Fanelli (2002: 295) argue that both models are complementary in that "extant solutions from the environment are never simply applied to novel problems. They are instead interpreted in light of the contextual conditions the actor perceives, before being used to construct new action" and further: "For organizational members, cues in the environment invoke a particular schema which in turn shapes their interpretation and action – but to be perceived, those cues themselves must already reside within their existing latent knowledge" (: 300). The relationship between past learning and future action is definitely a complex one. Action shapes empirical knowledge from which mental schemata arise. These schemata in turn influence action which makes the cycle start anew. Hence, both the mental frameworks used and the action giving rise to and resulting from these frameworks are path-dependent (Bogner & Barr, 2000).

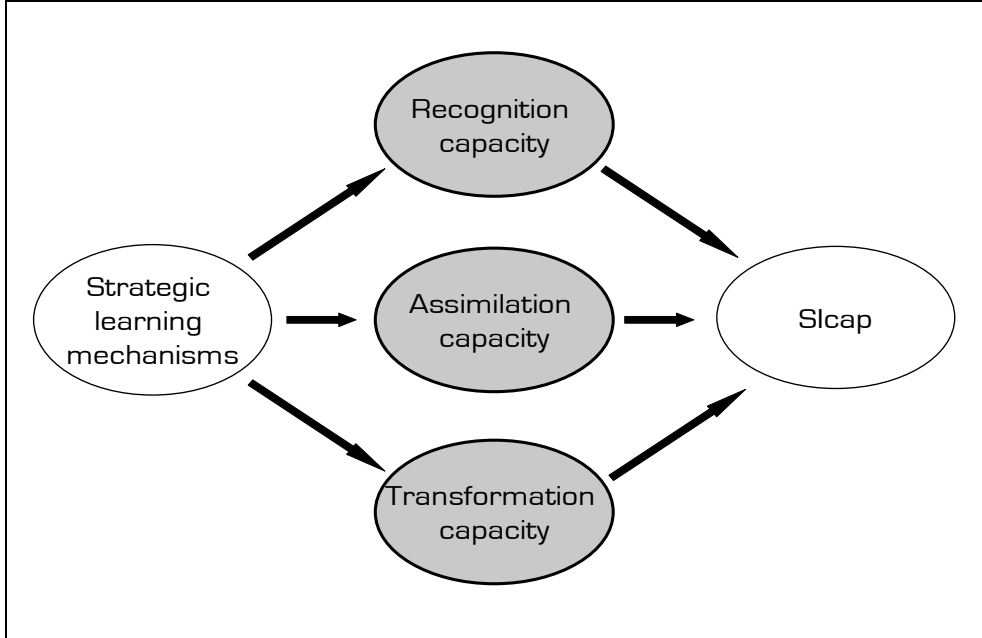
The challenge, especially in the context of SI, is thus to break this vicious cycle and to modify the constraints on a firm's internal variety generation (Coombs & Hull, 1998). Hargadon & Fanelli (2002) claim that influencing the creation of schemata (i.e., redefining them) is key in this respect. In similar vein, Gioia & Chittipeddi (1991) assert that especially the study of the processes whereby mental schemata are altered is fundamental. "Understanding and action, including strategic action, [thus] derive from the framework of meaning ascribed by the organization's members" (Gioia & Chittipeddi, 1991: 435).

Strategic learning, as required for SI, hence involves altering mental frameworks (dominant logic). Changing dominant logic means altering the entire sensemaking cycle, as all sensemaking activities influence what is noticed, how this noticed information is interpreted and what actions should be undertaken (Bogner & Barr, 2000; Daft & Weick, 1984). In this respect, we assert that all sensemaking activities that create and reflect dominant logic are also the activities through which dominant logics can be modified.

Referring to the previously mentioned similarities between the sensemaking activities and the ACAP dimensions of recognition, assimilation and transformation, we could postulate that changing dominant logics, and breaking path dependencies in sensemaking, can be

triggered by influencing recognition, assimilation and transformation capacity (see Figure 2.4).

Figure 2.4: Recognition, assimilation and transformation capacity and SIcap



In order to further specify the path-breaking potential recognition, assimilation and transformation capacity can have, we will now return to contributions on SI. We argue that the literature streams on ACAP, SI and sensemaking can be enriched by integrating them with each other.

In other words, we will map crucial antecedents to SI, as mentioned in the SI literature, to the three previously mentioned antecedent ACAP dimensions and enrich them with insights from the sensemaking literature. Accordingly, the path-breaking aspects of SI will become incorporated in the ACAP dimensions of recognition, assimilation and transformation capacity.

As such, we do a first attempt to further refine and tailor the construct of ACAP to the specificities of the dependent variable SIcap. In this way, it is also a first step in our attempt to operationalize the ACAP construct within the domain of SI.

The following section indicates what specific aspects of recognition, assimilation and transformation capacity, as regards the contents of these capacities, may be marked as crucial. We call these aspects ‘path-breaking focus areas’.

2.3 RECOGNITION, ASSIMILATION, TRANSFORMATION AND SICAP

2.3.1 The path-breaking focus areas of recognition capacity

Scanning an organization's external environment has been proposed as the starting point of strategic sensemaking (e.g., Daft & Weick, 1984) and organizational performance (Thomas et al., 1993). Exemplifying the role recognition plays in unlearning, Weick (2002) asserts that "it is those with the least information who are most certain [...] there is no felt need for learning, right at the very moment where learning is most urgently needed (Weick, 2002: S14). He means that if new information, or disconfirming information is not perceived, not sought after or even consciously avoided, unlearning may be hampered, obsolete logics are preserved, which in turn makes the organization more vulnerable.

Scholars on cognition seem moreover to agree that knowledge *structures* may change as a function of some change in the information environment (Walsh, 1995). By influencing a firm's recognition capacity, i.e. its capability to identify and acquire new external information (Zahra & George, 2002), a firm's knowledge structures may hence be changed. In fact, recognition capacity affects the 'filtering' aspect of the dominant logic.

In general, the establishment of external knowledge linkages has been found a common aspect of successful knowledge creation processes (Eisenhardt & Martin, 2000). The intensity of an organization's effort to acquire new external knowledge has hence been proposed to positively affect the development of capabilities as well (Zahra & George, 2002). Especially for firms adopting a proactive strategy the development of external knowledge acquisition capabilities was found of critical importance (Liao et al., 2003). It has thus been argued that not so much slack resources, but the capacity to recognize new opportunities and options in a sustainable way is of crucial importance to any firm that aspires breakthrough innovation (Ahuja & Katila, 2004; Colarelli O'Connor & Rice, 2001; Johnson et al., 2003). In particular, market knowledge has been considered as an important driver to innovativeness (Hurley & Hult, 1998). The generation of market intelligence has been found to be especially beneficial for firms with a global and pro-active strategic posture (Tuominen et al., 2004).

Logically, scholars on SI have stressed the value of external knowledge. Indeed, the outside-in character of SI (Krinsky & Jenkins, 1997) requires deep and fast customer and market insight (Varadarajan & Jayachandran, 1999). To achieve customer and market insight, the SI literature emphasizes to study customers and especially their dissatisfactions (Christensen et al., 2002; Styles & Goddard, 2004). Dell, an often-cited strategic innovator, is hence considered as "a shining example of acquiring information about business customers" (Simpson et al., 2001: 122). In addition, the organization's environment should constantly be monitored (Markides, 1999a) in order to discover any innovation potential in environmental discontinuities, to detect any change in the underlying sources of competitive advantage (Christensen, 2001), or to tap ideas from outsiders to the organization, such as customers, suppliers, industry visionaries, etc. (Hamel & Getz, 2004). Furthermore, in a dynamic environment characterized by random and unclear information flows, the establishment of centralized 'gatekeeping' functions seems somewhat counterproductive (Cohen & Levinthal, 1990). Neither should the responsibility of recognition be reserved exclusively to top management (Hamel, 1999). Instead,

everyone in the organization should act as ‘spies’ who collect and utilize information and ideas from everybody in- and outside (e.g. suppliers, distributors) the organization (Markides in Mang, 2000; Markides, 2004b; Cohen & Levinthal, 1990).

These elements all bring the value of market orientation to the forefront. The market orientation literature (e.g., Slater & Narver, 2000; Tsai & Shih, 2004) has indeed emphasized the value of market intelligence generation for the creation of superior value propositions (Day, 1994; Simpson et al., 2001). Varadarajan & Jayachandran (1999) hence explicitly consider research into the innovation consequences of market orientation as an important future research direction in the strategic marketing field. However, as mentioned in chapter 1, the literature on strategic innovation emphasizes, more than does the traditional literature on market orientation, the need to *shape* customer behaviors and to develop dramatically *new* customer value propositions over retaining and better satisfying current customers and markets (Kim & Mauborgne, 1997). More recently, researchers have indeed started to doubt the business performance benefits originally associated with market orientation (e.g., Jaworski & Kohli, 1993).

In general, little empirical evidence exists regarding the relationship between external search strategies and the degree of novelty of innovation (Laursen & Salter, 2006). Still, unlike the emphasis that has traditionally been put on hearing, understanding and adapting to the immediate voice of the customer (e.g., Day, 1999), implying more customer insight and interactions (e.g., Vandenbosch & Dawar, 2002), some scholars have raised the idea that customer and market information may well offer insights into existing value systems, but not into new markets with different systems of use (Christensen & Rosenbloom, 1995). Recognition channels may come to mirror existing perspectives, values and strategy and may as such have a blinding effect towards information that helps shaping or evaluating new business ideas (Shimizu & Hitt, 2004; Miller, 1993). In a supply chain, beliefs about competitors, suppliers and customers focus managers’ limited attention to specific transactional partners (Porac et al., 1989). Especially, the detrimental effects of close customer relationships have aroused researchers’ interest. For instance, Danneels (2003) argues that tight customer coupling becomes self-validating in the sense that when suppliers arrive at a specific insight and definition of the customer, they automatically become more focused on those customers that correspond the best to their definition. This convergence of cognition and behaviour diminishes firm’s flexibility to serve alternative customers and markets. Traditional market research & analysis techniques, being primarily focused on intelligence generation from and on current customer needs (scarcely revealing unmet needs or long-bared vexations) lock firms into a specific strategic course and may in this respect hamper SI (Christensen et al., 2002; Christensen & Bower, 1996; Hamel & Getz, 2004; Lynn et al., 1996; Zhou et al., 2005). In fact, ‘hearing the voice of the customer’ might lead companies to merely adapt their offerings, neglecting to proactively reshape customer preferences (Kumar, et al., 2000). Zhou, et al. (2005: 45) even speak of the ‘tyranny of the served market’. Given the dynamics in the customer value models as discussed in the chapter 1, a market orientation approach might in this respect be detrimental to both customer and supplier. Furthermore, the idea has become widely shared in the marketing literature that not all buyers do have well-defined preferences that can be revealed, but that they often construct their preferences when faced with the need to make a decision. Hence, the plea one-to-one marketing researchers have made for building

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a learning relationship with customers may come into question, and at the very least “the benefits and costs of addressing individual customer preferences are much more complex and less deterministic than has typically been assumed” (Simonson, 2005: 42).

Scholars opposing against the traditional market orientation literature, have in contrast emphasized the need to understand the future evolution of markets in order to uncover new opportunities to serve current or new customers (D’Aveni, 1994). Companies thus need market-sensing capabilities to signal and read market developments (Johnson et al., 2003). Understanding the future gives change a direction (Brown & Eisenhardt, 1997). More specifically, to avoid drifting, reacting, or following (Brown & Eisenhardt, 1997), companies are advised to use intuition-based processes (Christensen et al., 2002) and to develop ‘industry foresight’ (Hamel & Prahalad, 1994; Brown & Eisenhardt, 1997). So-called ‘strategic soothsaying’ (D’Aveni, 1994), or ‘forward-sensing’ (Kumar et al., 2000) enables firms to understand markets, not in order to react to it, but in order to modify structures and behaviors (Jaworski et al., 2000). Firms are advised to closely monitor new tendencies in the market and industry, e.g. in technology, demographics, regulations, and lifestyles (Christensen, 1997; Markides, 1999a; Krinsky & Jenkins, 1997; Styles & Goddard, 2004), and to focus on fringe (Markides, 1999b) and non-customers (Kim & Mauborgne, 1999a). In addition, the customer’s own business can be studied to develop an idea of how the offering can enhance the customer’s own value creation potential vis-à-vis his customer (Markides, 1997, Normann & Ramirez, 1993). In this way, hidden customer needs can be explored or new demand can be created (Kim & Mauborgne, 1999a).

Moreover, “In a world in which changes come from many different directions, the ability to balance organizational focus with the wide-angle view may be the most important ability for long-term survival and success” (Day & Schoemaker, 2004a: 117). A recent special issue of *Long Range Planning* (2004) was entirely devoted to the creation of ‘peripheral vision’. Paying proactive attention to the periphery is important since these fringes of the business can contain sources of strategic blunders, of strategic attack but of opportunities even so.

A broad-based ‘panoramic surveillance of the market’ has been associated with the development of dynamic capabilities (Teece et al., 1997). Zahra & George (2002) have likewise emphasized the importance of the ‘direction’ of knowledge acquisition for the development of ACAP. In similar vein, Van den Bosch et al. (2003) stress the ‘scope’ dimension of ACAP (i.e. the ability to absorb knowledge from new domains) as especially useful for exploration. Following this line of argument, Almeida et al. (2003) assert that, given detrimental effects of path dependencies, firms should make deliberate investments to broaden the scope/breadth of their search activities. A broad scanning of the environment increases firms’ flexibility to follow different strategic courses and to serve new customers (Danneels, 2003). Still, the mantra of strategy has been ‘focus’, and different institutional mechanisms and internal forces are aligned to this perspective (Day & Schoemaker, 2004a). Organizations thus tend to focus views on their current frames of reference, which are in turn determined by the current business. As indicated, this narrow focus may eventually lead to blind spots (Zahra & Chaples, 1993). Alternatively, a too broad vision may be inefficient either; information overload creates confusion and is very costly. The challenge organizations deal with is hence to take notice of the periphery, without ignoring ‘traditional’ information (Day & Schoemaker, 2004b).

Other scholars have furthermore argued that the use of analogy, in studying other companies in other industries (e.g. Lilien et al., 2002) or geographical regions may point the way to new business ideas and may help to rethink the logic of the business (Prahalad, 2004; Hamel & Getz, 2004; Markides, 1997). Yet, if analogies are based on superficial similarity, and if they are used, not only as a creativity trigger, but to really copy businesses they may be useless, even dangerous (Gavetti & Rivkin, 2005).

Next to stressing the value of a customer orientation, the traditional definition of market orientation (Narver & Slater, 1990) points to establishing a competitor orientation as well⁵. Even though SI contributions stress the value of monitoring competitors, they strongly discourage firms to use rivals as benchmarks (Kim & Mauborgne, 1997; Markides, 1999a), because competitive benchmarking may reinforce herd behavior (Prahalad, 2004). It leads to imitative market approaches, reactive acting and hazy understanding of emerging mass markets and changing customer needs (Kim & Mauborgne, 1999b): “intense competition makes innovation indispensable, but an obsessive focus on the competition makes innovation difficult to attain” (: 49). Benchmarking may hence be valuable to increase efficiency in the current game, but will never lead to a distinct competitive advantage (Hamel, 2004). Benchmarking against conventional and ‘close’ rivals leads to the ignorance of unexpected and unconventional new threats, and produces even adaptive failure (Abrahamson & Fombrun, 1994). Likewise, Khalifa (2004) pleads for a shift in thinking from beating competitors to serving customers with superior customer value. Competitor benchmarking could indeed reinforce chances of incremental improvements at the detriment of searching for fundamentally new sources of customer value (Urbany & Montgomery, 1998).

In conclusion, despite growing interest, the debate whether (traditional) market orientation facilitates (e.g. Johnson et al., 2003) or impedes (e.g., Zhou et al., 2003) SI remains unsolved so far. Danneels (2003) speaks of the ‘paradox of customer orientation’: tight coupling with customers (cfr. Jaworski & Kohli, 1993) enables efficient transactions but meanwhile restricts environmental inquiry and available options for the firm. What is however less debated is *that* sensing, surveillance, and visualization of the market in one way or another facilitate the recognition of new SI options (Johnson et al., 2003).

A study of the SI literature however reveals that path-breaking factors such as market sensing (forward sensing, industry foresight), peripheral vision (e.g. broad tendencies, non-customers, other industries) seem crucial aspects of recognition capacity in the context of SI. Strategic learning mechanisms influencing recognition capacity to improve SIcap, should hence primarily target these path-breaking focus areas.

⁵ In fact, the –cultural– market orientation construct has traditionally been defined as a three-dimensional construct (e.g., Slater & Narver, 1995), involving interfunctional coordination too. Others have however rejected this third dimension, arguing that the latter is an intrafirm communication mechanism and not a dimension of market orientation (e.g., Day, 1994). We therefore incorporated this third dimension as a separate factor, see section 2.6.1.3.

2.3.2 The path-breaking focus areas of assimilation capacity

To influence the ‘lens’ through which dominant logics constrain interpretation, assimilation capacity may be influenced. This is because assimilation capacity comprises a firm’s capability (its routines and processes) to analyze, process, interpret and understand acquired external information (Zahra & George, 2002). Assimilation is hence primarily considered as a sensemaking process whereby new knowledge is connected to existing knowledge (Lane et al., 2001).

Despite advancements in IT, making large amounts of data available, organizations are still characterized as “information-rich but interpretation-poor systems” (Prahalad & Bettis, 1995: 6). Organizations apparently lack interpretation capacity and actionable knowledge. Therefore, if recognition is not to lead to an information overload, it should be tied to the organization’s capacity to distill meaning out of the information collected (Day & Schoemaker, 2004b). The evaluation and interpretation of external information may help the identification of new opportunities (Child, 1997). In fact, Liao et al. (2003) empirically verified that proactive firms faced with high environmental turbulence placed indeed an even greater emphasis on the assimilation than on the acquisition of knowledge. Lane et al. (2000) note that flexibility and other learning structures and processes impact primarily on the assimilation component of ACAP. Marinova’s (2004) results showed that not so much the possession of market knowledge by itself stimulates innovation. Only when interpretation updates market knowledge, which is then shared among managers, an increased innovation effort could be discerned. These arguments all place assimilation practices to the centre stage of SICap development.

By definition, SI involves a departure from a proven business definition and all of its underlying assumptions about what success consists of (Govindarajan & Trimble, 2005). Hamel & Välikangas (2003) use the term ‘cognitive challenge’ and posit that “infatuation with conformance severely hinders the quest for resilience” (: 60). Scholars in the SI field have indeed emphasized that changing the rules of the game requires an inquiring and nondogmatic collective mindset (e.g. Baden-Fuller & Stopford, 1996). As learning theorists have advocated, learning takes place when organizational members reconstruct old meaning into new meaning (Louis & Sutton, 1991). Logically, Baden-Fuller (1995) asserts that building SICap does not so much require an investment in physical assets, but rather in intangibles and organizational mindsets.

Tripsas & Gavetti (2000) point to the value of ‘deframing’ skills and the ability to question current strategic beliefs in an *ongoing* way (Dunbar et al., 1996). Likewise, Barr et al.’s (1992) empirical findings demonstrated the value of a gradual and *continuous* change in mental frames, in contrast to abrupt, radical and drastic changes to it. In successful, strategically proactive organizations, so they mention, new mental models are not ‘refrozen’, but stay open to additional and continuous adjustments. Unlearning entails ‘switching cognitive gears’, i.e. the shift from an automatic to a conscious cognitive mode of ‘active thinking’ (Louis & Sutton, 1991). It has been shown that effortful thought (e.g. by means of causal cognitive mapping) can reveal mental schemata and can attenuate framing bias (Hodgkinson et al., 1999; Hall, 1984). Likewise, Porac & Thomas (1990) mention the triggering effects of personal reflection. As Weick

notes (2002: S12): “When people engage in what they call ‘reflection’, the bulk of this activity may involve unbelieving things they initially believed to be true”. Critical reflection could in this respect stimulate unlearning. The value of critical reflection also explains why it has been argued that exploration is primarily performed by means of cognitive efforts to develop new intuitions and ideas, and to select promising ones by assessing their ‘fitness value’ or performance implications (Zott, 2003; Zollo & Winter, 2002). Therefore, Rajagopalan & Spreitzer (1996) also contend that learning at a cognitive level is more fundamental than learning at the action level. Unfortunately, these deliberative cognitive efforts have been largely ignored in for example the behavioral tradition on organizational learning (Zollo & Winter, 2002).

Organizational knowledge is however a socially constructed phenomenon: it originates from social interaction (Nonaka, 1994; Floyd & Lane, 2000). “The distinctive feature of organization level information activity is sharing” (Daft & Weick, 1984: 285). In Crossan et al.’s (1999) 4I framework of organizational learning, the ‘interpreting’ phase, i.e. explaining ideas and insights to one’s self and to others, is the process whereby individual learning moves to a collective level. Through the interpreting process, ideas are incorporated into cognitive maps and, as such, are related to new ideas and new domains. However, this social character of new knowledge creation also implies that the organizational knowledge needed to efficiently pursue and sustain an existing strategy, emerges through and builds upon communication channels that have become implicitly embedded in the organization (Henderson & Clark, 1990). This creates islands of perspective and knowledge that reinforce instead of undermine the existing strategy, and that make it hence extremely difficult to explore new ideas and assimilate new information.

With the view of SI, the assimilation process should hence cut through existing knowledge barriers in order to modify these ‘lenses’. Schein (1993) makes a plea for cross-functional and cross-hierarchical dialogue. More specifically, assimilation processes should involve an open dialogue among a group of people with perspectives as diverse as possible (Liedtka, 2000; Thomas et al., 2001). This is because learning about the external environment through organizational assimilation structures with greater breadth will produce more renewable or continuous adaptive capacity (Jarzabkowski, 2004: 543). New ideas, that are so critical to SI, emerge if issues are reflected on from different angles or perspectives (Markides, 1997). Bogner & Barr (2000) pointed to the value of cognitive diversity for ‘adaptive sensemaking’. Similarly, Leonard-Barton (1992) has pointed to the value of having multiple frameworks and discrediting existing perspectives in order to avoid core rigidities.

“Paradoxically, organizations often try to make too much sense of an inherently noisy environment. They would be better off making less sense and developing multiple views” (Day & Schoemaker, 2004b: 139). Hargadon & Fanelli (2002) hence point to the value of ‘pluralism in mental schemata’. This pluralism can be triggered by interactions and confrontations between diverse organizational members, enriching people’s perspectives (see also, Bogner & Barr, 2000 for similar arguments).

When individuals learn to use different lenses on information, they hence create new knowledge from the same information (Okhuysen & Eisenhardt, 2002). Hence, “Sharing interpretations enables a firm to create new knowledge through the collective

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reinterpretation of existing information” (Denealt & Gatignon, 2000: 16). As Weick & Roberts (1993: 378) put it: “when individual comprehension proves inadequate, one of the few remaining sources of comprehension is social entities. Variation in the development of these entities may spell the difference between prosperity and disaster”. Decision-making teams made up of persons with diverse cognitive perspectives hence reach a higher level of cognitive complexity (March, 1991) and a richer firm-level framework (Bogner & Barr, 2000).

People expressing and sharing their beliefs, opinions, ideas and individual experiences, and a constructive dialogue and debate of these (the so-called ‘knowledge articulation’) are therefore considered as an important way of collective learning (Zollo & Winter, 2002; Denealt & Gatignon, 2000). Kuwada (1998) also stressed its value for strategic learning, i.e. for changing cognitive frameworks.

Managers thus need to build variety in their understandings and develop a ‘complicated understanding’ that will eventually make the organization as a whole more effective (Bartunek et al., 1983). Shimizu & Hitt (2004) propose a team-based approach with a devil’s advocacy lens. Discussion of multiple hypotheses, asking disconfirming questions, stimulating dissenting viewpoints (Bartunek et al., 1983), creative interpretation of information, and brainstorming about possibilities (Day & Schoemaker, 2004b) can all be useful in this respect.

Even though top management plays a critical role in initiating a change in organizational mindsets (Markides, 1999a; Kim & Mauborgne, 1999b), ultimately every organizational member, and manager in particular, should be willing to continuously challenge taken-for-granted trade-offs (such as low price versus good service) and traditional assumptions about the competitive arena and the overall business (Mintzberg, 2000; Kim & Mauborgne, 1997). Markides (1997), for example, remarks that the organization’s perception of the business it is in probably constitutes the most dominant mental model in the organization. Since mental models guide behavior, an organization’s perception of the business they are in determines its strategy (Styles & Goddard, 2004). Consequently, Markides (1997) believes that an honest questioning of the business the firm believes it is in is often the first step to SI. Empirical research by von Krogh et al. (2000) showed that the higher the variety in a company’s conceptualization of its business, the better it can cope with environmental variety. Questioning the strategic position not only allows companies to detect early the decay of their current position (reactive) but it also enables them to be the first in exploring new opportunities (pro-active) (Markides, 1999b). In similar vein, Slater & Narver (1995) made a plea for the development of organizational processes that target the critical assessment of key assumptions about the business. They argue that these processes are requisite for frame-breaking innovation and generative learning (a redefinition of the way business is done). Yet, especially in established companies currently doing well this proves an extremely difficult process. Likewise, the company’s business model may be deconstructed in its constituent parts (e.g., marketing strategy, value proposition, distribution methods, etc), which are successively critically reflected upon (Hamel & Getz, 2004; Slywotsky, 1996). Companies can also question who their customers and their needs are in order to discover entirely new customers or new customer segments by re-segmenting the existing customer base (often the low-end of the market or niches) (Markides, 2004b). Reflection on the sources of competitive advantage,

revenue and profit models, organization and management systems, and the offering are fruitful routes as well (Markides, 1999b; Styles & Goddard, 2004).

In conclusion, within the context of SI assimilation capacity largely centers on collective critical reflection. This reflection serves to question especially the dominant assumptions and beliefs regarding the competitive arena, customers, and the overall business. Strategic learning mechanisms influencing assimilation capacity to improve SIcap, should hence primarily target these path-breaking focus areas.

In sum, the PACAP dimension corresponds to sensemaking activities, consisting of environmental scanning and interpretation. Both the latter are deemed key elements for organizational decision and strategic change (Maitlis, 2005). “Scanning and sensemaking are at the center of things. Almost every organizational activity or outcome is in some way contingent on interpretation” (Daft & Weick, 1984: 293). Having clarified the value of recognition and assimilation capacity for SI, we hence agree with Zahra & George’s (2002) assertion that “Firms with well-developed capabilities of acquisition and assimilation (PACAP) are likely to be more adept at continually revamping their knowledge stock by spotting trends in their external environment and internalizing this knowledge, thus overcoming some of the competence traps discussed above” (: 195)⁶. This citation exemplifies the value of especially PACAP in –at least– loosening dependencies.

2.3.3 The path-breaking focus areas of transformation capacity

In contrast to recognition and assimilation, transformation capacity brings behavioral aspects of ACAP to the forefront. Transformation capacity has to do with changing ‘operating routines’ (Zollo & Winter, 2002), in order to integrate the newly acquired and assimilated knowledge (Zahra & George, 2002) within the organization’s activities (Lane et al., 2001). It centers on issues of conversion, internalization and recodification (Zahra & George, 2002; Daghfous, 2004). Transformation capacity could thus be viewed as the capacity to effectively change behavioral processes (Zahra & George, 2002).

It is in these changed behavioral processes that the development of new (combinations of) capabilities is rooted (Liedtka, 2000). This is since new or modified routines and processes form the fundament of new capabilities (Zahra & George, 2002). Therefore, we could posit that it is transformation capacity that will produce the change in operating routines that is required for new value creation (Almeida et al., 2003) and SI.

Furthermore, Daft & Weick (1984) consider behavioral processes in itself as the organizational mind. In their view, organizational cognition hence transcends a purely ‘cognitive’ approach. This would imply that changing knowledge structures may result in an altering of behavior, and that alternatively, changing behavior may alter cognitive maps. As transformation capacity is geared towards the development of new routines that combine existing and new knowledge (Zahra & George, 2002), it is entirely focused on behavioral issues. Therefore, we argue that the constraining effects dominant logic may exert on organizational actions may be loosened by influencing transformation capacity. Prahalad & Bettis (1995) compare a dominant logic with a genetic factor. Although it is

⁶ This assertion seemingly contrasts their belief in the path-dependent character of ACAP.

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invisible, its influence is pervasive through its interaction with organizational systems, structures and standard operating procedures (see also, Daft & Weick, 1984). Prahalad & Bettis (1995) hence argue that changing the dominant logic also implies making adjustments to these organizational aspects, since both are interwoven and mutually reinforcing. After all, organizational processes have, apart from their coordination/integration and learning purposes, also an important role in reconfiguring and transforming (Teece et al., 1997).

Even though the SI literature remains rather vague as regards the specific intra-organizational behavioral aspects of SI, it still recognizes the value transformation capacity may have for SICap. The implementation of new value propositions requires organizational changes (Carrillat et al., 2004) and a continuous redefinition of the “way of doing things” (Deneault & Gatignon, 2000). Since organizations with pro-active strategies should possess a ‘responsiveness capability’ (Liao et al., 2003), to turn new knowledge into new business concepts (Tuominen et al., 2004), they should be agile and develop the capabilities for flexible action and response (Day & Schoemaker, 2004b). Day (1994) furthermore indicates that new ideas do not succeed without any behavioral change.

The cognitive change recognition and assimilation capacity may invoke, should hence lead (and be aligned) to behavioral and procedural change, in the form of revised routines (Tranfield & Smith, 1998): new insights, meanings and initiatives should be leveraged (Zahra & George, 2002). Indeed, a new conception of ‘how business is done’ is only complete when old routines are replaced with new ways of working and behavioral standards (Tranfield & Smith, 1998). Organizations hence need to redesign the processes by which the work has traditionally been done, in order to better match the requirements of the new business (Christensen & Overdorf, 2000).

Furthermore, investments in PACAP all demand a significant amount of time, effort and other resources. These investments may eventually turn out counterproductive for an organization’s innovation capacity if too excessive exploration efforts reduce the attention available to actually implement and exploit new business ideas (Levinthal & March, 1993; Koput, 1997). Knowledge management theories have often ignored the latter aspect, becoming solely preoccupied with a firm’s intelligence *creation* (Davenport & Prusak, 1998; Becker, 2001).

The importance of the behavioral aspect motivates why exploratory search efforts (PACAP) have been hypothesized to be curvilinearly (inverted U-shape) related to an organization’s innovativeness (Ahuja & Katila, 2004). Recent research by Laursen & Salter (2006) confirmed that the depth and breadth of an organization’s external search strategies enhance its innovation performance, though with decreasing returns. Organizations can also ‘over-search’, which leads to an information overload, confusion, and financial outlays (Ahuja & Lampert, 2001; Levinthal & March, 1993). This issue is expressed in Zahra & George’s (2002) efficiency factor η as the ratio of RACAP (including transformation capacity) to PACAP. η determines the value a company can create out of its knowledge base; carrying with it a glaring contrast to the absolute value of ACAP (such as that which the popular measure of R&D expenses covers, e.g. Cohen & Levinthal, 1990). Over-searching would hence show a low efficiency factor. Since it is

primarily RACAP that is associated with performance outcomes, investing in both PACAP and RACAP is required (Zahra & George, 2002).

Yet, achieving a high transformation capacity is not evident. As already mentioned, cognitive schemata can be reinforcing in that they may prevent the recognition and assimilation of new, valuable information. Moreover, even if the firm remains vigilant to new information, this does not necessarily imply that an effective response is initiated. Organizational context (e.g. a culture where mistakes are severely punished) and ingrained behaviors may block behavioral changes (e.g., Schon, 1975). In addition, political power struggles and potential detrimental career effects may retard the transformational process (Shimizu & Hitt, 2004). SI may disrupt established routines and this intensifies perceived uncertainty (Shimizu & Hitt, 2004). Since people prefer the status quo, organizational inertia can prevent the transformation processes needed to create SI initiatives.

Therefore, effective transformation is often a fairly long process, surpassing traditional organizational functions (Carrillat et al., 2004). Behavioral change may be costly and firms are thus suggested to develop processes to minimize these costs by quickly reconfiguring and transforming ahead of competition (Teece & Pisano, 1994). As indicated, the timing of resource deployments in dynamic capability development (e.g., reconfigurations) have indeed been thought determinant of intra-industry differential firm performance (Zott, 2003).

In conclusion, SICap requires a behavioral change as well. Processes fostering and speeding up the development of new routines, processes and ways of working, which better integrate new external knowledge with existing knowledge, will lead to the behavioral change SI requires. Influencing transformation capacity to increase SICap means to influence essentially these path-breaking focus areas.

Recapitulating our logic: Our main research objective was to search for any mechanisms to increase SICap. We began our discussion by the assertion that SICap requires dynamic capabilities. We argued that dynamic capabilities may prove perishable over time and that hence the strategic, second-order learning mechanisms that create and modify dynamic capabilities are key. This line of reasoning essentially builds upon Eisenhardt & Martin's (2000) finding that dynamic capabilities are path-dependent in their emergence. That is, path dependence takes place through the learning mechanisms by which dynamic caps develop; it is the learning mechanisms that guide their development. So "the evolution of dynamic capabilities occurs along a unique path for any given firm, this path is shaped by well-known learning mechanisms" (: 1117). In other words: the learning mechanisms build the path. "these insights open the 'black box' of path dependence to reveal that the evolution of dynamic capabilities is guided by well-known learning mechanisms" (: 1117). In order to specify what these learning mechanisms should tackle, we had to refine the specific contents of dynamic capabilities in the context of SICap. Therefore, we used ACAP as a proxy for dynamic capabilities. More specifically, we took recognition, assimilation and transformation capacity as three antecedent capacities of SICap. Founding our argument on cognitive theories, we argued that influencing specific path-breaking focus areas in these three ACAP-dimensions could loosen path dependencies.

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Still, we have not yet plunged into the specifics of these learning mechanisms. Hence, in the following section we take the discussion one step further to study the specific form of these learning mechanisms.

Focusing on the strategic learning mechanisms for ACAP, we do a first attempt to answer Lane et al.'s (2002) critique of absorptive capacity research to date for paying too little attention "to the actual processes underlying absorptive capacity" (: M4). They further argue that this is rather disappointing since Cohen & Levinthal's (1990) original contribution emphasized the need to study organizational mechanisms for ACAP *development*.

2.4 DELIBERATE STRATEGIC LEARNING MECHANISMS FOR SICAP

We first dilate upon the deliberate character strategic learning mechanisms may have. Then, we pursue in greater depth the question as regards the specific form of these learning mechanisms.

2.4.1 Deliberate strategic learning mechanisms

Galunic & Eisenhardt (2001) critique existing contributions of dynamic capabilities for their implicit assumption of an underlying economic (i.e. business-minded) logic, that automatically optimizes internal firm capabilities to external market needs, without taking into consideration the influence of social (i.e. communal, e.g. loyalty) forces. Consequently, a stream of literature has recently arisen that stresses the value of *deliberate* investments in (dynamic) capability generation.

For example, Knott (2003) stresses it reserves a continuous and crucial role for managers to preserve a firm's resource advantages. The different roles managers at all organizational levels can play in the process of strategic renewal have also been indicated by Floyd & Lane (2000). Recently, Ethiraj et al. (2005) also empirically demonstrated the value of deliberate, proactive, institutionalized and sustained investments in systems and processes for the development of capabilities in the software services industry. A similar argument was developed by Helfat & Peteraf (2003). Even though these authors largely follow evolutionary arguments in explaining the development of dynamic capabilities, they still argue that the development of dynamic capabilities may branch into different directions, as a result of deliberate managerial decisions. In similar vein, Brown & Eisenhardt (1997) associated the development of successful core capabilities for innovation with specific management practices. In the context of architectural innovation, Henderson & Clark (1990) assert that given the way knowledge tends to be structured and organized to sustain the existing architecture (or strategy), learning about new architectures (or new business ideas) is unlikely to occur naturally and "may therefore *require explicit management and attention*" (: 28, italics added to original). Beck & Kieser (2003) have hence called to better study organizational rule systems, especially those encompassing change mechanisms that foster an organization's learning capacity.

Similar arguments can be found in ACAP research. ACAP has indeed been conceptualized as a combination of effort and knowledge bases (Kim, 1998).

Cohen & Levinthal (1990) argue that if a firm wants to acquire and exploit knowledge that is unrelated to its current activities, ACAP will not gradually arise as a natural 'byproduct' of the innovation process, but that the creation of ACAP in this case will require the dedication of explicit and exclusive effort. Zahra & George's (2002) view of ACAP even more points to the importance of managerial intervention in the creation and triggering of all four ACAP dimensions. They indicate that their conceptualization of ACAP as a dynamic capability implies that ACAP may be implemented deliberately to acquire, assimilate, transform and exploit knowledge. Thomas et al. (1993), for example, actually found that in firms that had put into place explicit mechanisms to increase information use, managers were more likely to initiate strategic change.

To increase an organization's ACAP, Jansen et al. (2006) make a plea for codification efforts through formalization, over experiential learning through tacit knowledge accumulation and routinization. For example, deliberate learning mechanisms for assimilation are valuable in that formal social integration mechanisms increase intra-organizational information dissemination, interpretation and the identification of trends (Zahra & George, 2002). As a consequence, Van Den Bosch et al. (2003) have made a call for incorporating the issue of managerial intentionality (deliberately influencing ACAP) in future ACAP models. Lenox & King (2004) responded to this call and found that managers can directly influence a firm's absorptive capacity. Their results suggest that absorptive capacity seems not durable and needs continuous investment. Lenox & King (2004) further conclude that also established firms can enhance absorptive capacity, even in domains where they lack prior experience. Furthermore, "The benefit of using clear and strict directions for knowledge absorption is that it can facilitate the process of breaking down existing socialization capabilities" (Van den Bosch et al., 1999: 565). Socialization capabilities refer to shared ideologies and cultures; deliberate learning mechanisms for ACAP could hence break the inertial influences of inappropriate (i.e. innovation curbing) cultures.

The usefulness that deliberate learning mechanisms may have for sensemaking and changing mental frameworks has been exemplified at length. Thomas et al.'s (2001) study of the US Army indeed demonstrated the value of systematic and intentional learning mechanisms for strategic learning (i.e. changing strategic assumptions). De Holan & Phillips' (2003) study showed that organizational forgetting required a high level of management concern, time and effort. Moreover, Daft & Weick (1984) posit that organizations using formal and systematic mechanisms to interpret their environment are so-called 'test makers', who do not accept their environment as given, but test and manipulate their environment by trial and error experimentation and/or by formal search. These organizations employ 'enacting' or 'discovering' interpretation modes. It is exactly these kinds of organizations, they argue, that may break or change environmental rules. Organizations hence need to establish driving mechanisms for discussing, sharing and interpreting information internally (Day & Schoemaker, 2004b). Furthermore, research has indicated that actors (and organizations too) switch to a conscious cognitive mode, not only when confronted with novel situations (e.g., a merger), or when discrepancy is felt between cognition and action (e.g., a performance decline), but also by deliberate requests for active thinking, i.e., in response to an internal or external request. Active thinking may hence be stimulated by motivating people to do so (Louis & Sutton, 1991). A more deliberate focus on collective reflection may increase the understanding of ambiguous

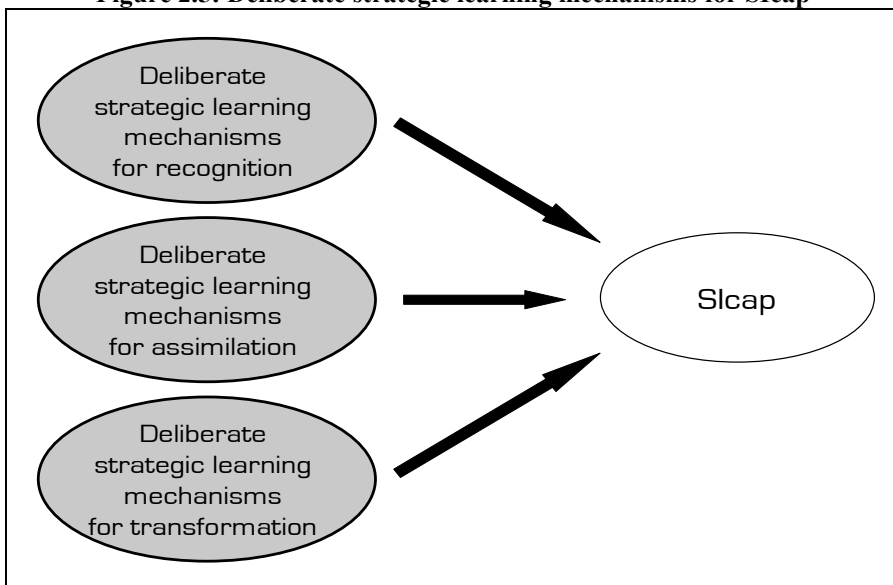
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action-performance links and has as such been suggested as highly beneficial to the development of dynamic capabilities (Zollo & Winter, 2002).

In the innovation area, Dougherty & Hardy (1996) found, in turn, that especially large, mature organizations are confronted with the innovation-organization problem, which reduces their ability for sustained innovation. This is because the effective implementation of the innovation in the organization depends primarily on individuals' power bases. Hence, if innovation takes place, it occurs in spite of the system, not because of it. Dougherty & Hardy (1996) hence advice firms to design organizational systems and processes that ease the repeated creation of innovation in the organization. Koput's (1997) simulation results provide further evidence for this argument. They show that the chaos, traditionally associated with innovation initiation, has a stable, underlying structure. His results suggest the possibility to design stable processes, such as practices and routines, aimed at the generation and selection of new innovative ideas. Zollo & Winter (2002) hence emphasize the value *deliberate* learning mechanisms can have, especially in exploration. Moreover, they propose that deliberate learning mechanisms will be more effective in the case of a low task frequency, high task heterogeneity, and high action-performance ambiguity. SICap could indeed be considered as an extreme exploration capacity, involving the creation of new (read: infrequent) initiatives and tasks. By definition, it entails the execution of heterogeneous tasks (path-breaking, so different than before) and much causal ambiguity due to its strategic novelty.

In conclusion, all previous arguments lead to the proposition that *deliberate* strategic learning mechanisms could prove useful to foster SICap. As previously argued, deliberate strategic learning mechanisms that stimulate specific path-breaking focus areas in recognition, assimilation and transformation capacity, may foster SICap (see Figure 2.5).

Figure 2.5: Deliberate strategic learning mechanisms for SICap



2.4.2 The form of deliberate strategic learning mechanisms

The influence deliberate strategic learning mechanisms exert logically depends on the specific object, which they exert this influence on. Hence, to examine the specific form deliberate strategic learning mechanisms should take, we should first look at the object upon which these learning mechanisms act.

Actually, strategic learning mechanisms are second-order since they operate on first-order dynamic capabilities. They thus influence, act upon, dynamic capabilities. As noted, we follow the predominant conception of dynamic capabilities as first-order *routines* (e.g., Zollo & Winter, 2002; Zott, 2003; Winter, 2003). First-order routines, while ‘meta’, are still routines (Adler et al., 1999). Therefore, let us explore theories on routines and on routine changes. They may shed light on the way strategic learning mechanisms may influence dynamic capabilities (or, in our study, the three ACAP-dimensions).

2.4.2.1 Traditional view on routines

Routines are traditionally conceptualized as patterned, (quasi-)repetitious, collective activity (e.g., interaction) regularities that are founded mostly on tacit knowledge (Becker, 2004; Winter, 2003; Nelson & Winter, 1982). “Routines are stable patterns of behavior that characterize organizational actions to variegated, internal or external stimuli” (Zollo & Winter, 2002: 340). Routines increase efficiency in that they help to economize on the energy expended on calculation. In this way, they free up energy that may be spent on other calculations (Gomez & Jones, 2000). Winter (2003: 991) for example notes that: “brilliant improvisation is not a routine, and there is no such thing as a general-purpose routine”. This is because routines can only be successfully maintained to the degree they are frequently exercised and repeated. If a pattern of action occurs only once, it is no routine (Feldman & Pentland, 2003).

Routines have been thought to develop in an incremental way, resting on processes of trial and error learning whereby experience is accumulated in a tacit way (Nelson & Winter, 2002). Simply put, experiential learning is stimulus-response learning where choices associated with previous positive outcomes are reinforced, whereas choices associated with negative outcomes are suppressed (Gavetti & Levinthal, 2000). Only exceptional mismatches between routine outcomes and environmental conditions may provoke change (Levitt & March, 1988). This is why the development of dynamic capabilities (since they rest on changing routines) has often been thought to be a slow and incremental process (Teece et al., 1997). In this view, dynamic capabilities equal ‘dynamic *tendencies*’ (King & Tucci, 2002).

Since routines reflect experiential wisdom (Gavetti & Levinthal, 2000) they operate as ‘local search’ mechanisms, constrained by existing routines and previous search activities (Nelson & Winter, 1982). Considering routines as codification mechanisms of organizational memory, some scholars argue that routines reflect current organizational capabilities (Nelson & Winter, 1982; Teece et al., 1997). In this way, a firm’s prior behavior may constrain its future action in that learning may be restricted to conventional domains, favoring the status quo (Levinthal & March, 1993). In essence, routines may create path dependencies by stimulating only local search efforts (Teece & Pisano, 1994).

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Routines may in this sense promote innovation, as long as the innovation is still ‘in close proximity to current behavior’, i.e. in line with existing ideologies and strategies (Nelson & Winter, 1982; Miller, 1993; Gavetti & Levinthal, 2000). Innovation by recombination is confined since local search efforts block the recognition and assimilation of new and ‘more distant’ knowledge (Almeida et al., 2003). “Learning by doing does not contribute to the diversity that is so critical to learning about or creating something that is relatively new” (Cohen & Levinthal, 1990: 134). Routines are thus traditionally considered as limiting a firm’s adaptiveness; constraining its strategic pro-activeness all the more.

In conclusion, routines have traditionally been considered as repetitive, fairly mindless actions, concerning few cognitive effort, and taking place in an automatic mode (Becker, 2004; e.g., Miller, 1993). Within the context of Scap, it is especially the inertia, mindlessness, and path-dependent character of routines that should be tackled.

2.4.2.2 *Modern view on routines*

Recently, some scholars have critiqued this traditional view on routines. Their assertion that actors are to be considered as intentful in their use of routines puts into question the mindless and rusty character routines are traditionally assigned. Moreover, whereas the traditional conception of routines is lacking empirical proof, this ‘new’ perspective on routines as mindful and interpretative actions has been well documented in empirical research (Becker, 2004).

Pentland & Reuter (1994) reconceptualized a routine from its traditional meaning of a fixed, mindless response to “a set of repetitive, functionally similar patterns of action” (: 505), stressing the reflective agency (i.e. the explicit deliberation and search) actors dispose of in their execution of routines. “In the same way that English grammar allows speakers to produce a variety of sentences, an organizational routine allows members to produce a variety of performances” (: 623). Their results further illuminate the emerging idea that routines are not inert, but possess an endogenous dynamic of incremental change (e.g., Massini et al., 2002). Pentland & Reuter (1994) hence propose to substitute the term ‘process’ for the pejorative term ‘routine’.

Feldman & Pentland (2003) later brought these ideas into a coherent framework, differentiating between the ‘ostensive’ and ‘performative’ aspect of routines. The ostensive aspect refers to the abstract, ideal, schematic, ‘structure’ part of the routine; the performative aspect refers to the routine in practice, the enactment, i.e. the actual performances of the routine by specific people, at specific times, in specific places. The performative aspect clarifies that actors may tailor routines to better serve their particular intents and ‘improvise with the materials at hand’ (Jarzabkowski, 2004). As such, routines may consist of adaptive and creative behavior. Feldman & Pentland (2003) assert that routines are not blindly followed and reproduced but, through their performative aspect, stay open to constant change and variation. Some of the performance variations are eventually selectively retained in the ostensive aspect, producing incremental and continuous change. Feldman & Pentland (2003) argue that when performative aspects of routines are stimulated and effective selection and retention mechanisms are in place, this sheds doubt on theories of punctuated change (e.g., Tushman et al., 1986) that built their

argument on the assumption of routines' structural inertia (cfr. Brown & Eisenhardt's (1997) findings on continuous change in the computer industry).

Their view reflects the idea that routines are not inert, are mindful and may be considered as a source of organizational flexibility. This improvisational aspect of routines has also been exemplified in, for example, Weick & Roberts' (1993) study on flight decks.

Feldman (2000), for her part, has taken the discussion even one step further. She found that people who engage in routines reflect on and react to various outcomes of previous iterations of the routine. As such, actors may not only choose another possible set of actions in a given repertoire (cfr. Pentland & Reuter, 1994), but may even try to make the routine itself more efficient (the process) or more effective (what the routine accomplishes). Her empirical results pointed to an internal dynamic in routines, i.e. even the repertoire, the 'grammar', can change over time. Although action is bounded by the cognitive, material and relational structures in the organization, at the same time it affects and changes these structures (Child, 1997). The 'behavioral stability' routines are said to induce is thus a relative concept, encompassing the potential change that is endogenous to the routine (Becker, 2004). As Okhuysen & Eisenhardt (2002) found in their study on knowledge integration in groups: "Structure acts not only as a channel for knowledge flows among individuals, but also can provide a platform for changing and improving these flows" (: 383).

These conceptualizations bring the cognitive, reflective, agency aspect of routines to the forefront. In contrast to classic models of organizational routines, this research stream shows that routines can indeed change, as long as actors spent time on reflecting on previous iterations and outcomes (Feldman, 2000; Edmondson et al., 2001). "While organizational routines are commonly portrayed as promoting cognitive efficiency, they also entail self-reflective and other-reflective behavior" (Feldman & Pentland, 2003: 95).

Feldman (2000) notes that because of the agency, more specifically the reflection people engage in before changing routines, the inherent dynamic in routines may encompass *an ongoing process of double loop learning*. Accordingly, in Feldman's (2000) view, routines are not only a source of flexibility (cfr. Pentland & Reuter, 1994), but of considerable and radical organizational change as well.

In other words, deliberate strategic learning mechanisms fostering changes in dynamic capabilities should hence stimulate the agency aspect of routines.

2.4.2.3 Deliberate strategic learning mechanisms as general, semi-structured rules

As the previous discussion indicates, the effectiveness of routines is context-dependent (Massini et al., 2002). Specific situations call for judgment and interpretation, in order to tailor the rules to the specific context before applying them (Becker, 2004). The more rules are formulated in general terms, the more their 'performative' aspect (Feldman & Pentland, 2003), or 'adaptive use' (Jarzabkowski, 2004), will prevail. General rules thus stimulate creative behavior (Becker, 2004). This is important since Feldman (2004) showed that changes in organizational routines affect resource mutability. Likewise, Prietula & Watson's (2000) computer simulation demonstrated that even subtle changes in key routines may have drastic organizational and economic effects. In addition, empirics demonstrated that changes in organizational routines should correspond to changes in the

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work environment; strict routine changes that are enforced from above are likely to cause resistance to change (Feldman, 2004). General rules leave in this respect room for agents to tailor routine changes to the specifics of their work environments.

If there exist rules for almost any action organizational members may take, persons have no time or opportunity left for improvisation and the creative development of more efficient or effective solutions. As a consequence, innovation is curbed (Beck & Kieser, 2003). In a similar vein, Weick & Roberts (1993) argue that high-efficiency organizations have simple minds; whereas “A smart system does the right thing regardless of its structure and regardless of whether the environment is stable or turbulent” (: 377).

Simple, formal interventions provide some kind of ‘semi-structure’ (Eisenhardt & Sull, 2001) that holds processes together while not rigidly controlling them, balancing order with disorder (Brown & Eisenhardt, 1997). This semi-structure can also help entire groups self-organize in more effective ways, enhancing both their efficiency and flexibility (Okhuysen & Eisenhardt, 2002).

Similar ideas have been posited by Adler & Borys (1996), who distinguished between two types of bureaucracies: ‘enabling’ and ‘coercive’ ones. Their central message is that: “Formal procedures do not have to be designed to make the work process foolproof. They can be designed to enable employees to deal more effectively with its inevitable contingencies” (Adler & Borys, 1996: 69). Employees can be actively involved in defining and refining rules (Adler et al., 1999). In this way, and contrary to common perceptions, in an enabling bureaucracy high levels of formalization may support high levels of commitment and innovation. Beck & Kieser’s (2003) empirics did indeed show that formal organizational rules and mechanisms may enable organizational change and learning. Likewise, Gilson et al.’s (2005) result point to the complementary effects of creativity and standardized work practices for team effectiveness. Adler & Borys (1996) even note that if both routine and nonroutine tasks are managed in an enabling way, this can be *the* effective and real path to ambidexterity. They verified this proposition in subsequent empirical research (Adler et al., 1999).

From a cognitive perspective, the value of general rules has been promoted as well.

Bettis & Wong (2003) propose the establishment of multiple dominant logics as a way to build the requisite internal variety to cope with complex and changing environments. Building their argument on complexity theory, they argue that “multiple logics can evolve from simple rules” (: 352). In their view, simple rules permit the co-existence of multiple logics because the rules leave enough flexibility to accommodate different meanings. As these rules stimulate frequent deconstructions in processes (cfr. routines) the required instability is built in within the organization. Bettis & Wong (2003) position these rules on a deeper level as ‘meta-logic’. They draw the conclusion that: “The origins of complex adaptive behavior can, therefore, be surprisingly simple” (: 352). They accordingly call for more research on the establishment of such meta-logics.

Maitlis (2005), in turn, suggested that a ‘guided’ form of organizational sensemaking may be well suited to produce innovative proposals; “guided sensemaking processes may be particularly valuable in situations that require the development of a rich, multifaceted account that can be used as a resource for ongoing and spontaneous actions” (: 47). Guided sensemaking coordinates and structures the overall process, while actively engaging

participants in sensegiving. In this way, while the discussion of diverse opinions and understandings is promoted, the process is meanwhile controlled and is hence more likely to lead to consistent actions.

Furthermore, as proposed by Jarzabkowski (2004), the more turbulent the environment, the less likely fully institutionalized routines will meet environmental demands. This will promote internal change in the routines themselves, or even their entire rejection. This view is echoed in Eisenhardt & Martin (2000) and Galunic & Eisenhardt (2001). Based on their study of the Internet search engines Yahoo! and Excite, Rindova & Kotha's (2001) conclude that "dynamic capabilities depend on emergent learning processes and simple organizing principles" (: 1274). Even though these findings relate to first-order routines (e.g., Eisenhardt & Martin, 2000), resting on Adler et al.'s (1999) and Winter's (2000) statements large analogies exist with second-order routines (i.e. strategic learning mechanisms). If semi-structured first-order routines promote change in operating routines, then second-order routines promote change in first-order routines.

In conclusion, deliberate strategic learning mechanisms should take the form of general rules, stimulating agency in the performance of first-order routines. In this way, deliberate strategic learning mechanisms foster the inherent dynamic of recognition, assimilation and transformation processes.

2.5 REMARKS ON THE EFFECTS OF DELIBERATE STRATEGIC LEARNING MECHANISMS

We argue that the establishment of deliberate strategic learning mechanisms may foster SICap. The effects these learning mechanisms provoke occur in fact on two different dimensions.

The first dimension is the most obvious one. In order to develop the dynamic capabilities required for SICap, we argue that second-order mechanisms should target recognition, assimilation and transformation capacity (see Figure 2.1). Relating the ACAP cycle explicitly to cognitive theories of sensemaking and to literature on SI, we detected aspects in the three ACAP dimensions that are crucial to promote path-loosening effects. We hence propose that strategic learning mechanisms fostering especially these path-breaking focus areas may foster SICap. We furthermore contend that firms may deliberately establish these strategic learning mechanisms.

Stressing the value of strategic learning mechanisms, we follow Bogner & Barr (2000) and Bettis & Wong (2003) that it is this pattern of strategy creation processes (the 'how'), and not the specific strategy contents (the 'what'), that may be regarded as the source of success itself, especially in hypercompetitive environments. "recipes for success must focus on the process or "hows" of strategy, and not the "whats"" (Bogner & Barr, 2000: 224). This highlights the competitive value deliberate strategic learning mechanisms may have.

Furthermore, our focus on strategic learning mechanisms stresses the strategic value of specific, concrete firm processes, instead of studying more abstract 'resources'. Although organizational knowledge processing (ACAP) is in itself unobservable, it is influenced by other organizational practices. Concrete organizational practices could hence function as a

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proxy of a firm's knowledge processing (Lane & Lubatkin, 1998) and hence carry a great potential for empirical research. "They provide a 'window' to the drivers underlying change [...] enabling researchers to map organizational change" (Becker, 2004: 649).

The establishment of deliberate strategic learning mechanisms also provokes changes on a less obvious dimension. The aforementioned ACAP-capabilities actually consist of specific routines aimed at recognition, assimilation and transformation (Zahra & George, 2002). Edmondson et al.'s (2001) study on the establishment of new cardiac surgery routines in US hospitals showed that routines do not only change in a natural way (e.g., variation, selection, retention) but that the establishment of new routines can also be deliberately facilitated and triggered. Hence, deliberate strategic learning mechanisms should steer the development of ACAP-routines. Furthermore, we explained how agency promotes the inherent dynamic in routines (Feldman, 2000; Pentland & Reuter, 1994). Feldman's (2000) results show that agency may not only lead to organizational forgetting (de Holan & Phillips, 2003), but it also enables path-breaking behavior to occur within daily organizational processes and routines. In addition, Coombs & Hull (1998), not only argue that especially routines and processes aimed at the generation and organization of market knowledge (say, ACAP) are crucial in the innovation process, but that these routines, and the modification of these routines (i.e. the first *and* second dimension), hold the key to (partially) relaxing the constraints on path dependency in innovation. Fostering the agency aspect in the performance of the ACAP-routines means stimulating the inherent change potential of recognition, assimilation and transformation capabilities.

We hence argued that establishing deliberate strategic learning mechanisms as semi-structured, general rules stimulates agency and hence cranks up the endemic change potential of routines. "A management practice may, therefore, be used deliberately to generate adaptive behaviour, in so doing adapting the practice itself to local circumstances" (Jarzabkowski, 2004: 549).

In conclusion, not only the development of path-breaking aspects in ACAP is promoted (first dimension), but the internal change in ACAP capabilities, i.e. ACAP's development *path* (second dimension), is stimulated as well. For instance, deliberate strategic learning mechanisms may not only foster the path-breaking aspects of assimilation capabilities (say, processes for collective critical reflection), they affect the way these assimilation capabilities are built as well (say, stimulating a change in the specific processes for collective critical reflection, in order to make them more efficient or effective).

In sum, we follow evolutionary theorizing for we recognize the existence of bounded rational actors, operating within a particular set of mental frameworks and firm-specific routines (incl. capabilities on a higher order). This implies that levels of analysis (from individual to organizational) are in fact –and inevitably– blurred (Weick & Roberts, 1993), since organizational structures affect cognitive processes and individual cognitive processes enact organizational structures (Pentland & Reuter, 1994).

We further share the evolutionary idea of performance differences rooted in firms' ability to create and internalize innovations themselves (Massini et al., 2002). We however dissociate ourselves from traditional evolutionary theory in our assertion that actors still do have the (albeit incomplete) ability to (partly) 'see through' the context they are embedded in, and thus dispose of mechanisms to consciously improve routines or to develop better

ones (Nelson & Winter, 2002). This does however by no means imply we entirely reject the idea of path dependency; we only reject the idea of *complete* path dependency and dissociate ourselves from its deterministic character. Sharing Child's (1997) critique against the polarization of entire determinism versus entire voluntarism, we consider organizational reality as a mix of both.

This view is consistent with more recent ideas in 'strategic choice' theory. As Child (1997: 68) put it: "This [intentionality] is largely ignored by evolutionary economists because they try to concentrate their attention on essentially behavioural routines rather than on the level of cognition and rationale". Child argues that evolutionary theories of the firm still tend to rely on assumptions of optimization and survival, ignoring the understanding and the intentions of actors: "Evolutionary theories of the firm are aware of the structural and technological manifestations of evolution, but they are searching for a link from these to the actions and underlying rationales which bring them about" (Child, 1997: 66)⁷.

Gavetti & Levinthal (2000) exemplified the effect of actors' understanding. They demonstrated the superiority of joint cognitive and experiential search over pure experiential search. Their computer simulation showed that, despite the value of experiential search, cognition may help organizations find more attractive regions in the business landscape. The authors furthermore found that cognition, and cognitive change, may influence subsequent experiential learning. Similarly, even Nelson & Winter (2002) themselves argue that over time, understanding and practice co-evolve; they tend to advance together. "Cognition is useful not only in seeding the process of experiential search on a particular location in the fitness landscape but also in constraining the process of experiential search from wandering to less attractive regions on the landscape" (Gavetti & Levinthal, 2000: 133). In this sense, cognitive search (even if consisting of imperfect cognitive representations) may prevent the competency traps induced by exclusive local, experiential search. Furthermore, Gavetti & Levinthal (2000) stress the value of cognitive *change*, especially when the organization faces environmental change. They argue that the loss of experiential wisdom induced by a change in cognitive representations, is attenuated as the experiential wisdom has become outdated anyway, given altered environmental conditions. In turn, Miner (1994), March (1994) and Lovas & Goshal (2000) have leveled their criticism against the natural, deterministic explanations of the evolutionary theory of the firm, that are devoid of any role of voluntary choice and managerial action. Lovas & Goshal (2000) did actually an attempt to study the organization as an 'artificial' selection environment, incorporating the active role of (top) management in guiding the evolutionary innovation processes of firms.

More specifically, asserting that deliberate strategic learning mechanisms can both loosen path dependencies by stimulating specific aspects of recognition, assimilation and transformation capacity and foster the internal dynamic of routines, we follow the view that the impetus for organizational change comes both from strategic choices and from the auto-evolution of the system itself (Deneault & Gatignon, 2000).

⁷ Nelson & Winter (2002: 33) later write: "The idea that habits of management thought channel strategic choices is not a radical new discovery of the evolutionist camp. The challenge, however, is to build a theoretical structure that is capable of making effective use of that insight".

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This auto-evolution lies herein that the effect deliberate strategic learning mechanisms exert is an indirect one. They influence dynamic capabilities (ACAP), which in turn affect capabilities, which in turn affect resource configuration and operating routines. In fact, they set a chain of sequential effects into motion (cfr. Winter, 2000). The objects affected in this chain however comprise inherited things from the past. The central premise of the resource-based view is indeed that resources or factor inputs are available to all firms, but the capabilities to deploy them are not (Amit & Schoemaker, 1993; Ethiraj, 2005). (Dynamic) capabilities, just as ACAP, can not be bought, but should be *developed* (Teece & Pisano, 1994; Cohen & Levinthal, 1990). Furthermore, Ahuja & Kathila (2004) demonstrated that resource heterogeneity stems from particular situations and opportunities firms are confronted with. In this sense, the idiosyncratic situations firms face create specific (search and capability development) paths. Consequently, capabilities and dynamic capabilities are idiosyncratic.

This implies that the effect strategic learning mechanisms exert on dynamic capabilities depends on the level and characteristics of dynamic capabilities. This in turn affects the influence dynamic capabilities have on capabilities, and so forth. In other words, in each organization, strategic learning mechanisms and capabilities have other objects they operate on; firms do not start with a clean slate. Even though Ray et al. (2004) make a plea for business processes (cfr. high-order routines) as the ultimate sources of competitive advantage in the resource-based view, they hence note that “firms are not empty ‘canvasses’ upon which any activity, routine, or business process can be drawn, and the differential effectiveness of these firm processes depends critically on the resources and capabilities a firm possesses” (: 35). In this respect, we share the idea of path dependency posited in evolutionary economics (e.g., Massini et al., 2002).

The existence of path dependencies implies that even if two firms would apply the same deliberate strategic learning mechanisms, chances are almost nihil that these would eventually lead to exactly the same product-market and performance implications. “Although the notion of making deliberate investments to improve firm capabilities may be understood uniformly by most firms, there are idiosyncratic firm-level differences in the timing of this effort, the nature and amount of the investment and effort they undertake, and the internal organizational mind-set that supports this process. These differences may get reflected in significant heterogeneity across firms with respect to the capabilities that result from this effort” (Ethiraj, 2005: 28).

2.6 CRITICAL ORGANIZATIONAL AND SUPPLY CHARACTERISTICS

Organizational theory posits that capabilities can only be used to the extent they correspond to the architecture, or overall configuration, of the firm (Grant, 1996; Miller, 1993). Accordingly, Markides (in Mang, 2000) explicitly calls for more research on the interrelationships between a firm’s strategy and its internal organizational environment. Govindarajan & Trimble (2005) put much emphasis on the role of the ‘organizational DNA’ in the management of SI initiatives. This DNA consists primarily of systems, structure and culture. Especially organizational mechanisms (such as deliberate strategic learning mechanisms) and processes are not established in a vacuum; they are embedded in a broader organizational context. Characteristics of this context hence determine their effectiveness (Adler et al., 1999).

This internal organizational context influences cognition and behavior (Vera & Crossan, 2004). Deliberate strategic learning mechanisms may hence provide an integrated system of valuable strategy creation processes as long as it is backed by different organizational side conditions that make it operate efficiently and effectively (Liedtka, 2000). Culture and structure have been proposed as central building blocks of such an environment (Markides, 1999b). Apart from organizational characteristics, attributes of the supply chain (network) relationships have been associated with ACAP and SI development as well (e.g. Baden-Fuller, 1995).

Therefore, we propose several organizational and supply chain characteristics that may exert a critical influence on the relationship between deliberate strategic learning mechanisms and SIcap. The selection of characteristics discussed below is not meant to exhaust the universe of spheres of influence, but to summarize factors suggested in the literature. This provisional selection will be further refined based on the qualitative findings (see chapter 4).

2.6.1 Organizational characteristics

2.6.1.1 Organizational culture

Organizational culture can be defined by “the pattern of shared values and beliefs that help individuals understand organizational functioning and thus provide them with the norms for behavior in the organization” (Deshpandé & Webster, 1989: 4). Since an organizational culture refers to the values and beliefs of employees it can govern the behavior of individuals and hence make the function of more formal administrative methods redundant (Teece & Pisano, 1994). The shared values of a culture may function as a beacon of stability in the midst of change (Kanter, 1985).

However, organizational values also reflect a strategic business logic (Hurley & Hult, 1998); they set priorities and determine for example whether a new business idea is regarded as an attractive opportunity or not. Organizational culture can in this respect also produce conformity, blindness, and intolerance (Miller, 1993). Strong, coherent and unitary cultures may prevent defiance from current operations, may produce core rigidities (Leonard-Barton, 1992), and may retard innovation (Jarzabkowski, 2004) and the development of ACAP (Van den Bosch et al., 1999). Changing the organization in response to external forces can thus be extremely difficult (Christensen & Overton, 2000; Leonard-Barton, 1992).

Therefore, the role of crisis as a trigger of paradigm shifts and strategic renewal has been exemplified at length, especially by adherents of the punctuated change model (e.g., Tushman & O’Reilly, 1996). Yet, there exists something as ‘the crisis paradox’: a negative crisis may evoke action, but a crisis situation in itself often hampers effective action (Markides, 1998). Therefore, scholars with a more gradual perspective on renewal have hence posited that the required crisis should by definition not be as painful as traditionally thought (Hamel & Välikangas, 2003).

Notably organizational learning theorists have argued for the role that organizational culture can play in this respect. The value of innovation could actually be incorporated

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within the culture itself (Jarzabkowski, 2004). Culture may thus also help to break with existing assumptions in order to increase entrepreneurial and creative action (Huber, 1991) By deliberately making creative tension as a central element of the organizational value system and culture, organizational culture can function as a less drastic and less reactive way to create the 'crisis' required for the continuous generative, frame-breaking learning (Leavy, 1997) that is inherent to SICap. In large organizations the power of culture is that it enables employees to act in a conscious way (this means *not* by automatism and past assumption) while keeping overall consistency. In this way, it contributes to an organization's capabilities (Leonard-Barton, 1992) and innovation capacity. Floyd & Lane (2000) stress the value of such a 'clan' coordinative system within conditions of high environmental turbulence.

Furthermore, organizational culture (reflecting a supportive environment for experimentation, dissent and examination) has also been considered as a crucial element in actively leveraging the strategy development process in itself (Liedtka, 2000). Especially adhocratic cultures (characterized by an informal and external focus) fostering creativity, entrepreneurship and risk taking, have been considered beneficial to the creation of a market-driving organization (Carrillat et al., 2004) and to the creation of dynamic capabilities (Galunic & Eisenhardt, 2001). The organizational culture could in this way promote the pursuit of SIs (Leifer et al., 2001).

In conclusion, as the assumptions and beliefs underpinning the organizational culture determine the way environmental stimuli are interpreted and strategically acted upon (Johnson, 1987), it is logical that the effect deliberate investments in dynamic capability creation will have, also depends on a the organizational mindset (Ethiraj, 2005). Adler et al (1999), for example, demonstrated how culture fosters the effectiveness of meta-routines.

2.6.1.2 Organizational structure

The firm's structural design determines the distribution of responsibilities and authority among organizational members, planning and control systems, managers' perceptions and the creation, coordination and execution of decisions (Miller, 1993; Volberda, 1996). Volberda (1996) hence made a plea for the convergence of strategic and structural change. Moreover, SI requires a behavioral change. Since organizational (and individual) values, beliefs and behavior are conditioned by the structure of the system, a change in behavior requires structural modifications (Markides, 1999b, Amis et al., 2004).

Decentralization and local autonomy have been suggested as beneficial to the development of dynamic capabilities (Teece et al., 1997) and of new ways of understanding (Kuwada, 1998). High degrees of formalization and centralization correspond to a mechanistic organizational structure, one that only enables incremental changes (Volberda, 1996). High centralisation was also found a barrier to market orientation (Jaworski & Kohli, 1993). This is because a limited delegation of decision-making authority inhibits the dissemination and utilization of information (Matsuno et al., 2002). These results were corroborated by Harris' (2000) results that high centralization may contribute to efficient decision making, but that it hinders both market responsive and innovative change.

Structural properties have also been proposed as moderators in the creation of ACAP (Van den Bosch et al., 1999). A functional or hierarchical organizational form may limit the scope and flexibility of absorption (Van den Bosch et al., 1999) and restricts renewal to a

function of top-down managerial processes (Jarzabkowski, 2004). In contrast, decentralized structures stimulate participative decision making, which in turn enriches the organization's knowledge architecture (Van den Bosch et al., 1999), its creativity, learning and risk-taking attitudes (Jarzabkowski, 2004). Flatter and more horizontal organizational structures facilitate innovation and increase the development speed of reconfigurations, transformations, and strategic actions (Hitt et al., 1998; Teece & Pisano, 1994). It corresponds more to an 'emergent' than 'deliberate' strategy creation process (Leonard-Barton, 1992). Jansen et al. (2006) empirically demonstrated the positive influence of participative decision making on acquisition (i.e. the first ACAP-dimension) because of an increased number of 'receptors' to the environment. Their results showed furthermore a positive relation with transformation. Markides (1999b) hence contends that a decentralized structure promotes SI.

2.6.1.3 Cross-functional information dissemination

Isolated knowledge from different parts in the organization and from different frames of reference should be juxtaposed to generate new insights (Hamel, 1998b; Hitt et al., 1998). From a cognitive tradition, Bogner & Barr (2000) likewise stressed the value of interaction among individuals with diverse cognitive frameworks for adaptive sensemaking. They argue that cognitive diversity broadens individual cognitive perspectives, thereby increasing cognitive complexity since more trends, industry characteristics and environmental issues can be noticed. This is why the value of cross-functional communication for decision-making has been stressed (Brown & Eisenhardt, 1997).

In addition, research has suggested that social contact in an organization may be required to keep the organizational memory from decay (e.g., interpretation of infrequent events) (Walsh, 1995). Formal lateral integrating mechanisms increase the frequency, breadth and quality shared across various functional domains (Hitt et al., 1998).

However, contrary to the continuous and intense knowledge sharing as promoted by proponents of the 'learning organization', Almeida et al. (2003) found that it is the loose interaction between different individuals and groups over time that permits the integration of different knowledge bases and perspectives.

Furthermore, the location in the organization where new information can best be found and acquired often differs from the location where it can best be applied (Lenox & King, 2004). Therefore, cross-functional liaisons enable intra-organizational information and knowledge transfers (Markides, 1997; Gupta & Govindarajan, 2000; Becker, 2001).

Knowledge transfers within and between organizational subunits have in turn been proposed as beneficial to an organization's ACAP (Liao et al., 2003; Vinding, 2000; Cohen & Levinthal, 1990). This was empirically confirmed in Lenox & King's (2004) study.

Likewise, research has shown that the key to a value-driven strategy is to move away from a traditional functional organization toward a process model integrating different functions for creating customer value (Sharma et al., 2001). In this way, all stakeholders can bundle their insights and efforts toward what customers value (Carrillat et al., 2004; Day, 1999). Especially the cross-functional information dissemination of market information has been

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related to innovation (Martin & Grbac, 2003; Matsuno et al. 2002). Sharing market knowledge was hence found critical to put value innovation strategies into action (Kim & Mauborgne, 1999b). The innovative recombination of resources, essential for SI, requires indeed the establishment of specific intra-organizational mechanisms that ensure the communication of various subunits over time (Almeida et al., 2003). Scherer (1992) hence notes that one of the most important research areas to gain deeper insight into Schumpeter's thesis is research into the relationship between large firms' innovative capacity and their intra-firm communication networks.

2.6.2 Supply chain characteristics

2.6.2.1 Supply chain information potential

Sharma et al. (2001) assert that the information asymmetry typical of the industrial era has made way for information ubiquity in the present business environment. Both suppliers and buyers have increasing information about the other and can thus be polled for innovative ideas (Adler et al., 1999). Establishing mechanisms to increase a firm's exposure to external information could hence involve mechanisms that involve stakeholders more closely (Thomas et al., 1993).

A firm's interactions with external parties, such as customers and suppliers, has consequently been proposed as beneficial for its ACAP (Daghfous, 2004). Vinding (2000) demonstrated that especially a firm's close relationships to vertically related partners (i.e., customers and suppliers) positively affect ACAP's influence on a firm's innovative performance.

Organizational systems for receiving new ideas and perspectives from outside the organization moreover help managers avoid being trapped by path dependence (Shimizu & Hitt, 2004). Following this line of argument, Day & Schoemaker (2004b) point to the value of exchanging information with, and collecting information from outsiders (customers, competitors, channels and other stakeholders) to build the broad scope that peripheral vision requires. Similarly, Sinkula (2002) stresses the value of supplier cues to trigger the unlearning of obsolete mental models. He argues that since these cues tend to be more infrequent and serendipitous (than e.g. customer information) organizations must do explicit effort in receiving cues from suppliers.

Moreover, a close information exchange with customers can not only provide valuable customer insights, but the amount of customer interaction also enhances the opportunities to influence customer values (Carrillat et al., 2004) and to effectively communicate the new value that is created by the supplier (Sharma et al., 2001). Without effective communication regarding superior value-creating activities, efforts to create value may even lead to customer *dissatisfaction* (Simpson et al., 2001). Accordingly, in the SI literature Markides (1999b) and Krinsky & Jenkins (1997) stress the value of other parties' (e.g. customers, distributors) information for idea generation. Kodama (2003), based on his study of large, incumbent strategic innovators in Japan, stresses the absorption of knowledge generated through a firm's relationships with external parties, such as customers and suppliers.

We hence consider supply chain information potential as critical external factor. By incorporating this concept, we respond to Jansen et al.'s (2005: 1011) call to integrate "dimensions of external linkages of organizational units" in ACAP research.

2.6.2.2 Supply chain innovation stimulus

The value of inter-organizational relationships in the supply chain has been stressed throughout marketing research (e.g., Day & Montgomery, 1999; Day, 2000; Johnson & Selnes, 2004). Coviello et al. (2002) speak of 'interaction marketing' and 'network marketing'. More specifically, the literature on relationship marketing has advanced the 'co-operate to compete' thesis, advocating that firms are increasingly competing through their close relationships with stakeholders, such as customers and suppliers (Hunt, 1997). In the business-to-business marketing literature, especially the European Industrial Marketing and Procurement (IMP) Group has propagated to consider customer-supplier interactions from a relationships instead of a transactional perspective. More specifically, it is argued that customization tendencies have brought the relationship between seller and buyer to the forefront of differentiation in business markets (e.g., Ford et al., 1998). Within networks of customers and suppliers, parties jointly create customer value through relationships, alliances and partnerships (Ulaga, 2001). This view is echoed in recent approaches on market orientation as well. For example, Helfert et al. (2002) posit that part of the firm's internal value creation activity is outsourced to other supply chain partners. All this implies that market orientation extends beyond the organizational borders to include collaboration with other supply chain partners as an important element. The importance of supplier-customer relationships in the view of customer value creation has been highlighted in research on customer intimacy and CRM as well (Tuominen et al., 2004). Collaboration strategies with customers and bonding with other supply chain partners are traditionally thought especially suited for business-to-business markets (e.g., Day, 2000).

The value of inter-organizational relationships has been emphasized in the context of SI as well. For example, Baden-Fuller (1995) asserts that SI, causing rule breaking in the industry and changing sector boundaries, requires the organizational corporate entrepreneurship to extend beyond the firm into its suppliers, customers and the entire supply chain.

The establishment of long-term relationships with a few customers is argued to lead to a higher value than does a transactional approach to deal with customers, because of the indirect effects such relationships produce (Walter et al., 2001). Close network relationships may in this respect foster organizations to innovate since they help them in detecting complementary capabilities needed for the innovation (Cohen & Levinthal, 1990). As such, innovative projects can be launched jointly with customers or suppliers, and innovative activities may be integrated (Vandenbosch & Dawar, 2002). In this respect, Prahalad (2004) emphasizes the potential of value 'co-creation', where customers become actively involved in the innovation process itself. Simonson (2005) furthermore proposed that an offer that is produced with the active involvement of a customer, is perceived by this customer as better fitting his preferences.

Tuominen et al. (2004) state that especially in the context of business-to-business relationships, supplier-customer relationships reflect a continuum between market-based

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transactions and close, collaborative relationships. The authors argue that firms pursuing proactive business strategies (reflecting market-driving organizations) require high levels of customer intimacy, collaborative learning and partnerships with lead customers. Adler et al.'s (1999) study of the auto assembly joint venture NUMMI indicated that NUMMI's ambidexterity largely depended on its close relationships and joint innovation efforts with its suppliers.

Although largely overlooked in the literature, certain industries may however set rules or norms that govern the relationships behavior among parties. Low (1996) argues that especially dynamic industries (with high entry and exit levels) may not have developed expected levels of high commitment, favoring short-term, opportunistic exchange relationships over long-term partnerships.

Accordingly, we posit that supply chain innovation stimulus influences the effectiveness of the different deliberate strategic learning mechanisms on SScap.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 MIXED METHOD DESIGN: A GENERAL EXPLANATION

During the past decades, a large methodological debate has marked organizational research; this between the quantitative and the qualitative ‘camp’, largely associated with, and essentially rooted in, contrastive positivist and constructivist research paradigms (Morgan & Smircich, 1980; Tashakkori & Teddlie, 1998; Mir & Watson, 2000; Sandelowski, 2003). Qualitative research has generally been typified by a focus on induction, exploration, discovery, theory/hypothesis development, the researcher as the primary data collection ‘instrument’ and qualitative data analysis. In contrast, quantitative research is mostly marked by deduction, confirmation, explanation, prediction, theory/hypothesis testing, standardized data collection and statistical analysis (Johnson & Onwuegbuzie, 2004; Podsakoff & Dalton, 1987).

Despite these seeming contrasts, many management and marketing scholars have gradually come to recognize the actual compatibility of both methodological approaches (e.g., Jick, 1979; Van Maanen, 1979, Eisenhardt, 1989a; Razzaque, 1998). Scholars defending this viewpoint adhere to the application of so-called ‘mixed methodology’, or ‘mixed methods’, which contain and reconcile elements of both research traditions. Given its increased popularity, some scholars claim that mixed method research can now be viewed as a full and separate research design in the social sciences (Creswell et al., 2002, 2003; Onwuegbuzie & Teddlie, 2003; Johnson & Onwuegbuzie, 2004). Tashakkori & Teddlie (2003a) and Johnson & Onwuegbuzie (2004) even speak of ‘the third wave’ or ‘the third methodological movement’.

Mixed method studies are “those that combine the qualitative and quantitative approaches into the research methodology of a single study or multiphased study” (Tashakkori & Teddlie, 1998: 17-18). In Creswell et al. (2003: 212) a more detailed definition is provided: “A *mixed methods study* involves the collection or analysis of both quantitative and/or qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research” [italics in original].

Mixed method research, often interpreted as mixed ‘methodology’, falls within the ‘pragmatic paradigm’ (Tashakkori & Teddlie, 1998; Patton, 1990; Johnson & Onwuegbuzie, 2004). By and large, pragmatists reject traditional paradigmatic dualisms and believe that both objective (positivist) and subjective (constructivist) points of view co-exist⁸. They contend that methods derived from opposing paradigms may be combined if this combination ameliorates the credibility of findings (Petter & Gallivan, 2004). Underlying is the premise of ‘the dictatorship of the research question’ (Tashakkori &

⁸ For an extensive discussion of the ontological and epistemological assumptions of pragmatism, as opposed to those of (post)positivism and constructivism, see Johnson & Onwuegbuzie (2004) and Tashakkori & Teddlie (1998).

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Teddle, 1998); it is the research question that should drive the choice of research method and not vice versa (Rajagopalan & Spreitzer, 1996). Considerations of method and research paradigm underlying the method, are hence regarded as inferior; “The best method is the one that answers the research question(s) most efficiently, and with foremost inference quality (trustworthiness, internal validity)” (Tashakkori & Teddlie, 1998: 167). Accordingly, the superiority of either quantitative, qualitative or mixed method research is situational and depends on the specific circumstances of the research (Johnson & Onwuegbuzie, 2004). In a sense, pragmatism is thus anti-philosophy, preferring action and praxis over paradigm (Johnson & Onwuegbuzie, 2004)⁹.

Although Tashakkori & Teddlie (1998: 5) assume that “paradigm wars are over”, one can observe that qualitative and quantitative approaches still remain bifurcated (Currall & Towler, 2003: 514) and incommensurate (Morgan, 1998a). Moreover, research areas and their journals are still marked by their preference of, and inclination towards, specific methods and methodologies (Jick, 1979; Scandura & Williams, 2000; Currall & Towler, 2003).

For example, Scandura & Williams (2000) reviewed research strategies employed in three leading management journals during the 80s and 90s and criticized (in particular strategic) management researchers for their increasing predisposition toward qualitative field studies, the most popular research strategy employed. In his review of work on SI, Pitt (1998) reached the same conclusion. As field studies try to maximize realism because of their stress on contextual factors, relevance is preferred over research rigor (the latter entailing internal and construct validity and generalizability) (Scandura & Williams, 2000). Rajagopalan & Spreitzer (1996) argue that qualitative research (and especially single-case study research) may bear with it problems of overspecialization, which may result in underspecified theoretical frames, relying on poorly defined and measured variables and nongeneralizable context-specific –and even contradictory– research results. Hence, Scandura & Williams (2000) warn that, without enough attention being given to issues of rigor, relevance in management research can not be claimed.

In contrast to Scandura & Williams’ (2000) findings, others have noted the prevalence of a quantitative (post)positive stance in management research (e.g., Podsakoff & Dalton, 1987; Kiessling & Harvey, 2005; Nodoushani, 2000; Currall & Towler, 2003). These authors argue that even though qualitative methods are gradually becoming more appreciated, most management researchers still adopt quantitative approaches, with questionnaires as the primary source of data collection. An exclusive reliance on such a quantitative approach is however not flawless either.

⁹ Actually, mixed-method advocates divide themselves among two positions: the pragmatist and dialectical position. Pragmatists argue that researchers should simply choose whatever method is most appropriate given the research question. According to the dialectical camp, paradigms should be mixed *deliberately*, in order to reach synergistic benefits of different paradigms. So, whereas pragmatists argue that different research paradigms are compatible; dialectics take up a more extreme position, asserting that different paradigms are moreover complementary (Rocco et al., 2003). The vast majority of mixed method writers (and the most influential ones) adhere to the pragmatist position.

According to Currall & Towler (2003), the dominant quantitative orientation has resulted in poor theory development and trivial theory testing. Creswell et al. (2002: 17) follow suit, noting that: “This approach [the positivist stance in management research] results in precise measures while sacrificing serendipitous discovery, and often contributes predictably low explanatory power in which even well-conceptualized, well-executed research generally explains little more than 10-20% of variance in the data”.

In similar vein, Sawyer & Peter (1983) leveled their criticism against the predominance of the positivist tradition in marketing research (see also, Razzaque, 1998), and conclude: “we find it frightening to consider how much of the conventional wisdom in marketing is based on little evidence other than statistical significance” (: 125). A similar stance was taken by Laurent (2000), who fiercely criticized the lack of validity present in most marketing models. He condemns marketing researchers for formulating their models, variables and relationships mainly in view of statistical elegance instead of aiming at a representation of ‘reality’.

Moreover, the use of quantitative methods offers no saturated solution to the previously mentioned ‘rigor’ problem either. Even though statistical testing procedures can be considered as mathematical and precise, Sawyer & Peter (1983) contend that there is a general misconception that statistical significance testing (within the positivist paradigm) would be completely objective. They posit: “because researchers make many subjective decisions that greatly influence the probability of rejecting the null hypothesis, it is misleading to consider the process of statistical significance testing as objective solely because of the objectivity of the mathematics” (: 124). The subjective decisions, or even manipulations, of the researcher they refer to include: increasing the sample size, increasing the reliability of the measures, changing post hoc the acceptable level of significance (e.g., from 0.01 to 0.05), and changing a two-tailed test to a one-tailed test.

In conclusion, *qualitative methods* outperform quantitative data collection methods foremost in terms of realism: contextual information enriches researchers’ interpretive frameworks and may lead to theories that are understandable, experientially credible and managerially relevant (Maxwell, 1998; Matthyssens & Vandembemt, 2003). Qualitative data are also useful to reveal additional information not anticipated by the researcher. The continuous juxtaposition of different and conflicting real data may indeed ‘unfreeze’ researchers’ thinking (Eisenhardt, 1989b).

Yet, methods for qualitative research are formulated verbally and are less formalized (Verschuren, 2003). Despite techniques for recording field notes, it is almost impossible for other researchers to trace in detail how interpretations from field notes were made. Qualitative methods are moreover more tied up with the personality and the interpretation of the researcher. Furthermore, the fact that statistical inference techniques can not be used, is a major drawback. This means that the mere presence or absence of a phenomenon can be identified, but not the degree to which the phenomenon is present. Hypotheses can not be tested in a formal way. Qualitative methods thus help to develop and refine theories, but do not test them (Currall & Towler, 2003; Onwuegbuzie & Teddlie, 2003). By far, the most commonly cited deficiency is their lack of external validity (Verschuren, 2003; Calder, 1977). Field studies score hence high on practicality and access to participants, but low on factors such as the precision of measurement and control of behavioral variables and on generalizability to the entire population (Scandura & Williams, 2000; Currall & Towler, 2003; Maxwell, 1998).

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Quantitative methods, for their part, excel in their reliance on standardized measures, which enable the use of inferential statistics. The probability, strength and direction of relationships can be tested and compared across studies. However, quantitative methods have weaknesses as well. Especially sample surveys have been said to lack empirical realism (Podsakoff & Dalton, 1987; Scandura & Williams, 2000). Quantitative methods may hence test slivers of theory without having a direct and deep understanding of the phenomenon under study (Currall & Towler, 2003). In addition, the strong focus on predefined hypotheses and constructs may make researchers miss out important phenomena, the so-called ‘confirmation bias’ (Greenwald et al., 1986; Johnson & Onwuegbuzie, 2004). As noted above, statistical methods are not entirely objective either, and may become so ritualized that studies are too much ‘sanitized’ at the detriment of content validity (Van Maanen, 1979, cfr. infra: our discussion on the use of formative indicators). Furthermore, quantitative researchers may become more preoccupied with results than with interpretations (Onwuegbuzie & Teddlie, 2003). In sum, quantitative methods, and particularly surveys, score high on population generalizability and statistical conclusion validity but low on realism of context (Currall & Towler, 2003; Scandura & Williams, 2000)¹⁰.

An entirely unflawed study does apparently not exist. Even the influential quantitative methodologists Cook & Campbell (1979) referred to ‘mono-method bias’ as an important threat to construct validity, since it may lead to an equation of the conceptual construct definition with the operational definition in the one method applied. Champions of the qualitative stance alike have promoted the use of additional methods (e.g., Patton, 1990). Strauss & Corbin (1998) even explicated the value of quantitative methods in grounded theory.

Basically, the choice of a research method will limit the conclusions that can be drawn from it (McGrath, 1982). This is because research design choices imply trade-offs between:

- 1) external validity (generalizability to the population),
- 2) internal and construct validity (precision in measurement and control of behavioral variables), and
- 3) realism of context (see e.g., Currall & Towler, 2003).

Hence, McGrath (1982) posits that it is essential to triangulate, not only for measurement (e.g., multitrait-multimethod, Campbell & Fiske, 1959) or data collection purposes (e.g., combining interviews and observations to discover different perspectives on the same phenomenon, Patton, 1990), but also on the level of the research strategy itself.

In light of this, Scandura & Williams (2000) make a claim for more triangulation on research strategies in the management field. “qualitative fieldwork and quantitative surveys can be employed within the same research domain [...]. Triangulation can therefore improve internal and external validity as the combination of separate research strategies in one study helps to counter the trade-offs inherent in others” (: 1252). Ideally, different methods applied should thus show complementary strengths (Morgan, 1998a) and nonoverlapping weaknesses (Johnson & Turner, 2003).

¹⁰ For a good overview of relative weaknesses and strengths of quantitative and qualitative research methods, see e.g. Johnson & Onwuegbuzie (2004), Johnson & Turner (2003), Currall & Towler (2003).

Mixed method research could hence be placed under the heading of advanced triangulation. We use the term ‘advanced’ since triangulation in the mixed-method sense transcends the goal of mere convergence of results (Sandelowski, 2003) and may, for example, also add to the enrichment and broadening of results (Tashakkori & Teddlie, 1998). Already in his 1979-article, Jick contended that the value of cross-method validation may well go beyond reliability and convergent validation in that it may also enrich findings by revealing new and other insights. The mixing of qualitative and quantitative methods may make the depiction of a phenomenon more comprehensive, accurate, detailed and complete (Johnson & Turner, 2003; Morse, 2003), and may as such improve the ‘knowledge yield’ of research (Morse, 2003; Currall & Towler, 2003).

The choice of a mixed method design may hence be grounded in considerations of *legitimation* (i.e., convergence) or *complementarity* (i.e., enriched comprehension) (Morgan, 1998a; Onwuegbuzie & Teddlie, 2003; Morse, 2003). A rationale of pure legitimation has however motivated the use of mixed methods only rarely (Petter & Gallivan, 2004). Legitimation implies that methods can not build upon each other, and each on their own should satisfy all types of validity (Scandura & Williams, 2000; Cook & Campbell, 1979). Most researchers find that the amount of effort required to perform both qualitative and quantitative studies simultaneously and independently is not compensated for by the fairly meagre results of producing ‘only’ convergent findings (Morgan, 1998a). Hence, it is the rationale of complementarity that has become the major source of justification for mixed method research (Morgan, 1998a). Here, qualitative and quantitative approaches are combined to examine overlapping phenomena or different aspects of the same phenomenon (Petter & Gallivan, 2004). The strength of one method is deployed to enhance the performance of the other one. This is also why the term ‘mixed methods’ has survived terms such as ‘multimethod’ or ‘combined methods’. The term ‘mixed’ best conveys the meaning of really *integrating* different types of data in specific stages of the research process, so that both approaches strengthen each other (Creswell et al., 2002). To put it in the metaphoric words of Pearce (1868): “Reasoning should not form a chain which is no stronger than its weakest link, but a cable whose fibers may be ever so slender, provided they are sufficiently numerous and intimately connected” (in Johnson & Onwuegbuzie, 2004: 18).

Even though more than forty types of mixed method designs were identified in the literature (Tashakkori & Teddlie, 2003a), we shortly distinguish between three main types of mixed method designs (Tashakkori & Teddlie, 1998):

- ‘Equivalent status designs’: qualitative and quantitative approaches are equally applied to understand a phenomenon
- ‘Dominant – Less dominant designs’: either the qualitative, either the quantitative approach primes. The other approach serves only as small ‘add-on’ to the overall study (e.g. a short post-experimental interview)
- ‘Multilevel designs’: data on multiple levels are collected and analyzed using different approaches (e.g., a survey of students combined with interviews from principals)

In all types, the quantitative and qualitative approaches may be used sequentially, or simultaneously.

3.2 A RATIONALE FOR THE APPLICATION OF A MIXED METHOD DESIGN IN OUR STUDY

Given the complexity of social phenomena, mixed method research is thought especially appropriate in social science (Creswell et al., 2003), management (Currall & Towler, 2003) and especially strategic management research (Creswell et al., 2002). Although the mixing of qualitative and quantitative approaches in organizational research has been touted for over 25 years (e.g., Jick, 1979), these calls have largely remained unanswered (Petter & Gallivan, 2004). A study of recent management articles shows that management researchers are still reticent to adopt a mixed methods research design (Currall & Towler, 2003). This restraint may be due to three fundamental issues.

First, there is the technical difficulty involved in mixing methods, and the required methodological knowledge of different approaches (Creswell et al., 2003; Tashakkori & Teddlie, 2003a; Morgan, 1998a). The majority of methodological courses for beginning researchers are designed to train them in either of both approaches (Rocco et al., 2003; Tashakkori & Teddlie, 2003b). And, not surprisingly, young researchers will apply the methods they are trained in to their own research (Podsakoff & Dalton, 1987). Consequently, many researchers still profile themselves as either qualitative or quantitative advocates. Their specific preference also flows from journal and internal academic evaluative criteria (Tashakkori & Teddlie, 2003a; Petter & Gallivan, 2004).

Second, social scientists have sparked the debate whether methods that are seated in different paradigms, with different assumptions about reality, the nature of knowledge (e.g., objective versus subjective) and the appropriate means to generate it (e.g., deductive versus inductive), can actually be combined. This comes down to the dispute between ‘purists’ and ‘pragmatists’ (e.g., Johnson & Onwuegbuzie, 2004), which is basically more about the mixing of paradigms than the mixing of methods. Morgan & Smircich (1980: 498) for example note that “any given technique often lends itself to a variety of uses according to the orientation of the researcher”, and that consequently “the dichotomization between qualitative and quantitative methods is a rough and oversimplified one” (: 499). Indeed, Howe’s (1988) ‘compatibility thesis’ states that qualitative and quantitative methods may actually be reconcilable even though the underlying paradigms from which these methods originally derive are not¹¹.

Third, multiple methods research is often more demanding in terms of the amount of time, money and other scarce research resources required (Creswell et al., 2003; Podsakoff & Dalton, 1987).

Despite these difficulties and debates, Creswell et al. (2002) maintain that the adoption of mixed method design opens fruitful avenues for both content- and process-based strategic management research (see also Fredrickson, 1983). In their view, “mixed method designs provide logical options for creative approaches in all areas of management research by combining the best that each has to offer in terms of depth and breadth, and in terms of precision and discovery” (: 19). As Eisenhardt (1989b: 547) put it: “Perhaps “grand”

¹¹ For an extensive discussion on this paradigm debate, see: Johnson & Onwuegbuzie (2004), Petter & Gallivan (2004), Tashakkori & Teddlie (1998, 2003a), Morgan (1998a), Morse (2003), Sandelowski (2003), Morgan & Smircich (1980).

theory requires multiple studies – an accumulation of both theory-building and theory-testing empirical studies”.

King & Tucci (2002) moreover call for the application of multiple empirical methods in the study of organizational phenomena such as dynamic capabilities. The problem strategic management researchers are confronted with is to make a pay-off between large samples with less rich measures, and smaller samples of richer variables. These authors however argue that on the one hand, studies that analyze the full population of firms cannot reveal the rich internal processes within a small group of firms. On the other, case studies on firm-specific difficulties can neither uncover central tendencies across the full population, nor can they determine the economic importance of the issues observed. They accordingly conclude that: “Both types of studies are needed” (: 184).

We also follow Curral & Towler’s (2003) claim that a mixed method design is especially suitable when research questions tackle innovation issues. Furthermore, they argue that mixing qualitative and quantitative methods can also prove useful to refine and test a nascent theory or theoretical model, which is indeed of major importance in our study.

In addition, mixed method research, generating broader and deeper insights than monomethod research, has also the potential to be more useful to policy makers in business (Rocco et al., 2003; Podsakoff & Dalton, 1987). The adoption of mixed method designs may hence improve both the scientific value and managerial relevance of management research.

Furthermore, from the marketing research area, Compeau (2003) writes that “marketing researchers have achieved some consensus that knowledge can be valuable regardless of the paradigm from which it is materialized or the paradigm to which it is applied”. Razzaque (1998) even makes a plea for a synthesis between the positivist and constructivist school in marketing research. In this sense, paradigm inconsistency is an invalid rationale to justify the non-adoption of mixed methods.

These arguments considered there is everything in favor of using a mixed method design in our research. Now, it only remains us to specify the exact type of mixed method design we decided to use.

Tashakkori & Teddlie (1998; 2003a) argue that particularly the sequential qualitative-quantitative (‘QUAL → QUAN’) design is appropriate when the researcher studies a relatively unexplored area. The design’s main focus is indeed to ‘explore a phenomenon’ (Morgan, 1998a). This type of mixed method design has hence been referred to as a ‘sequential exploratory’ design (Creswell et al., 2003). In fact, this design is used to firstly develop or refine a theory or model and then to test this (Morse, 2003).

The QUAL→QUAN design is a common type of sequencing (Morgan, 1998a) because in most quantitative survey research, close-ended instruments can only be developed after exploratory qualitative interviews or narrative data have been content analyzed. This is especially the case when new research instruments are to be developed (Creswell et al., 2003).

In addition, this design may also help to explore a phenomenon and specify the elements of an emergent theoretical model (Creswell et al., 2003). Qualitative research is particularly useful in theory building (Bacharach, 1989; Charmaz, 2000); in generating hypotheses and speculations (Curral & Towler, 2003). In the qualitative phase, attributes or themes can be formed, and theoretical relationships between them specified, by means of for example

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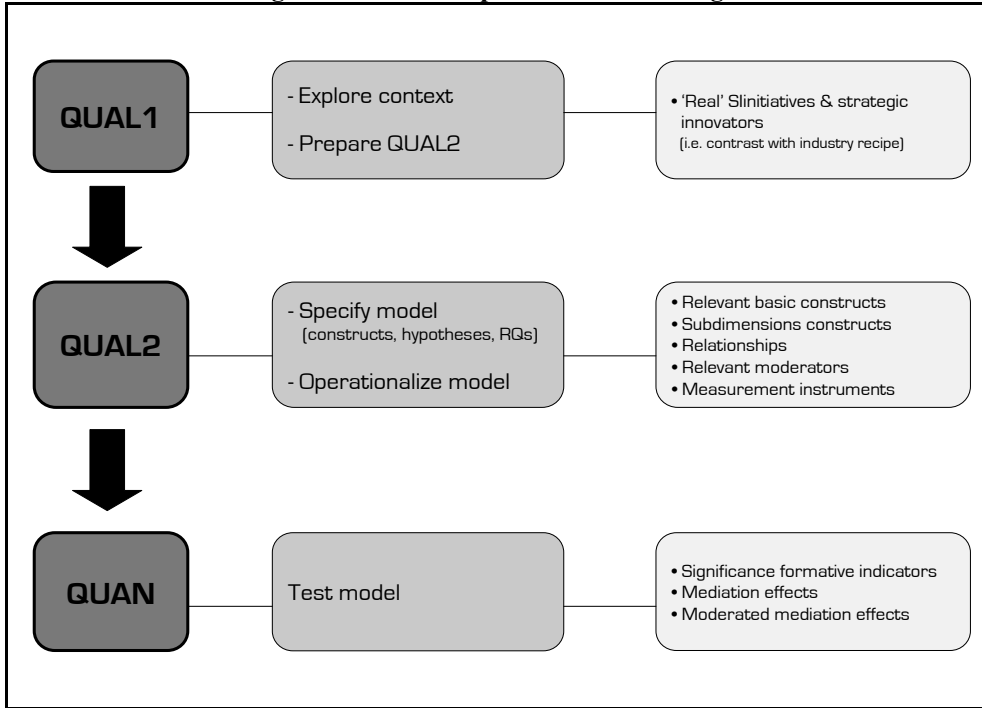
content analysis (Tashakkori & Teddlie, 1998; Creswell et al., 2003). These results are in turn used to design a subsequent quantitative phase. These calls have also been voiced in marketing research, where, for example, Laurent (2000) has made a call for using qualitative methods as an input to formal model development and testing in order to increase the validity of models. As he put it: “The hypothesis should come from a thorough study based on information derived from the real system and the involved actors, and not from a lonely decision by the model builder” (: 181).

The subsequent quantitative phase finally serves to generalize the qualitative findings (Scandura & Williams, 2000) to a larger sample, and to confirm the ideas induced by qualitative methods using more sophisticated measurement instruments and statistical testing of isolated causal relationships (Currall & Towler, 2003). Quantitative research, thus limiting threats to external, construct and internal validity, may lead qualitative research findings to more sophisticated and full-blown theory development (West, 1997). Given the nascent status of conceptual and empirical research on SI and ACAP, and the non-existence of any research tackling their interrelationship, the sequential ‘QUAL→QUAN’ type seemed hence appropriate.

Our design incorporates Morse’s (2003: 199) claim that “When used sequentially, the method that theoretically drives the project is usually conducted first [QUAL], with the second method [QUAN] designed to resolve problems/issues uncovered by the first study [internal, construct and external validity] or to provide a logical extension from the findings of the first study”. Our preference of a QUAL → QUAN design moreover reflects our view that social science research is a process that moves from the ‘emic’ to the ‘etic’, and back (Stewart & Shamdasani, 1998).

Figure 3.1 gives a simplified, general overview of our *empirical* research design and relates each major empirical phase to its specific research purpose(s). The qualitative phase was split into two subsequent parts: QUAL1 and QUAL2. A more detailed explanation of the research design will be provided in the next section (section 3.3). Here, we will confine ourselves to a general discussion.

Figure 3.1: Main empirical research design



In short, the qualitative phase was incorporated because of the specific qualities qualitative research is claimed to have (Maxwell, 1998, cfr, supra). First, the qualitative findings of QUAL1 helped us to ‘understand meaning’ (Maxwell, 1998), i.e. how different managers make sense of their environment and industry in order to reveal the industry recipe (e.g., Spender, 1989). This industry recipe helped us to understand the particular (mental) context in the industries studied. It furthermore helped us to identify real SI initiatives and business units (or single-unit firms) with a high level of SIcap (what we call ‘strategic innovators’) by explicitly contrasting them with the industry recipe. In addition, knowledge of the industry recipe helped us to better frame the data of QUAL2.

In QUAL2, these SI initiatives and strategic innovators were further scrutinized. First, QUAL2 enabled us to check the relevance of the basic constructs. Furthermore, we identified and refined relevant (sub)constructs. QUAL2 finally helped us to understand the specific processes (relationships among the constructs) that lead to the creation of SIcap (Maxwell, 1998), within the context of specific industries and strategic innovators. Results were mirrored against the conceptual insights of chapters 1 and 2, in order to formulate hypotheses (internal validity) and additional research questions. In this way, the qualitative findings enabled model development, i.e. internal and construct validity. Furthermore, the results of QUAL2 led us to refine and operationalize relevant constructs (measure development, construct validity). Overall, QUAL2 in fact served to specify an emergent theoretical model founded on the conceptual insights of chapter 2.

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This model was in turn statistically tested in the quantitative phase (internal validity). Furthermore, the quantitative analyses were performed on a sample of all Dutch industrial companies (external validity). Samples were hence distinct, with the qualitative phase using small, purposeful samples (Patton, 1990), and the quantitative phase using a larger randomly selected sample.

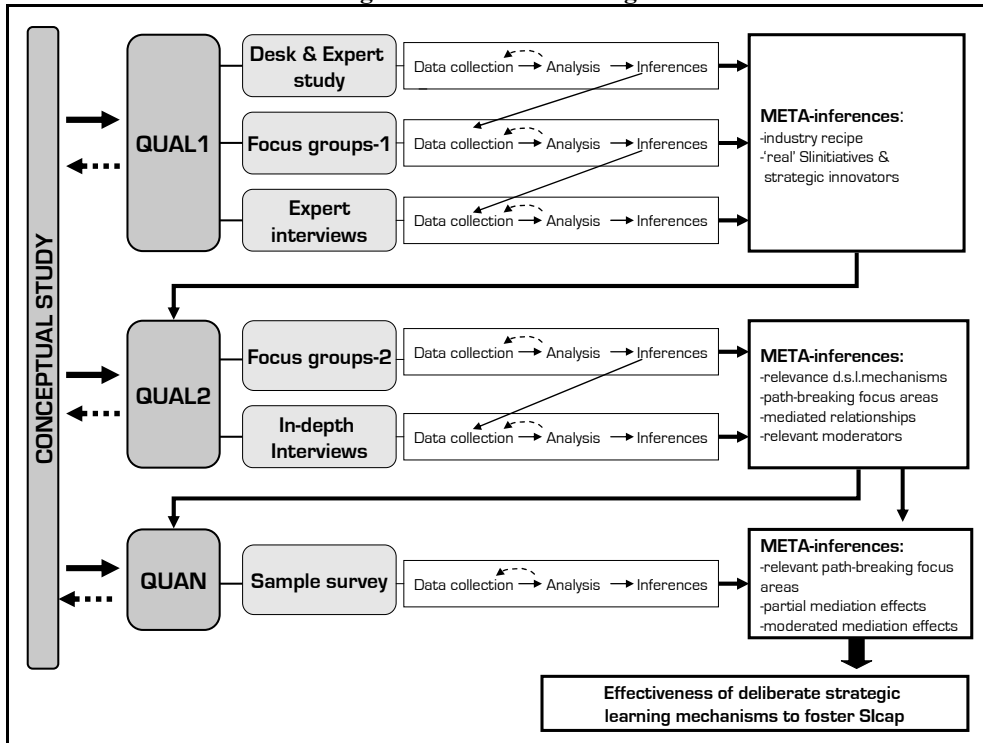
Figure 3.1 shows that the qualitative phase served broader goals than the mere development of measurement instruments (Petter & Gallivan, 2004); it did have important theoretical value as well. As noted, the sequential character of the mixed research design served to first develop and specify the theoretical model before testing it (Onwuegbuzie & Teddlie, 2003). We incorporated the qualitative phase for we judged the theoretical insights as too premature to be immediately subject to theory testing. The qualitative and quantitative phases were hence given equal importance in the overall study (Creswell et al., 2003). We therefore applied a ‘sequential equal status design’ (Johnson & Onwuegbuzie, 2004). A QUAL→QUAN mixed method design attaching equal status to the qualitative and quantitative phases has an inductive thrust (Morse, 2003). Even though the empirical research was guided by theoretical ideas (see section 3.3), the *main* research purpose was still of an exploratory nature and the *overall* theoretical thrust of the entire study was inductive.

3.3 A FURTHER EXPLANATION OF THE RESEARCH DESIGN

Figure 3.2 shows all the research methods we employed. It depicts the research logic we followed to provide answers to our research questions in the separate phases, and throughout the entire research project.

Figure 3.2 makes a crucial extension to Figure 3.1 by incorporating the box ‘conceptual study’. As such, Figure 3.2 alludes to the role theory played in the research design. The role of theory in a research design clarifies whether a study is deductive or inductive: “either the theory is planted and the data are adapted to fit the theory (deductive research), or the data are planted and the theory is adapted to fit the data (inductive research)” (Orton, 1997: 422). Yet, in research practice the distinction between induction and deduction is far less clear-cut than may seem at first sight. Or, as Orton (1997: 422) put it: “Most researchers readily admit that research is a function of both inductive and deductive analyses, but they know they must present their research in either an inductive or a deductive rethoric”.

Figure 3.2: Research design



Our research design, starting with a QUAL-part, takes us to theories of qualitative approaches. A well-known and often used one is grounded theory, which has traditionally been positioned as an extreme inductive approach (Huberman & Miles, 1994). Data analysis leads to new theory development with no prior hypotheses or theory considered at all (see e.g., Charmaz, 2002). However, Strauss, one of the founding fathers of grounded theory, softened this position by later arguing that starting with a theoretically clean slate is practically impossible (Perry, 1998). In this vein, Strauss himself, in a later contribution with Corbin (1998: 166-167), writes: “Glaser & Strauss overplayed the inductive aspect. Correspondingly, they greatly underplayed both the potential role of extant (grounded) theories and the unquestionable fact (and advantage) that trained researchers are theoretically sensitized”. Greenwald et al. (1986) furthermore posit that even though theory may obstruct progress in research (due to for example confirmation bias), at the same time it is necessary to the progress –and process– of research. In their view, the blinding effects of theory come especially to bear in the use of confirmation, so when a theory is only tested. “Theory obstructs research progress when testing theory is taken as the central goal of research, if (as often happens) the researcher has more faith in the correctness of the theory than in the suitability of the procedures that were used to test it. In other words, theory obstructs research progress when the researcher is an ego-involved advocate of the theory and may be willing to persevere indefinitely in the face of prediction-confirming results” (Greenwald et al., 1986: 227). When theory is however less sacred, and only serves as a rough guide to the researcher, dangers are less prominent.

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Hence, “Pure induction might prevent the researcher from benefiting from existing theory, just as pure deduction might prevent the development of new and useful theory” (Perry, 1998: 789). Eisenhardt (1989b, 1991) has followed suit and made out a case for the use of a priori specified –though tentative– constructs in theory *building* research.

In similar vein, Miles & Huberman (1994), made a claim for ‘prestructured research’ in research areas where some theoretical knowledge has been achieved, but more theory development and refinement is required before actual theory testing can be performed. In this case, tighter designs bring clarity and focus and are more time efficient. This ‘theory-driven’ or ‘concept-driven’ posture in qualitative research (Wolcott, 1992 in Morse, 1994) seemed to fit the specifics of our research. Furthermore, Miles & Huberman (1994) argue that tight, prestructured research is less case-sensitive, which we judge especially convenient since the qualitative research was followed by a quantitative phase. In conclusion, a mix of induction and deduction seemed most appropriate in our research.

Orton (1997) demystified this ‘no-researcher’s land’ between deductive and inductive research, which has become very popular with strategy process researchers. In the qualitative phase, we hence applied Orton’s (1997) iterative research process, in which empirical data collection and analysis and theoretical insights mutually influence, inform and drive each other. This method bears strong resemblance to what was called the ‘extended case method’ by Burawoy (1991). Even though our analysis did not consist of exactly case study research, the underlying idea is the same: “the goal of the extended case method is to integrate and extend existing theory. The researcher examines the literature relevant to his/her problem area, and employs the empirical data to fill in its gaps, reveal its flaws, elaborate its meaning, and extend its coverage” (Danneels, 2002: 1101). In order to identify, refine and operationalize relevant constructs and to develop hypotheses, the ultimate purposes of the qualitative phase (see the meta-inferences of QUAL2 in Figure 3.2), we hence applied such an ‘interactive design’ (Maxwell, 1998) and iterated forth and back between two ‘running exchanges’ (Burawoy, 1991): this between data collection and analysis (e.g., Eisenhardt, 1989b; Maxwell, 1998) and this between theory and empirics (Orton, 1997). These iterations are marked by the full (forward) and dashed (backward) arrows in Figure 3.2. So, although the qualitative research was in itself led by the theory discussed in chapter 1 and 2 (deduction), the inductive theory building was at least as important overall (Perry, 1998).

Following Orton’s (1997) methodology implies we take up the –popular– methodological middle-position between inductive and deductive research, and we continually cycled between theory and data (Eisenhardt, 1989b).

Figure 3.2 furthermore shows that, although the study proceeds with separate qualitative and quantitative data collection and analysis stages, real integration of both methods was attained during the interpretation phase of the final findings (Creswell et al., 2003). This means that the previous qualitative findings were further used to illuminate the quantitative results (internal validity), providing important contextual aspects (Morse, 2003). This is indicated by the vertical arrow in Figure 3.2, linking the meta-inferences from QUAL2 to the meta-inferences from QUAN.

Finally, in Figure 3.2 it can be seen that both for QUAL1 and QUAL2 ‘within-method triangulation’ (Jick, 1979) or a ‘multimethod design’ (Tashakkori & Teddlie, 2003a) was

applied; this means that both these phases consisted each of multiple qualitative data collection strategies. QUAL1 consisted of a desk & expert study, focus groups and interviews; QUAL2 built on focus groups and in-depth interviews. Especially, the work by Patton (1990) has promoted the value of triangulation in qualitative studies, i.e. the use of different qualitative techniques in one study. Since a correlation coefficient cannot be calculated for qualitative observations, triangulation of multiple data sources is a viable alternative to evaluate the validity of observations by corroborating data from multiple sources (Tashakkori & Teddlie, 1998: 82). We hence applied within method triangulation with the view of cross-checking internal consistency and reliability of the data (Jick, 1979). Therefore, the term ‘meta-inferences’ (see Figure 3.2) is used for each main research phase; the separate inferences we made from the analysis of each individual data source became integrated in the meta-inferences. In addition, the use of the different QUAL methods enabled us to become better acquainted with the contextual specificities of the five industry contexts. Especially in theory-driven approaches, seeing how a construct works in the field took time (Huberman & Miles, 1994).

Following pleas that the different data collection methods used should show complementary strengths and nonoverlapping weaknesses (e.g., Currall & Towler, 2003; Tashakkori & Teddlie, 1998; Johnson & Turner, 2003), in Table 3.1 we provide an overview of the main strengths and weaknesses of the methods we applied. A more extensive explanation of the different research methods is provided over the next sections.

Table 3.1: Strengths and weaknesses of the different methods used

Data collection method	Strengths	Weaknesses
Desk research (official documents)	<ul style="list-style-type: none"> - Unobtrusive - May be collected for past time periods - Useful for corroboration - Useful for exploration 	<ul style="list-style-type: none"> - Possibly incomplete because of selective reporting/recording - Access to some type of contents possibly difficult - Interpretive validity possibly low
Focus groups	<ul style="list-style-type: none"> - Useful for exploring ideas - Good interpretive validity - In-depth information about exactly how people think about an issue - Information about how people inter-react - Allow probing - Most content may be tapped 	<ul style="list-style-type: none"> - Expensive - Reactor/investigator effects - Possibly dominated by one/two participants - Difficult to generalize when small unrepresentative samples - Moderator possibly biased - High dross rate* - Possibly low measurement validity - Preferably combined with other data collection methods - Data-analysis possibly time consuming
Interviews	<ul style="list-style-type: none"> - Useful for measuring attitudes and most other content of interest - Allow probing - In-depth information - Good interpretive validity - Moderate measurement validity - High response rates - Useful for both exploration and confirmation 	<ul style="list-style-type: none"> - Expensive - Time-consuming - Reactor and investigator effects - Low perceived anonymity by respondents - Time-consuming data analysis - Measures need further validation
Questionnaire	<ul style="list-style-type: none"> - Useful for measuring attitudes - Inexpensive - May be administered to probability sample - High perceived anonymity by respondents - Moderately high measurement validity - Low dross rate* - Ease of data analysis 	<ul style="list-style-type: none"> - Need validation - Must be kept short - Possibly missing data - Possibly reactive effects - Nonresponse to selective items - Low response rate
<p>* The dross rate is the amount of irrelevant material in relation to the data collected</p> <p>The table is largely based on Johnson & Turner's (2003), Johnson & Onwuegbuzie's (2004) and Currall & Towler's (2003) discussion</p>		

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The empirical study was performed within an externally funded three-year research project (2002-2005). The project was coordinated by the Dutch Foundation of Technique, Marketing (STEM) and co-financed by the Dutch Ministry of Economic Affairs, several Dutch industrial companies and Cap Gemini Ernst & Young. Over its entire course, the project was supervised by a steering committee consisting of captains of the Dutch industry (most of them marketing managers) and a representative of the Ministry of Economic Affairs. Every four months progress presentations were held, where process issues and preliminary findings were presented. In addition, many progress reports had to be prepared. The steering committee acted as critical expert panel. Each industry selected had at least one industrial ‘marketer’ in the steering committee, who was also used as an informant/expert (mainly during the start-up phases).

Table 3.2 shows a chronological overview of the specific methods we applied in each research phase. Over the next sections, these methods will be tackled in detail.

Table 3.2: Research questions and methods

Research phase	Research questions	Methods	Method specifics
QUAL1	<ol style="list-style-type: none"> 1. <i>What are the specific industry recipes in each of the industries selected</i> 2. <i>Given these industry recipes, what are interesting and 'real' Slinitiatives in these industries?</i> 3. <i>Given these 'real' Slinitiatives, what are 'real' strategic innovators in these industries?</i> 	Desk & Expert study	- Study of numerous industry & company reports, conferences - 12 interviews, 1 brainstorm session with industry 'visionaries'
		Focus groups-1	5 industry-bound focus groups with each 4 to 10 industry players (across supply chain)
		Expert interviews	28 semi-structured interviews with industry players
QUAL2	<ol style="list-style-type: none"> 1. <i>Do deliberate strategic learning mechanisms for recognition, assimilation and transformation foster a BU's Slicap?</i> 2. <i>What are relevant path-breaking focus areas these mechanisms target?</i> 3. <i>How do deliberate strategic learning mechanisms for recognition, assimilation and transformation foster a BU's Slicap?</i> 4. <i>Which internal and external characteristics may exert a critical influence on the effectiveness of deliberate strategic learning mechanisms?</i> 	Focus groups-2	5 industry-bound focus groups with each 4 to 9 industry players and strategic innovators (across supply chain)
		In-depth interviews	18 interviews with strategic innovators and their customers
QUAN	<ol style="list-style-type: none"> 1. <i>Which of the path-breaking focus areas that deliberate strategic learning mechanisms target are critical?</i> 2. <i>What (partial) mediation effects can be detected among deliberate strategic learning mechanisms for recognition, assimilation and transformation and a BU's Slicap?</i> 3. <i>What moderating effects of organizational and supply chain characteristics can be detected on the relationship between deliberate strategic learning mechanisms and a BU's Slicap?</i> 	Sample survey	Survey of proportionate, random sample of Dutch industrial companies (respondents: people in charge of marketing)

3.4 THE FIRST QUALITATIVE PHASE (QUAL1)

3.4.1 Research questions and level of analysis

In chapter 1 we explicated how managers tend to enact their –socially constructed– environments and explained the concept of ‘industry recipe’ (Spender, 1989; Huff, 1982). We then defined SI as a deviance from traditional industry conventions and assumptions, with the view of creating new and substantially superior customer value. All this implies that the study of SI builds essentially on insights of the industry recipe. As qualitative research takes the perspective of the participant, instead of that of the researcher, it is well suited to study participants’ cognitions, interpretations and beliefs (Maitlis, 2005). Matthysens & Vandenbempt (2003) have accordingly made a case for the use of interpretive methodologies to study business market strategy formation, particularly those affected by complex and dynamic contexts. In this respect, qualitative research was the appropriate method to uncover industry recipes.

In chapter 1 we made an argument to use the concept of *SIcap* as the dependent variable. Adopting *SIcap* as the dependent variable however implies the identification of *SIinitiatives* in the first place. Indeed, Kim & Mauborgne (1997) performed their study on value innovation on the initiative-level (“business *launches* of about 100 companies”, “business *initiatives* in the marketplace”: 104). In the same vein, Govindarajan & Trimble (2004, 2005) performed their empirical study on SI by examining strategic experiments and ventures, and Colarelli O’Connor & Rice (2001) studied breakthrough innovation *projects*. Lovas & Goshal (2000) support their focus on ‘strategic initiatives’ with the argument that strategic initiatives incorporate external (product-market) aspects, whereas routines, competences and resources tend to focus attention exclusively on the internal organizational functioning. These external aspects are especially of importance within the context of SI, as argued in chapter 1. Furthermore, our focus on ‘initiatives’ instead of on completed, successful, SIs was grounded in Leifer et al.’s (2001) findings on breakthrough innovation projects, that the radical innovation life cycle is long (often a decade or longer), unpredictable, sporadic (stops, starts, deaths, revivals), non-linear and stochastic (with unpredictable exogenous events). A study of *SIinitiatives* enabled us to study SI in ‘real-time’ and focused attention on the isolated effects of internal organizational, managerial mechanisms, making abstraction of punishing or favoring market factors determining the eventual SI success. In addition, we ourselves observed that over time, successful initiatives tend to become bogged down by the traditional industry recipe, and are hence easy to overlook and difficult to trace back with hindsight.

Hence, first, in order to define concrete initiatives as ‘real’ *SIinitiatives*, they should be contrasted with the industry recipe (see chapter 1). Then, business units (or single-unit firms) excelling at the creation of such *SIinitiatives*, are considered as business units with a high level of *SIcap*, the so-called ‘strategic innovators’.

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The main research questions we tried to answer through QUAL1 were hence:

RQ1: What are the specific industry recipes in each of the industries selected?
RQ2: Given these industry recipes, what are interesting and 'real' SInitiatives in these industries?
RQ3: Given these 'real' SInitiatives, what organizations are 'real' strategic innovators in these industries?

Given these research questions, the level of analysis of QUAL1 was obviously the industry.

3.4.2 Design

After two brainstorm sessions with the project's steering committee, five industry contexts were selected: energy, focused on electricity, functional foods (FF), traffic management systems (TMS), trucks & trailers (T&T) and graphics printing. For budgetary reasons, the industries chosen were restrained to the Dutch geographical territory. The selection of Dutch, industrial contexts constrained variations in terms of territorial and market type. In addition, the choice of five specific industries enabled us to control environmental variation across different industries (Eisenhardt, 1989b). The domain of findings was hence bound to industrial companies, operating in the Netherlands in one of these five industrial contexts.

Qualitative research is essentially based on theoretical or purposeful sampling instead of probabilistic sampling (Patton, 1990; Eisenhardt, 1989b, Yin, 1998). Since the industry selection primarily reflected the preferences of the project's steering committee, the selection of these industries was in fact based on 'convenience sampling' (Henry, 1998). The exact delineation of these five industries was based on literature and on incumbents' perception of the traditional industry boundaries, e.g. the parties included in the traditional supply chain (see chapter 4). We recognize that the classification of organizations in these industries is however partly arbitrary. For example, Porac & Thomas (1990: 226) note that: "both industry and market criteria can be ambiguous". Nightengale (1978), in turn, argues that industry classifications often lead to somewhat arbitrary groupings, and Robinson (1956: 361) stated "a precise and meaningful definition of an industry is a vein objective". Similar arguments have been offered against the economic market criterion (e.g., Day et al., 1979).

Given the structural and technical complexity of these industries and the high dynamism many of them were subject to, a three-phase data collection was opted for. As noted in the previous section, the combination of several qualitative methods was used in order to improve the validity of results (Tashakkori & Teddlie, 1998). Only findings that were corroborated by findings of other data sources were retained.

Rajagopalan & Spreitzer (1996) moreover plead for the combination of perceptual measures and objective data sources. Indeed, a combination of interviews and archival data, with the view of triangulation, is very common in theory building research (Eisenhardt, 1989b). First, to provide perceptual measures of managerial cognitions, actions and noneconomic outcomes (e.g. satisfaction, perceived success of change), Rajagopalan & Spreitzer (1996) argue that not only interviews can be used, but insights

from industry experts or academics who are knowledgeable about the industry can also prove useful. This is why we chose to conduct interviews with both industry players and industry experts. In addition, focus groups were run. Focus groups are especially suited to use for triangulation purposes or in conjunction with other data collection strategies (Fontana & Frey, 2000). Second, objective measures of organizational and environmental conditions were found by studying industry reports and archival data sources (e.g., annual reports).

Data were gathered up to theoretical saturation and in line with pragmatic considerations such as time, budget, availability of resources and willingness of individuals to participate (Yin, 1989; Eisenhardt, 1989b).

3.4.2.1 Desk & expert study

This phase was used to get a first impression of the industries under study. Its aim was to explore the industry context and to reveal a preliminary industry recipe. As indicated, later, these data were combined with other data for corroboration purposes (see, Johnson & Turner, 2003).

More specifically, we tried to study the industry profile and traditional chain structure (market share, market growth, concentration, players, segments and applications, technologies, end users,...), the industry dynamics (trends and their impact, commodization, liberalization, e-commerce,...), financials (value added per level), typical strategies used in the industry, their key strategic dimensions (efficiency, technological innovation,...) and specific growth strategies (vertical integration, alliances,...).

Although this phase is considered as one entity, it contained both objective and perceptual measures.

Regarding the objective data, we studied public industry reports published by large consulting firms, banks, Chambers of Commerce, specialist and trade journals, industry and trade confederations, Dutch and international (economic) newspapers and periodicals (e.g., Financial Times, NRC Handelsblad, FEMBusiness), Ministeries, and official governmental institutions (e.g., Centraal Bureau voor de Statistiek, EC). Likewise, annual reports of large players were studied. All this secondary material was obtained through the library, databases and the Internet. We also attended some specialist conferences (e.g., The 'Future of Manufacturing' conferences, organized by the EC). In addition, members of the steering committee (linked to one the industries chosen) and the CGE&Y-consultants provided us with non-public, in-depth industry reports.

As regards the perceptual measures, orientational interviews were held with different key informants to the industries under study (business consultants, industry captains, 'visionary' members, etc.). The number of interviews per industry depended on the level of complicatedness of the industry and on the willingness of individuals to participate. In total, 12 semi-structured were administrated, each lasting approximately 1 to 2 hours: 2 for graphics printing, 5 for TMS, 2 for energy, 1 for functional food and 2 for truck & trailer. For TMS, an additional group interview sessions with a total of 11 managers of a TMS-systems supplier and a TMS engineering/consulting firm was organized by a member of the steering committee. Despite the high complexity of the energy industry, we only found two persons willing to be interviewed. We felt that members of the energy industry, which was in the midst of deregularization and liberalization, were very reluctant to participate.

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Finally, we discussed the general process characteristics of preparing an industry report with a Mc Kinsey-consultant, experienced in the writing of industry studies.

3.4.2.2 Focus groups-1 (FG1)

The second phase of QUAL1 consisted of focus groups. Focus groups are considered as a viable way to conduct qualitative research (Fontana & Frey, 2000; Morgan & Krueger, 1998) and have accordingly been used in marketing, sociology and other social science research (Wooten & Reed, 2000). Focus groups have been advocated as a tool to study shared experiences of the group members (Fontana & Frey, 2000). Furthermore, focus groups may delve into group members' thinking, stimulating participants to articulate their – normally unarticulated – normative assumptions about certain issues (Bloor et al., 2001). “The group is a socially legitimated occasion for participants to engage in ‘retrospective introspection’, to attempt collectively to tease out previously taken for granted assumptions” (Bloor et al., 2001: 6). In this respect, focus groups were considered an appropriate data collection method to reveal industry recipes. Furthermore, since focus groups may be used to “clarify, extend, qualify or contest findings on the same topic produced by other methods” (Bloor et al., 2001: 90), their combined use with the desk & expert phase and the expert interviews seemed fruitful.

According to Morgan (1998b: 1) “focus groups are group interviews. A moderator guides the interview while a small group discusses the topics that the interviewer raises. What the participants in the group say during their discussions are the essential data in focus groups”. The major virtue of the technique lies in its explicit use of group interaction, which is said to produce data and insights that would be less accessible in individual, serial questioning (Morgan, 1997; Calder, 1977; Hydén & Bülow, 2003). Participants share their views through the moderator (Fontana & Frey, 2000), but any kind of consensus need not necessarily be reached (Patton, 1990). Two of the major benefits of focus groups are their time efficiency and the built-in quality control on data, since participants tend to provide checks and nuances on each other so that extreme or faulty views are questioned (Patton, 1990). Krueger (1988) hence stressed their high face validity.

Given these basic characteristics, it is indicated in the literature (see e.g. Morgan & Krueger, 1998) that researchers have many degrees of freedom in determining the actual format of the focus group (concerning e.g. interview structure, number of participants, number of groups, ...). Nevertheless, general rules of thumb have been formulated: a) a homogeneous group of strangers as participants, b) a relatively structured interview with high moderator involvement, c) 6 to 10 participants per group, d) 3 to 5 groups, and e) an interview length of 1,5 to 2 hours (see e.g., Bloor et al., 2001; Morgan, 1992, in 1997; Patton, 1990). These rules of thumb were generally followed.

Five focus groups were set up, one for each industry context. Each focus group had 4-10 participants, all representatives of both general players and niche players, representing at least three levels of the traditional supply chain (for instance: second-tier supplier, first-tier supplier and OEM). In addition, a service provider to the industry (e.g. engineering office, R&D lab) and an industry expert participated in the focus group discussion. Participants were invited by letter, which explained the research, and the format and discussion topics of the focus group.

As the industry recipe needed to be uncovered, we chose participants who were strangers to each other. “Conversations among strangers avoid the taken for granted assumptions that are common among friends” (Morgan, 1998b: 68). The venue of the focus groups was the office building of one of the major sponsors. Advantages were that this was situated in Utrecht, central to the Netherlands and the Randstad, which maximized accessibility from all over the country (Bloor et al., 2001), and that we had rooms at our disposal with video-recording equipment. Focus groups generally lasted 2 to 2,5 hours.

Table 3.3 shows an overview of the companies represented during the focus groups. Since members were promised anonymity, the exact names of companies and participants can not be provided. Between brackets, we indicated the job title of the focus group members. Especially in the focus group on functional food, we had trouble in finding participants. On top of that, two participants we invited did eventually not show up without prior notice. This explains the relatively low number of participants in the focus group on functional food, in comparison to the focus groups on other industries.

Table 3.3: Participants focus groups-1

Industry	Number of participants	Companies represented (function of representative)
TMS	6	1 systems developer (business manager traffic systems) 1 systems supplier (BU manager traffic systems) 1 installation company (vice-director infrastructure) 2 consulting/ engineering companies (director infrastructure+ director software & technology services) 1 consulting company (senior consultant telematics)
Energy	10	1 energy management consulting company (MD) 2 energy systems suppliers (director energy distribution+ director energy total solutions) 1 energy company (director business development) 1 engineering/ consulting firm (business group manager energy) 1 installation company (director energy systems & solutions) 1 engineering company (account manager energy) 1 energy research center (director durable energy) 1 corporate end customer (director energy facilities) 1 consulting company (senior consultant energy)
FF	4	1 ingredients supplier (sales manager) 1 food research company (manager processing, quality & safety) 1 food packaging company (sales manager) 1 food company (R&D program manager)
T&T	6	1 ITS systems supplier : 1 st tier (director telematics) 1 jobber : 2 nd tier (director) 1 raw material supplier : 3 ^d tier (manager product market development) 1 truck producer : OEM (marketing manager commercial vehicles) 1 trailer producer: OEM (manager transport & trailers) 1 consulting company (senior consultant automotive)
Graphics printing	7	1 printer (director) 1 advertising agency (managing director) 2 hard-, software & solutions suppliers (director strategic planning + sales mgr.) 1 hardware supplier (director printing) 1 national copy center (marketing director) 1 consulting company (senior consultant graphics printing)

The promotor and co-promotor of this research took up the role of moderators (one in two, the other in three focus groups) with myself observing and writing down specific points of interest (in terms of content and behavior). Being well-experienced in the guidance of focus groups, both moderators took consideration of the general characteristics of a good

interviewer: be empathic, objective, a good listener, etc. In addition, the moderators paid close attention as to avoiding a small coalition to dominate the discussion and to encourage recalcitrant respondents to participate, in order to gain a discussion from the entire group (Fontana & Frey, 2000). The moderator used slides prepared in advance and a flip-chart.

With the view of exploration of the industry contexts (Fontana & Frey, 2000) and given the participants' proficiency, a 'moderately structured' (Morgan & Krueger 1998, Morgan 1998b) interview was opted for. This means a 'funnel-based interview' where the discussion becomes more structured towards the end of the focus group. Such a format enabled to reveal participants' perspectives in a relatively unexplored research area while at the same time keeping focus and structure, necessary for staying as close as possible to our pre-established research agenda (Morgan 1998b). The format assures that background information, context and broader issues are broached before the discussion narrows down on very specific topics (Stewart & Shamdasani, 1998). A broad interview guide was used, since this kept the interactions focused while allowing individual perspectives to emerge (Patton, 1990). Table 3.4 shows the discussion guide used.

Table 3.4: Discussion guide focus groups-1

<p><i>Introduction</i></p> <p><i>Part 1: Traditional industry recipe</i></p> <ul style="list-style-type: none">• Show supply chain on slide- Discussion, refinement and correction of supply chain showed [parties & chain flow]- Discussion of traditional strategies and market approach of all parties- Discussion of roles, relationships and tensions between parties• Show inventory of important tendencies in the industry on slide- Discussion, refinement and correction of industry tendencies- Impact of tendencies on parties, strategies, roles & relationships <p><i>Part 2: Slnitiatives</i></p> <ul style="list-style-type: none">- Discussion of unconventional strategies in the industry• Show definition of SI- Ask for similar initiatives in industry + motives- Ask for strategic innovators in the industry <p><i>Round-up</i></p>
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First, the moderator welcomed the participants and briefly explained the research, the aim, structure, and timing of the discussion. Participants were asked to introduce themselves.

In the first part of the focus group (generally lasting 1,5 hour) the traditional industry context, supply chain, strategies used by incumbents and industry mentality/recipe were discussed. We used the preliminary results of the desk & expert study to structure and fasten the discussion (slides of supply chain and industry tendencies). In this way, the desk & expert results could be validated, extended and refined. In part 1, less structure allowed us to learn as much as possible about a relatively unexplored area and hence, to reveal the industry logic (Morgan, 1998b). The moderator continuously corrected and added information to the transparencies (e.g., when participants mentioned conventional shortcuts in the supply chain) and made notes on the flip-chart.

In the second part (lasting $\frac{1}{2}$ to $\frac{3}{4}$ hour), participants were asked to suggest innovative market strategies in the industry that clearly were distinctive from the ‘normal’ industry behavior. Next, they were given a definition and a neutral example of SI, and were asked to discuss similar initiatives in their industry. In addition, the moderator explicitly asked why these initiatives had been undertaken. In this phase, more interview structure was opted for, as a strong research agenda and well-defined questions were necessary (Morgan & Krueger, 1998) for the listed initiatives to be used as an input to the following part of the research: QUAL2. In addition, participants were asked about companies excelling in this kind of initiatives, the so-called strategic innovators. All information was noted on the flip-chart.

Finally, the moderator summarized the main conclusions and asked participants for additional remarks and considerations.

All focus groups were videotaped since our memory largely permits us to summarize what people said, but it usually fails in remembering pauses, overlaps, inbreaths (Silverman, 2000), tones, intonations, and facial expressions. Since interview data are far more than mere verbal expressions (Fontana & Frey, 2000; Patton, 1990), the videotapes enabled us to add other communication aspects to the interpretation of the data. Each focus group was transcribed verbatim (Bloor et al., 2001) by a secretary. She attended all focus groups and during the discussions, she already typed as much as possible of the conversations, and of what was written on the flip-charts by the moderator. We supplemented these transcripts with additional behavioral information observed during the group discussions (Stewart & Shamdasani, 1998).

3.4.2.3 Expert interviews

Even a first analysis of the focus groups already made clear the very complex nature of many industries, which were moreover subject to many shifts in terms of technology and regulation. In addition, not all levels of the supply chain were represented during the focus groups. For instance, in the focus group on functional food all downstream parties were conspicuous by their absence, TMS lacked a representation of governmental bodies, just as the tuck&trailer-focus group missed downstream parties. This could have led to misrepresentations of reality as we felt that often the absent parties were scapegoated. Finally, the collection of SI initiatives and strategic innovators the focus groups had yielded was insufficient. This is why we still added a third data collection method: individual interviews with industry parties.

Per industry, 4-8 individual interviews with –preferably marketing managers or CEOs– of the top 2-3 market leaders and 2-3 fast growers (based on relative average growth over the last two years) were conducted, in order to provide us with additional insights on each industry.

The strategy consultants of Cap Gemini Ernst & Young sponsoring the project carried out these interviews. Per industry, one senior consultant, with expertise and contacts in this industry, conducted all interviews. Table 3.5 shows an overview of the interviews conducted; it specifies the type of companies and the interviewees’ function in these companies.

Table 3.5: Interviewees: expert interviews

Industry	Number of interviews	Companies	Functions
TMS	4	<ul style="list-style-type: none"> - Systems supplier - Ministry of Traffic (Rijkswaterstaat) - Systems supplier - Systems & solutions supplier 	<ul style="list-style-type: none"> - Business development manager - Project manager future traffic systems - Vice-president board - Managing director
Energy	8	<ul style="list-style-type: none"> - Combined heat & power producer & supplier - Producer - Amsterdam power exchange - Corporate customer - Producer, trader, supplier - Distributor, metering company - Corporate customer - Ministry of Economic Affairs-Directorate Energy 	<ul style="list-style-type: none"> - Director energy systems - Chief Operations Officer - Corporate lawyer - Director facilities - General director - Director - Facility manager - Senior policy advisor
FF	5	<ul style="list-style-type: none"> - Ingredients producer - Ingredients producer - Research center - Food producer - Food producer 	<ul style="list-style-type: none"> - Marketing manager - Manager development & application - Director strategy BU Food - R&D director - Marketing manager
T&T	5	<ul style="list-style-type: none"> - Components & module supplier (2nd& 3^d tier) - Module supplier (2nd tier) - Module & systems supplier (1st & 2nd tier) - Trucks producer (OEM) - Trucks importer 	<ul style="list-style-type: none"> - Director (+chair branch federation) - Director Board - Managing director - Director product & marketing planning - Manager commercial aftersales
Graphics printing	6	<ul style="list-style-type: none"> - Distributor hardware - Producer hard-&software + solutions - Producer hard-&software + solutions - Raw material producer - Information & communications solutions provider - Digital content distributor 	<ul style="list-style-type: none"> - Marketing supervisor - General marketing manager - Director NL - Marketing manager - Director Sales - CEO

A detailed interview manual was prepared by the researchers (Bok van Kammen & Stouthamer-Loeber, 1998). The manual included the interview guide (the questions and their preferred sequence) and provided some background information on the research. It furthermore specified what each question needed to probe and instructed the interviewers how this was preferably to be done. The outcomes of the desk & expert research, the transcripts of the focus groups-1, and preliminary analyses were given to the consultants. In addition, two researchers met beforehand with the consultants and spent an entire day explaining the research project: its purpose, conceptual background, research questions, its different phases and the preliminary findings of the desk & expert study and the focus groups-1. In addition, the researchers went through the entire interview guide and explained all questions in detail. Overall, the questions followed the same structure as the focus group interview guide, but more specific information was probed, especially on topics where the focus group data failed.

The consultants were asked to audiotape all interviews. Even though we asked them to provide us with verbatim transcripts of all interviews, many of them only handed in interview summaries, due to their tight time schedules. The quality of the interviews differed from one consultant to the other. Nonetheless, the additional interviews provided us with more detailed information and filled out many gaps in the industry analysis.

3.4.3 Analysis

The qualitative research essentially built on the process guidelines by Eisenhardt (1989b) for case study research. For the coding and analysis procedures we mainly followed Coffey & Atkinson's (1996), Dey's (1993) and Miles & Huberman's (1994) treatises on qualitative data analysis. We used content coding in order to analyze the qualitative data.

In the concrete, per industry data were categorized according to the following predefined categories: general profile of the industry (e.g., size of industry for up- mid- and downstream companies), supply chain, traditional strategic approach and critical success factors (for up-, mid- and downstream companies), perceived trends and their perceived impact (for up-, mid- and downstream companies), and the (power) relationships among the industry parties. Per industry, we located and bundled stretches of data along these categories. We focused more on phrases than on single words. In addition, we paid attention to specific figures of speech such as metaphors (Coffey & Atkinson, 1996).

Per content category, we furthermore structured the data stretches by source (i.e. separately for the desk & expert study, FG1s and interviews) and looked for similarities and dissimilarities across the different sources per industry (as advised in a cross-case analysis, Eisenhardt, 1989b). Each data source was checked against the others in order to reveal consistent tendencies (Tashakkori & Teddlie, 1998).

The analysis of the focus group1-data deserves some further clarification. While methodologists like Morgan & Krueger have developed scientific advices concerning the procedures for focus groups, their potential research uses, strengths and limitations (Wooten & Reed, 2000), literature still lacks clear methods for focus group *analysis* (Smithson, 2000; Stewart & Shamdasani, 1998). Accordingly, many focus group data have been analyzed in similar ways as classic interview data (Hydén & Bülow, 2003). However, using focus group data implies that the *group* functions as the unit of analysis, and not the individual (Bloor et al., 2001). Hence, in the analysis of the focus group data, in addition to content analysis, we also looked at how persons' perspectives changed over the course of the focus group (Smithson, 2000) and how individual perspectives fitted into the other participants' expressions (Bloor et al., 2001; Hydén & Bülow, 2003). Furthermore, we were cautious as to the influence group dynamics may have exerted on the data expressed (Smithson, 2000; Wooten & Reed, 2000) and the possible bias in discussions involving members from companies with conflicting or strained relations in the supply chain.

Gradually an industry recipe was developed for each industry. The industry recipe characterized assumptions about the specific role/mission of the industry parties, critical success factors, future critical success factors, power center and power play, competitive relationships among the industry parties, and co-operation along the supply chain. Per industry, the different SI initiatives that had been named and explained were systematically contrasted with the characteristics of the industry recipe, in order to check their defiance from it. The analysis finally enabled us to identify one or more strategic innovators per industry (see chapter 4).

3.5 THE SECOND QUALITATIVE PHASE (QUAL2)

3.5.1 Research questions and level of analysis

The conceptual study of chapter 1 revealed that SI theory, largely built on managerial literature, is lacking well-funded insights, especially in terms of process studies. In chapter 2, we hence made an argument as to how theories of dynamic capability creation, ACAP and routines may prove useful in filling this gap. However, these different theoretical areas have not yet been fully developed either, let alone in terms of their theoretical relationship to the concept of SIcap. Hence, theoretical insights have not been specified to the degree that a theoretical model would be directly amenable to quantitative testing. Therefore, we deemed it necessary to follow a QUAL→QUAN research design, where first the elements of an emergent theoretical model could be further delineated and specified (Creswell et al., 2003; Bacharach, 1989; Charmaz, 2000), before subjecting it to inferential statistical tests. Accordingly, QUAL2 served to further refine theory, by selecting relevant constructs and proposing relationships among them, and to operationalize constructs, in order to quantitatively test the model afterwards.

QUAL2 has important theoretical value since it is this phase, which lays the foundation of the theoretical model. In this sense, QUAL2 had a pivoting role in the overall research project. More specifically, relying on the conceptual insights of chapter 2 in particular, in QUAL2 we aimed to study the value and form of deliberate, strategic ACAP learning mechanisms for SIcap, and we aimed to propose some relationships among them. Moreover, we wanted to uncover influential internal and external conditions (moderators). QUAL2 further proved useful to the development of new research instruments (Creswell et al., 2003).

The research questions we tried to answer during the QUAL2-phase were hence:

RQ1: Do deliberate, strategic learning mechanisms in the areas of recognition, assimilation and transformation foster a business unit's strategic innovation capacity? (relevance of the basic constructs?)

RQ2: What are relevant path-breaking focus areas these mechanisms target? (subdimensions of the constructs?)

RQ3: How do deliberate, strategic learning mechanisms in the areas of recognition, assimilation and transformation foster a business unit's SIcap? (relationships among the constructs?)

RQ4: Which internal and external characteristics may exert a critical influence on the effectiveness of deliberate strategic learning mechanisms? (relevant moderators?)

In our attempt to study deliberate strategic learning mechanisms for SIcap, we were forced to lower the level of analysis from the industry in QUAL1 to the organizational level. To measure information scanning and interpretation processes, Thomas et al. (1993) too, operationalized these constructs on an organizational level. For large, diversified firms, we deliberately chose the business unit level. Since the level of analysis issue is still a subject of fierce discussion in the organizational literature (Klein et al., 1994), we followed previous studies in this choice. For instance, in their studies on value innovation Kim & Mauborgne (1997) tackled the business, rather than the corporate level. They even explicitly critique the industry or company level as the traditional unit of analysis (Kim &

Mauborgne, 2004). Also Jaworski et al. (2000) apply their conceptualization of market-driving organizations on the business unit level, in consistence with the research tradition on market orientation. Mizik & Jacobson (2003), in their turn, suggest value creation (and appropriation) strategies to be measured at the business unit level. The ACAP construct has likewise most often been operationalized at the business unit level (e.g., Tsai, 2001; Jansen et al., 2006).

Even though the level of analysis was the organization/business unit level, we deliberately commenced discussions often by one or more specific SI initiatives, since we felt that these concrete initiatives provided participants with a 'feel' of what SI meant in practice in their industry. Concrete SI initiatives were hence used as a concrete angle of incidence to get the debate started.

3.5.2 Design

As dictated by the QUAL→QUAN design, we relied on qualitative methods to study the research questions in this phase. The benefits of qualitative methods for exploratory purposes, especially in the preparation of a quantitative study, have already been exemplified in sections 3.1 and 3.2.

Per industry, an additional focus group was organized. These findings were further extended and validated by additional, individual in-depth interviews with strategic innovators.

In QUAL2, cases were purposefully selected. This means that cases were deliberately chosen in order to extend the emergent theory (Patton, 1990; Eisenhardt, 1989b).

3.5.2.1 Focus groups-2 (FG2)

In QUAL2, once again we chose to use focus groups. This is since focus groups have been said to be particularly useful for exploratory purposes in a research project (Stewart & Shamdasani, 1998). They are of particular use to explore members' views of, attitudes towards, and experiences in particular areas (Hydén & Bülow, 2003). They are hence suited to suggest a range of hypotheses about a particular topic and are, in this respect, very useful as an input to quantitative methods (Stewart & Shamdasani, 1998). Focus groups thus lay bare important types of phenomena, of which the frequency and magnitude may be subsequently assessed in a quantitative study (Stewart & Shamdasani, 1998). Therefore, focus groups are well suited for sequential mixed method studies; they may inform the further development of interviews and questionnaires (Johnson & Turner, 2003).

Furthermore, since the focus group participants had essentially the same profile as the survey respondents targeted for the QUAN phase, a first contact with potential subsequent survey participants could produce more reliable measures than those generated in a so-called 'armchair fashion' (Morgan, 1997). Focus groups could hence reveal the domains, and their dimensions, that needed to be covered in the survey and could also provide specific item wordings that effectively conveyed our intents to the target survey respondents (Morgan, 1997). We hence used the focus groups-2 in "an explicit attempt to use everyday thought to generate or operationalize [...] constructs and scientific hypotheses" (Calder, 1977: 356).

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Since the rich data focus groups provide are formulated within participants' own words and context, these inartificial data show a high degree of 'ecological validity' (Stewart & Shamdasani, 1998). Smithson (2000) argues that the possibility for members to develop ideas collectively in a process of expressing individual priorities and perspectives, is one of the method's major strengths. Wooten & Reed (2000), referring to McQuarrie & McIntyre's (1988) study, mention the occurrence of selection effects during focus groups. Selection effects make that common concerns among members are more prominent in the group discussion than idiosyncratic, individual concerns. In this sense, the focus groups-2 could enable us to shed a first light on common, relevant constructs and proposed relationships among them. Focus groups could hence be used to plunge into common aspects of concrete SInitiatives and high-SIcap business units, while still taking account of the specifics of the five industry contexts. In this way, the focus groups-2 provided a valuable 'bridge' between the industry level of analysis of QUAL1 and the business unit level of analysis used in the remainder of the study.

Hence, a second round of five focus groups was set up. Again, a lot of effort was made to comply with the methodological prescriptions provided in the literature (e.g., Morgan, 1997, 1998b; Bloor et al., 2001). As purposeful sampling was applied, much care was taken in the selection of participants. Our original intent was to gather marketing managers of strategic innovators per industry. However, in several industries only one or a limited few strategic innovators were identified. On top of that, not all of them wanted to participate in the study. Given the 'innovative' character of SInitiatives, many managers seemed quite reluctant to share their experiences with other industry parties. In addition, several last minute cancellations forced us to 'sin' against our own rules. In fact, participants to the FG2s represented a mix of 4 to 9 strategic innovators and 'conventional' parties. However, only managers, who were known in the industry as visionary and innovative, represented the latter. Furthermore, a double participation for the first and second focus group was avoided and only deemed acceptable when short on alternatives. A balanced representation of all levels of the supply chain was aimed at. In most focus groups an industry expert took part, namely the strategy consultant who had also conducted the QUAL1-expert interviews. In some focus groups an industry specialist from the Ministry of Economic Affairs attended and observed the discussion. Most participants were strangers to one another. Participants were invited by a letter, explaining the research, the format and the topics to be discussed in the focus group. Confidentiality was guaranteed.

Table 3.6 shows all participating companies, their representatives and their respective functions. The representatives of the Ministry of Economic Affairs were only listed as participants insofar they actually took active part in the discussion. The limited number of participants to the focus group-2 on TMS was due to late cancellations. The extreme competitive and hostile character of the energy industry (at the moment of the research) resulted in the relatively small size of the focus group-2 on energy.

The focus groups-2 were held in the same venue as the focus groups-1 and lasted for 1,5 to 2 hours. Similar to the focus groups-1, the discussions were moderately-structured by the same moderators. Once again, moderators used a funnel-based approach and used powerpoint transparencies and a flip-chart to make notes during the discussion. I took

notes of interesting issues raised and of attitudinal observations. All focus groups-2 were videotaped and transcribed verbatim during the discussions by a professional agency.

Table 3.6: Participants focus groups-2

Industry	Number of participants	Companies represented (function of representative)
TMS	4	2 hard- & software suppliers (business development supervisor + product manager) 1 large city (senior manager traffic) 1 consulting company (senior consultant telematics)
Energy	5	1 energy broker (director) 1 installation & maintenance company (head energy systems) 1 energy systems suppliers (director power transmission & distribution) 2 consulting companies (senior consultant energy, senior consultant industry)
FF	6	1 raw materialist (marketing manager) 1 large retailer (project manager) 1 food packaging company (manager unit food) 1 consulting company (senior consultant food industry) 2 ingredients suppliers (sales manager + sales manager)
T&T	9	1 automotive coats supplier (business development manager) 1 raw material supplier s:3d tier (manager product market development + manager business dev.) 1 components supplier: 2 nd tier (marketing manager) 1 truck producer: OEM (marketing manager) 1 jobber: 2 nd tier (manager commercial & production) 1 trailer producer: OEM (director) 1 branch federation (vice-president, also CEO of components supplier) 1 consulting company (senior consultant automotive)
Graphics printing	8	2 hardware suppliers (director printing + marketing manager) 2 printers, incl. pre-press (director + commercial director) 1 communications company (director) 1 corporate customer (manager output & traffic management) 1 hard, software & solutions supplier (director strategic planning) 1 consulting company (senior consultant graphics printing)

The discussion guide that was used to structure the group discussions is shown in Table 3.7.

As in the focus groups-1, the discussion took off with a brief introduction. The moderator welcomed the participants, explained the problem statement of the overall research, and the specific structure and discussion topics of the focus group session.

During the first part of the discussion (lasting approx. ½ h), participants were shown the general definition of SI. The moderator clarified this definition in detail and provided some well-known examples of SI from the literature (such as Ikea, Dell, Kinopolis). Then, the moderator showed a slide to participants with concrete industry-specific examples of SI initiatives and strategic innovators. These examples had been inventoried based on the QUAL1 results and concretized the concept of SI by means of recognizable examples from the participants' own industries. Participants reflected on these initiatives and strategic innovators and often provided additional information on them. Indeed, some of the examples mentioned had been launched by one of the companies represented. Almost spontaneously, participants brought up additional SI initiatives recently launched in their industry. Participants referred to initiatives that either their own company or other industry parties had set up. All examples were noted on the flip-chart.

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Then part 2 of the focus group was broached, which formed the pith and marrow of the discussion and lasted for approximately 1,5 hours. Here, participants were asked to make a cross section of all the examples mentioned. First, the moderator asked the participants to indicate some important internal and external characteristics in the systematic creation of such initiatives (i.e. SIcap). Then, participants were asked whether and what kind of concrete managerial mechanisms for recognition, assimilation and transformation could help to foster the systematic creation of such initiatives. All information was inventoried on the flip-chart and participants were motivated to discuss and reflect on these collections. Finally, the moderator summarized the discussion and asked participants whether they wanted to add some more comments. Participants were thanked for their cooperation.

Table 3.7: Discussion guide focus groups-2

<p>Introduction</p> <ul style="list-style-type: none">• Show definition SI on slide <p>Part 1: Examples of Slnitiatives and Sltors</p> <ul style="list-style-type: none">• Show examples on slide- Discussion, refinement and correction of Slnitiatives and strategic innovators shown- Inventory and discussion of additional industry-bound Slnitiatives and strategic innovators <p>Part 2: Intersection</p> <ul style="list-style-type: none">- Inventory & discuss critical internal & external characteristics- Inventory & discuss managerial mechanisms (in the areas of recognition, assimilation and transformation) to drive the systematic creation of such initiatives <p>Round-up</p>

The focus groups uncovered many interesting issues, still we judged it appropriate to add some in-depth interviews with strategic innovators, in order to deepen out some issues raised and to triangulate the findings.

3.5.2.2 Interviews with strategic innovators

Focus groups are very useful as an input to in-depth interviews (Morgan, 1997; Bloor et al., 2001). Subsequent individual interviews can provide more depth and detail on topics that were only broadly discussed during the focus groups (Morgan, 1997). Moreover, they cover for some methodological drawbacks of focus groups, such as responses that are not independent of one another, responses that may be biased because of dominant members (Smithson, 2000; Stewart & Shamdasani, 1998). In addition, Churchill (1979) stressed the benefits of combining focus groups and interviews at the item-generation stage of a quantitative study.

In the concrete, we selected several strategic innovators per industry for further study. Confining ourselves to strategic innovators implies we focus on business units that are successful in the creation of Slnitiatives. In this respect, we follow Lynn et al.'s (1996)

argument to study successful cases in diverse contexts (in this case, dissimilar organizations in five different industries), rather to compare successes and failures in similar contexts. They argue that this is a very appropriate method to reveal what management practices are relevant in the creation of discontinuous innovations. “If we uncover similarities in management practices across these successful projects despite the differences, we have reason to believe that a relationship exists between practices and outcomes” (Lynn et al., 1996: 12).

Table 3.8: In-depth interviews: strategic innovators, focal SInitiatives, interviewees

Industry	Strategic innovator	Focal SInitiative	Interviews
FF	Dutch, multinational chemical company: BU Food ingredients production	Launch of sports drink concept [invention & production active ingredient+ production drink+ design package+market launch]. Concept sold to leading sports-food producer, IP's name remains highly branded on product	1 business development manager Food + 1 external: consultant of BU
Energy	Dutch energy company: BU Retail	24h-energy maintenance & service (advise, appliance lease, installation, maintenance, 24h-service, subscription for damage repair (franchise formula with 8 regional installation companies)	1: Director retail services
	Energy management company	Total package of energy performance contracting for corporate customers (scanning of energy consumption, finance, purchasing (=brokering), maintenance, metering, invoicing, etc.	1: director + 1 external: facility manager of customer
Printing	Printer	-Partnership of three printers, each with their specialties, to subscribe to public tenders (combination of scale & flexibility & specialties) -Co-organization of exposition with museum: printing high-quality (high price) leaflets, posters and books	1: sales mgr + 3 external: directors of 2 partner companies + documents traffic manager of customer 1: sales manager + 1 external: manager customer
	Printer	Set-up of bureau for multi-media design (incl. training)	1: owner
	Hardware supplier: BU Benelux	Document management (performance contracting document flow & cost → BPR)	1: services director Benelux
TMS	Systems supplier: BU Traffic management	Content provider: Collects real-time traffic information from its existing traffic systems, information is analyzed and a) reported to municipal traffic managers (real-time insight in traffic intensity) (e.g. in Almere, Utrecht), b) can steer dynamic traffic systems by DRIPs (e.g. in the Hague, Zoetermeer), c) can be shown real-time on the internet (e.g. Almelo), etc... Cities pay for content	1: manager traffic & mobility + 2 external: head municipal traffic mgt & project manager traffic of customer-city + senior process manager municipal traffic management of other customer-city
	Systems supplier	B2C portable navigation software + hardware	1: CEO
T&T	Chemical company: BU Car refinishes	Total repair, accident & claim management: intermediary function between body shops, insurance companies, fleet owners and leasing companies.Strategic partnerships with automotive insurance companies and international network of body shops, many of which do not even use their coatings	2: manager car refinishes+ international project support manager Europe

As already noted, given the confidential and innovative nature of SInitiatives, much effort had to be made to convince potential interviewees to participate. Even though we guaranteed confidentiality and anonymity, some of our efforts were in vein. The fact that the study was sponsored by Dutch industrial companies and, even worse, by consulting companies, did not fall on fertile ground. Consequently, some strategic innovators refused to participate. In addition, even for the strategic innovators who agreed to cooperate, we experienced problems. Even though we tried to triangulate data by means of multiple interviewees within the same strategic innovator, the unwillingness of individuals to participate prevented us from doing this for every strategic innovator (see Table 3.8). We

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however explicitly recognize the limitations of single-informant studies (i.e. individual level of measurement and individual level of analysis), especially when the level of theory is the business unit or organizational level (see e.g., Klein et al., 1994), because homogeneity of organizational members is assumed in terms of the constructs studied.

18 interviews were held with strategic innovators (and their customers). The interviewees had been/were all highly involved in the creation of SI initiatives. Table 3.8 provides information on the strategic innovators studied in this phase.

All interviews were audiotaped because of the same reasons as those cited above, and because it diminished the burdens of note taking, which decreases one's interviewing capacity (Patton, 1990). Interviews were semi-structured: on the one hand, the interview guide helped us to make sure important elements were covered, on the other enough freedom was left to probe deeper into issues raised and to adapt the question formulation and sequence to the specific respondents and situations (Patton, 1990; Fontana & Frey, 2000). The advantage of using an interview guide was that data collection was relatively systematic across respondents, while still leaving room for conversation and situational aspects (Patton, 1990). Even though the overall contents of the interview guide remained relatively stable across the different interviews, following Orton's (1997) iterative research process resulted in minor adjustments to it in the course of the interviews. Some subquestions were added for completeness, examples were added for clarity and the sequence became even more structured from the concrete to the abstract.

In the main, we followed Patton's (1990: 277-368) advices regarding question formulation and interview conduct. For example, special attention was paid to ask questions in an open-ended way and to avoid dichotomous ones. Research jargon and typically Flemish words and expressions were consciously avoided. Often, role play had to be used for clarity, concreteness and re-experience ('Suppose I worked here at your company as an account manager and thought of an incredible new idea to better serve my key customers, what should I normally do then?' or, 'Suppose I attended your monthly meeting with R&D, what would I see happening there? What points would I typically here being discussed?'). Furthermore, during the interviews, we often used a devil's advocacy approach, we avoided management and marketing jargon, we guaranteed anonymity to interviewees, in later stages of the interview, we re-broached earlier mentioned themes using a different vocabulary, etc.

The previous QUAL1 proved very useful for the conduct of these interviews. First, it enabled us to establish rapport with the interviewees, i.e. to see the situation from their perspective (Patton, 1990), within their industry context, rather than imposing some academic view upon them (Fontana & Frey, 2000). Second, we experienced that demonstrating the industry knowledge we gained through QUAL1, by citing through the lines some recent events, company and product names and technical jargon, created trust (Fontana & Frey, 2000) and credibility with the interviewees.

The interview guide used is shown in Table 3.9.

Table 3.9: Interview guide in-depth interviews

<p>Filing information: Date of interview, company + BU, main activities BU, number of employees in BU</p> <p>Background information interviewee: Name, function/responsibility, years in company, years in sector</p>
<p>Part 1: General information of company/BU -main activities (% turnover, % profit) -customer segments -position in supply chain/network? -number of employees in BU -general image of organization structure (+ position of interviewee)</p> <p>Part 2: The focal SI initiative -explain initiative -immediate cause? -why launched? Why belief in its value? -why specifically launched by your BU, and not by other industry parties? -other parties involved? -situate initiative in time (in which phase now?) -how discovered? Detail entire process up till now. -is initiative 'different' and why? a) in industry? b) in company/BU? -good example of SI?</p> <p>Part3: Deliberate strategic learning mechanisms and other critical internal/external factors?</p> <p>3.1 Customer insights: comparison focal initiative-all initiatives How do you gain insight in customers' needs? Formal tools, informal tools, no tools? Which? Can customers define their own needs? Responsibility of whom? What function has most insight? What should you ideally study to discover such initiatives? (e.g., end customer? other industries? competitors? etc.) How study these? Role of suppliers?</p> <p>3.2 Development of ideas: comparison focal initiative-all initiatives How are initiatives discovered? Who has ideas? Who creates ideas? Who has credibility to create? Same as above? Role of corporate HQ? Specific instruments? What is done with ideas? Gathered, discussed, reflected on,...? Formal meetings/ informal channels? Who is involved? Really useful or formality?</p> <p>3.3 Try-outs: comparison focal initiative-all initiatives Often and quickly tried out? Cowboy or accountant approach? Dependent of...? General attitude of company/BU and corporate regarding such initiatives? Has evolved over time?</p> <p>3.4 Roll-out: comparison focal initiative-all initiatives Initiatives easily rolled out? Implementation often the bottleneck? Why? Resistance? Who? Internal/external (competitors, suppliers, customers?) How cope, solve? Improves over time? Partnerships? Risk? Complementarity with conventional business? Initiative-sponsors under pressure? Personal responsibility? Punished if unsuccessful?</p> <p>3.5 Overall reflections When focal SI initiative started from scratch: what to change? What to keep? What good/bad? Managerial mechanisms? Similar for other SI initiatives? Mistakes corrected over time? How?</p>

First, we introduced ourselves and explained the entire research project, its problem statement, process and the phases completed so far, all in simple language. We clarified the concept of SI and provided some concrete, industry-specific examples, gathered through the previous research phases. Then we explained the purpose of the interview, its structure and the specific topics to be discussed. We also noted some background information of the interviewee.

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The proper interview started with a general discussion of the organization and business unit. Similar to the process we followed in the focus groups-2, the main interview was structured from the concrete to the general. In other words, the interview was broached by the discussion of a specific SI initiative. In the second part, the interviewee was explicitly asked to bear in mind specific factors that had proved important in the creation of the initiative, but to make now a transition to a more structural, general level. To this end, we provided some other examples of SI initiatives recently created by the interviewee's company and asked the interviewee to compare factors across these examples. A continuous comparison was hence made between factors that were specific to the focal initiative and factors that were considered as 'standard' in the company/BU when such SI initiatives were created (see, Table 3.9, part 3). Originally, we structured this part of the interview on the basis of the conceptual and previous research findings (e.g. structure by recognition, assimilation, etc...). However, we felt that this approach was 'artificial' and obstructed the natural flow of the interview. We hence adapted the question sequence to better fit within the interviewee's perspective, which was often temporal instead of conceptual. The second part of the interview hence followed a chronological structure from idea generation to market launch (see, 3.1 to 3.4 in Table 3.9). This new structure of interviewing yielded better and deeper data, nonetheless, the analysis was complicated because the interview structure did not match the conceptual research structure anymore. In other words, different conceptually related issues became scattered throughout the interview responses.

We literally transcribed all interviews soon after interviews were conducted. This enabled us to remember patterns of behavior and facial expressions, which were added to the transcripts.

3.5.3 Analysis

As in QUAL1, the analysis largely built on guidelines by Miles & Huberman (1994), Dey (1993) and Coffey & Atkinson (1996). We applied a combination of categorical analysis (coding and thematic analysis) and memos and displays (Maxwell, 1998). Interview and focus group transcripts were read closely, highlighted, coded and analyzed. Often, audiotapes were relistened several times to overhear intonations and hesitations. We did not focus on loose words or phrases, but identified sequences of related talk (Silverman, 2000).

Qualitative research is especially appropriate to classify data into emerging categories or explanations (Tashakkori & Teddlie, 1998). Still, as the qualitative research was guided by the conceptual insights of chapter 1 and 2, we partly used preestablished criteria for the specification of themes. As already noted, Miles & Huberman (1994) argue that qualitative data can be analyzed using an inductive or a *deductive* logic. Accordingly, Huberman & Miles (1994: 431) state that: "Qualitative studies ultimately aim to describe and explain (at some level) a pattern of relationships, which can be done only with a set of conceptually specified analytical categories (Mischler, 1990). Starting with them (deductively) or getting gradually to them (inductively) are both legitimate and useful paths".

Departing from theoretical insights, preliminary themes and patterns were identified (Miles & Huberman, 1994) and noted. Data were grouped into conceptual clusters (Danneels, 2002). More specifically, we applied pattern matching of the data (Miles & Huberman,

1994) to the *predefined*, or ‘sensitizing’ concepts (Patton, 1990), of deliberate strategic learning mechanisms for recognition, assimilation and transformation and the different organizational and supply chain characteristics, derived from the ACAP and SI literature (see chapter 2). They served to indicate how these constructs were manifest in the context of SI initiatives. In these general data categories, we –inductively– discovered several *emergent*, or ‘indigenous’ (Patton, 1990) subcategories. Data were hence coded at different levels of abstraction (Coffey & Atkinson, 1996). For example, a data extract was coded into the category of deliberate strategic learning mechanisms for recognition, and more specifically to the subcategory on information about other sectors. Or, the emergent construct of ‘innovativeness’ arose in the category of cultural organizational characteristics. In this way, the theoretical model and insights of chapter 2 were enriched and specific items could be developed.

During coding, we were especially mindful of symbolic language and figures of speech, such as metaphors (Coffey & Atkinson, 1996). Wherever there was disagreement regarding the coding of verbal expressions into the (predefined or emergent) categories, we discussed the coding category until there was complete agreement on a judgment. Here, the advantage of using multiple investigators becomes clear (Eisenhardt, 1989b; Patton, 1990).

Similar to the analysis of QUAL1, we finally structured the data by source and looked for similarities and dissimilarities across the different sources per industry (Eisenhardt, 1989b). First, this was done ‘vertically’, i.e. between the different data collection methods per industry. In contrast to the QUAL1-phase, this vertical comparison was still followed by a ‘horizontal’ comparison between the different sectors. In this way, the different data patterns found within industries were corroborated across the five industries as well (Eisenhardt, 1989b).

Data collection and analysis partly overlapped according to the ideas of Orton (1997) and Burawoy (1991). Eisenhardt (1989b) argues that the adjustment of data collection instruments is legitimate for it helps to probe new insights that may enrich theory development. Changes to, for example, interview guides usually reflect a better contextual understanding and may hence enhance the internal validity of the study (Huberman & Miles, 1994). In addition, the concurrence of data collection and analysis allows analysis to guide further collection in a way of ‘theoretical sampling’, such that the collection of unnecessary and excess data becomes increasingly avoided (Morse, 1994).

First, during the course of QUAL2, field impressions were noted and different team meetings were held to share emergent ideas and reflections. We also created many memos (Miles & Huberman, 1994), which proved especially useful for ongoing reflections on theory and methods (e.g. regarding the formulation and the sequence of the interview questions). In addition, we used diagrams, tables and flowcharts to structure the information, to match it with theory and to develop understanding. They in turn guided further data collection and analysis (Maxwell, 1998; Miles & Huberman, 1994). As a result, particularly in the course of the interviews, some questions were added and removed from the overall interview protocol and the question sequence was adapted (see section 3.5.2.2). Furthermore, in later interviews more specific questions were asked to probe for emerging themes from previous interviews and the focus groups-2, and to check factual data (cfr. Danneels, 2002).

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In sum, the analysis of QUAL2 led to a) the identification and refinement of relevant constructs, b) the development of hypotheses and the formulation of additional research questions regarding moderator effects, and c) the development of quantitative measurement instruments (Eisenhardt, 1989b).

As regards the first objective, both prespecified and emergent categories were used.

Concerning the formulation of hypotheses and research questions, we looked for overall patterns in the data. The specified hypotheses and research questions did thus apply to the aggregate data. This implies we did not use the ‘replication logic’ (Yin, 1989) where each case is used to confirm or disconfirm the hypotheses. We hence applied what Huberman & Miles (1994) have called a ‘variable-oriented strategy’, and not a ‘case-oriented strategy’. We chose this strategy because QUAL2 did not consist of full, stand-alone cases like in case study research, which could be compared. Instead, it was the combination of the focus group-2 data and the interviews across the different industries that *together* laid bare some patterns. These insights were compared to theory. Furthermore, the qualitative phase was used as an *input* to the quantitative phase. This means we opted to test the model only in the quantitative phase. The quantitative phase served to enhance the internal validity of the hypothesized relationships based on the qualitative data. In addition, qualitative data are particularly useful to develop an understanding (the ‘why’) of a relationship (Eisenhardt, 1989b). Hence, in turn, the qualitative data served to increase the internal validity of the quantitative analyses.

Finally, regarding the third objective of QUAL2, we followed Creswell et al.’s (2003) guidelines for instrument development in a QUAL→QUAN design. On the one hand, themes, dimensions and specific statements from individuals raised during the qualitative phase were used to directly create items (see also, Morse, 2003). Alternatively, we looked for existing instruments that could fit the themes and statements found in the qualitative phases.

3.6 THE QUANTITATIVE PHASE (QUAN)

3.6.1 Research questions and level of analysis

As noted above, QUAL1 and QUAL2 were used in order to develop and refine the theoretical model. The analysis of the qualitative findings hence resulted in the selection and refinement of relevant constructs. For these constructs, measurements instruments were developed. In addition, hypotheses and research questions were formulated. As predicated by the QUAL→QUAN research design, and with the view of ameliorating statistical conclusion, construct and external validity, the qualitative findings were statistically tested in the QUAN phase.

More specifically, the research questions we attempted to answer in the QUAN-phase were:

RQ1: Which of the path-breaking focus areas that deliberate strategic learning mechanisms target are critical for a business unit’s SScap?

RQ2: What (partial) mediating effects can be detected among deliberate strategic learning mechanisms for recognition, assimilation and transformation on a business unit’s SScap?

RQ3: What moderating effects of organizational and supply chain factors can be detected on the relationships between deliberate strategic learning mechanisms for recognition, assimilation and transformation and a business unit’s SScap?

Incorporating RQ3, we followed Greenwald et al.'s (1986) 'condition-seeking' strategy in order to avoid confirmation bias and overgeneralized conclusions. This strategy implies that apart from studying the main hypotheses and results ('does the result occur?'), researchers should buckle down to the specific conditions under which this effect occurs. Greenwald et al. (1986) argue that this strategy is aimed to produce *qualified* conclusions. In fact, the condition-seeking strategy comes down to testing moderation effects. "The difference between unqualified and qualified conclusions corresponds to that between statistical main and interaction effects. The condition-seeking method can therefore be understood as an interaction-effect-seeking method" (Greenwald et al., 1986: 224).

Similar to QUAL2, in principle, the level of analysis was the business unit. Logically, for smaller, single-unit companies, the level of analysis had to be the organizational level. Our choice for this level of analysis is founded upon the same arguments as those discussed in QUAL2 (see section 3.5.1).

3.6.2 Design

3.6.2.1 Sample survey

In general, self-reports have been the most prominent sources of data in social science, organizational behavior and management research (Harrison & McLaughlin, 1996; Tashakkori & Teddlie, 1998). More specifically, the sample survey design (particularly by means of the paper-and-pencil questionnaire) has been one of the most widely used data collection strategies. Yet, it is also one of the most controversial techniques (Diamantopoulos & Schlegelmilch, 1996).

Although problems of, for example, common method variance (the artifactual covariance between self-report measures of different constructs) or response biases, such as acquiescence, extremity, central tendency, positivity (Mathews & Diamantopoulos, 1995; Tashakkori & Teddlie, 1998) or self-presentation biases (Podsakoff & Organ, 1986) have since long been recognized, self-reports are sometimes the only practical alternative left to study certain research questions; laboratory studies are not appropriate to the examination of several behavioral phenomena and experiments are difficult and expensive to conduct (Podsakoff & Organ, 1986).

Furthermore, methods that make efficient use of scarce research resources such as effort, time and money, are regarded with favor. Self-report surveys fall within this category for they are often a plausible alternative to study a large sample with reasonable investment in time and effort (Podsakoff & Dalton, 1987). The major advantage of a (probability-based) sample survey design lies indeed in its potential to quantitatively estimate the distribution of variables in a population by obtaining information on only a small proportion of this target population. In this way, surveys are relatively inexpensive and easy to conduct, can provide more extensive or directed information, are a practical alternative to study latent variables, and can reach a large sample (Cycyota & Harrison, 2002; Podsakoff & Dalton, 1987). In our research project too, we judged questionnaires (and consequently the use of self-reports) the most viable way to study our research questions on a large scale.

This choice has however not prevented us from acknowledging the main pitfalls of this data collection method. Self-reports imply that "the informant's statement represents

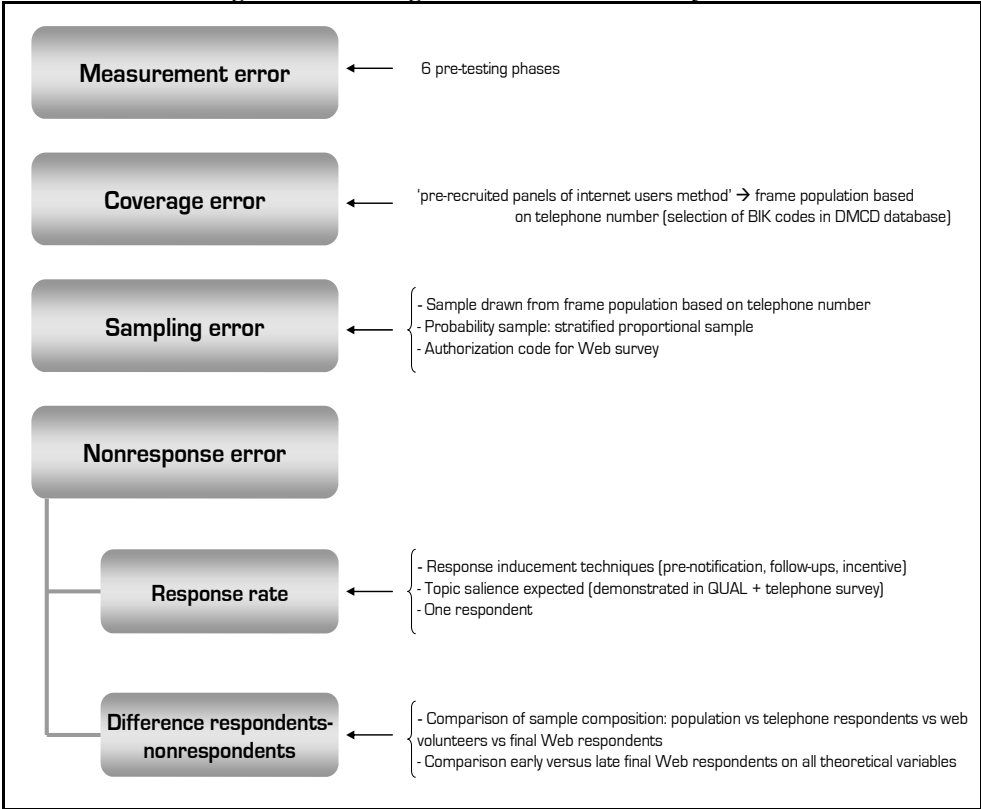
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merely the perception of the informant, filtered and modified by his cognitive and emotional reactions and reported through his personal verbal usages” (Dean & White, 1958: 178 in Mathews & Diamantopoulos, 1995: 844).

Hence, the use of sample results and derived population estimates to correctly infer conclusions about the entire target population (external validity), necessitates the elimination (or at least the reduction) of four sources of survey error, namely sampling error, coverage error, nonresponse error and measurement error (Groves, 1989 in Grandcolas et al., 2003). “A good sample survey, by whatever method, is one in which all members of a population have a known opportunity to be sampled for inclusion in the survey (noncoverage error is avoided); the people to be surveyed are sampled by random methods in sufficiently large numbers to provide a desired level of precision (sampling survey error is limited); questions are selected and phrased in ways that result in people providing accurate information (measurement error is avoided); and everyone who is included in the sample responds (nonresponse error is avoided)” (Dillman, 1991: 228).

Figure 3.3 shows a short overview of the strategies we used to reduce these error sources. In the following sections these will be more elaborated on. In addition, the results of tests we ran to estimate survey error will be reported.

Figure 3.3: Strategies used to reduce survey error



3.6.2.2 Construction of the questionnaire

The original questionnaire consisted of 85 questions (4 questions related to the control variables and 81 questions related to the research constructs). Even though all items had been gradually and carefully developed on the basis of conceptual and qualitative findings, we still wanted to pretest these questions before submitting the survey to the target sample.

3.6.2.2.1 Measurement error: Pretesting the questionnaire

The prior aim of pretesting is to reduce measurement error (or response error, Mathews & Diamantopoulos, 1995) in survey results (Presser et al., 2004) (see Figure 3.3). Measurement error belongs to the category of non-sampling error (Bagozzi, 1994a) and consists of two distinct components: response variance and response bias. The first reflects variability in responses across different participants within the same study, e.g. due to different data collection modes. The latter, response bias, is the degree to which respondents' answers reflect *the* true or correct values. It systematically stems from respondent characteristics, characteristics of the question wording (e.g., threatening or confusing questions, induced social desirability) or characteristics of the questionnaire design (Dillman, 1991; Mathews & Diamantopoulos, 1995). Pretesting particularly tackles this latter kind of measurement error, namely response bias.

Although the use of pretesting has been stressed in the survey research literature (Reynolds & Diamantopoulos, 1996), so far, social science research literature lacks methodological results of different pretest practices, and only provides little empirical guidance on executing pretesting methods (Hunt et al., 1982; Presser et al., 2004). Since Blair & Presser (1992) found out that different pretesting procedures often reveal different types of problems, it seems advisable to combine different types of pretesting methods. Therefore, before the final questionnaire was administered to the target sample, we performed a pretesting procedure consisting of different steps/methods (see Figure 3.4).

Overall, we followed Bagozzi's (1994a) guidelines to perform firstly a critical review by the researchers themselves, followed by a review by a group of knowledgeable experts. Finally, a pilot test was conducted by administering the questionnaire to a small number of sample respondents.

Step 1: Critical review by the researchers

During this pretesting phase, the final measures were once more conceptually reviewed in order to improve content validity.

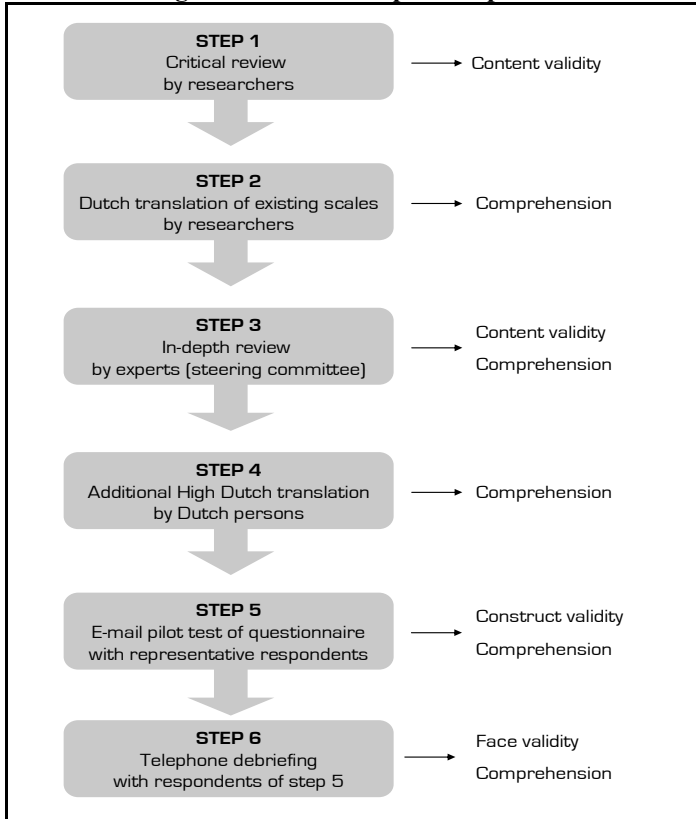
Step 2: Original translation

Since we targeted Dutch respondents, we wanted to develop a questionnaire in Dutch for the sake of clarity to the respondents. Yet, since the existing scales we wanted to use all had been developed in English, they first had to be translated into Dutch. Three Flemish speaking researchers translated these scales separately. From their versions a final translation was distilled and agreed upon.

The methodological literature is not unambiguous about whether a pretest method should be conducted using the final survey method, or using personal interviews. After the translation we hence followed a two-stage approach where firstly knowledgeable

participants were asked to comment in-depth on the questionnaire-in-construction (step 3). In a second stage an ‘undeclared pretest’ was conducted reflecting the final survey method (step 5) (Converse & Presser, 1996 in Reynolds & Diamantopoulos, 1996).

Figure 3.4: Different pre-test phases



Step 3: Review by knowledgeable experts

The Dutch questionnaire was sent by e-mail to the steering committee of the project. Persons of this steering committee had been following the project (and its previous qualitative results) from the start and consequently knew the problem statement, the research questions and the constructs under study. Moreover, being all in charge of marketing strategy (many being marketing managers) in Dutch industrial companies or business units, their profile was similar to the one of the target respondents the questionnaire was going to be administered to. In addition, all members of the steering were Dutch native speakers.

We undertook an e-mail Delphi round with the steering committee during which questions were discussed in-depth. The so-called ‘content-saturation’ of the scale (Burish, 1997) was discussed (deleting, adding or changing items). The question sequence and the clarity of the instructions were considered as well. As a result, the questions became more clearly formulated, some items were removed and others were added.

Step 4: Additional translation

During the previous phase it became clear that the questionnaire still contained typically Flemish words or expressions. The questionnaire version that resulted from this Delphi round was, once more, purged from Flemish words and expressions by three Dutch persons separately. As a result, Flemish words and/or expressions were replaced by (High) Dutch synonyms.

Step 5: Pilot test

In order to conduct the pilot test, we asked members of the steering committee to have marketing staff members in their company fill out the questionnaire as a test case. In this way, we followed Tull & Hawkins' (1976) and Zaltman & Burger's (1975) (in Hunt et al., 1982) guidelines to use respondents in the pretest who are similar to, or representative of the target respondents.

Although some authors (e.g., Dillman, 2000) advise to make use of multi-mode surveys (e.g., a combination of fax, mail and Internet-based surveys), others (e.g., Cobanoglu et al., 2001; Roster et al., 2004) explicitly caution for measurement differences between different modes that may result in different analytical conclusions. These multi-mode measurement differences could also apply to pretesting versus final survey mode. Since the final survey used an Internet mode (cfr. *infra*), for our pretesting results to be entirely transferable to the final survey, our pretesting procedure should ideally have been conducted on a Web survey too (Presser et al., 2004). Nonetheless, high set-up costs (resources & time) prevented us from having developed a Website only for pretesting purposes. This is why, for the pretest, we decided to send the questionnaire as an e-mail word attachment. Still, we tried to use a pretesting method that paralleled as well as possible the final survey method; possible measurement differences were anticipated by designing the pretest e-mail questionnaire according to the same structure as the one we were planning to use on the final Website.

The Word document consisted of an instructions page, an identification page and several pages for the actual research data. Questions related to a specific content domain were bundled each on a separate page. A cover letter was included in the e-mail body, indicating a) some background information on the research (general problem statement, sponsoring companies, researchers), and b) the time needed to fill out the questionnaire. A total of 30 completed surveys were returned. Since the target sample consisted of 'sophisticated' respondents (we questioned marketing staff about marketing research questions), the relatively small pretesting sample did suffice (Hunt et al., 1982).

The returned questionnaires were statistically analyzed in order to further purify the measures (Churchill, 1979; Presser et al., 2004). By means of descriptives (e.g., distributional properties of answers, frequencies) we tried to reveal unclear or inappropriate questions. In addition, a principal components analysis was carried out on the reflectively specified constructs. This type of exploratory factor analysis is a useful tool for data (item) reduction (see e.g., de Heus et al., 1995; Tabachnick & Fidell, 2001c; Iacobucci, 1994). In addition, for the reflective scales we calculated Cronbach's alphas as a measure of internal consistency. Results of these statistical analyses should however be treated with much caution since the required sample size for an exploratory factor analysis is much larger, the more if the factor pattern is relatively unclear (Tabachnick & Fidell, 2001c; Iacobucci, 1994). Therefore, we regarded these results as indicative of potential

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data patterns, rather than as definite, manifest data characteristics. Accordingly, no items were removed solely based on these statistical results.

Step 6: Telephone debriefing

Finally, we conducted a telephone 'debriefing method' (Hunt et al., 1982); we called several respondents and asked them to comment on the questionnaire (e.g., time needed to fill out the questionnaire; difficulty of wording, ambiguousness of questions, sequence of questions, meaning of questions, etc.). We were especially mindful of loaded questions, double questions and ambiguous questions (Payne, 1951), as Hunt et al. (1982) found that these errors are more difficult to detect from pretests. In addition, since debriefing methods are especially suited to discover comprehension problems (Presser et al., 2004), during the telephone debriefing we examined whether all questions meant to the respondents what they were intended to mean (Schwarz, 1999 in Rossiter, 2002).

As a result of the pre-testing phase, several items/questions had to be re-formulated. In addition, 1 item was added for deliberate strategic learning mechanisms for assimilation (assim2). Some items of the moderators were removed. The control variable for the respondent's function was removed as well, since respondents found this irritating and redundant as the respondent's function would already be checked during the telephone survey (section 3.6.2.3.2). The control variable for size (number of FTEs) was changed into a categorical question with four size-categories; when people had to fill out the exact size and they did not know the exact number of employees, they were inclined to leave the question completely unanswered.

After the entire pretesting procedure, the final questionnaire consisted of 81 questions (3 questions related to the control variables and 78 construct items). In Appendix II the final measures are shown.

3.6.2.2.2 Design of the final questionnaire

We chose to do a Web survey since this kind of survey has been shown to demonstrate advantages over traditional mail surveys in terms of speed of delivery and response, ease of data cleaning and, smaller printing, mailing, reminding and coding costs (Cobanoglu et al., 2001; Sills & Song, 2002; Umbach, 2004).

In the final survey the pretest design, layout and structure were kept wherever possible, except in the cases where pretest results had indicated modifications. Instead of using one paper per content domain as we had done in the e-mail questionnaire, here one screen per content domain was used. So, in the Web survey respondents had to click the 'next page' button instead of scrolling down to the next page in the pre-test. The similarity between the pretest and final Web design does not only diminish multi-mode measurement differences but also rests on the methodological argument to use a conventional format for a Website survey, one that is similar to a paper-and-pencil format (Umbach, 2004).

Since a Web survey is a self-administered survey instrument, we were especially mindful of potential measurement error. The importance of question wording has been well recognized in traditional written surveys and applies equally well to the construction of Web surveys. As already mentioned this argument has motivated our pretesting procedures in the first place. Still, there is a growing literature suggesting that also the design of the Web survey could impact on measurement error (e.g., Couper et al., 2001). Hence, we tried

to follow design recommendations as specified in the literature on Web surveys (e.g., the use of few colors, the avoidance of drop-down boxes, Dillman, 2000).

The Website format was developed in consultation with professional Website developers (Cap Gemini). These developers also technically programmed the Website. Respondents' answers were automatically stocked into an excel file, which could be directly read into statistical software. In this way, later data entry errors could be avoided (Zhang, 1999). Before being published on-line, the Website was submitted to extensive testing procedures, by the technical programmers and by ourselves. In order to avoid differences in visual appearance and technical errors, the stability of the Website was tested for several operating systems and browsers (Couper, 2000; Presser et al., 2004) and for all possible exceptional answers.

The final on-line survey consisted of 81 questions, which can be found in Appendix II. The survey was structured as follows.

The first Web page consisted of a general explanation of the research topic and purpose, in order to provide the respondents with some contextual information. Since the telephone survey had already indicated industrial marketing managers' interest in SI (see section 3.6.2.3.2), we hoped to enhance salience by stressing this aspect as being the overall research question of the survey. We were however careful to not reveal the specific research questions in order to (at least partly) avoid hypothesis guessing of the respondents. Hypothesis guessing may result in respondents adapting their behavior/answers, and may consequently threaten construct validity of putative causes and effects (Cook & Campbell, 1979).

Furthermore, key sponsors and researchers were named (STEM, University of Antwerp, CGEY and the Dutch Ministry of Economic Affairs) and their letterhead logos appeared on the Website. In addition, the expected time to fill it out was indicated on this page (15 à 20 minutes)¹². Finally, respondents were informed that the research guaranteed entire confidentiality and anonymity of data to them. It was also indicated that persons wishing to obtain a resume of the research findings could enter their e-mail address at the end of the survey. Respondents were ensured that this e-mail address would only be used to this purpose.

At the bottom of this page, respondents had to submit their personal authorization code before they were able to reach the actual Web survey.

The introductory Web page was followed by an instructions page. Here, the unit and level of analysis, the meaning of some (marketing and/or research jargon) terms and the scaling method were clarified. As recommended in the literature on Web surveys (Dillman & Bowker, 2001) clear and specific instructions about how to navigate through the Website and how to answer questions were provided.

Questions related to the control variables were also included on this page. Respondents were asked to position their company/business unit on a 10-point scale ranging from 10: upstream (supplier of raw material) to 1: end customer. They also had to indicate whether their company/BU was mainly a service or products provider. Both these categories were further subdivided into corresponding BIK categories; 8 types of industrial products (e.g.,

¹² On-line surveys of 15-30 minutes completion time are considered as short and yield a higher response rate than do longer surveys (Deutskens et al., 2004).

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raw materials) and 6 types of industrial services (e.g., maintenance/repair/installation). We finally asked respondents to provide us with the size of their company/BU, in terms of employees (full time equivalents, FTEs). Respondents could choose among the following size categories (largely based on the NIS classification): a small-sized organization was defined as one having less than 100 FTEs, a medium-sized 100-199, a large one 200-499, and a very large one as having more than 500 FTEs.

The remaining part of the Website was structured according to the different content domains being studied. In the concrete, based on the conceptual construct definitions nine different conceptual domains were defined: deliberate strategic learning mechanisms for recognition, for assimilation and for transformation respectively, SIcap, organizational culture (innovativeness & risk taking), cross-functional information dissemination, supply chain information potential (information provision by customers & by suppliers), organizational structure (formalization & centralization), and supply chain innovation potential (innovation stimulus from customers, from suppliers and general chain climate). All items tackling a specific conceptual domain were grouped onto one Web page. For example, all items measuring the cultural constructs of innovativeness and risk taking appeared on web page 7.

Little is known about the exact effects of question order (Bagozzi, 1994a). Even though researchers are sometimes recommended to mitigate items across concepts (see e.g., Andrews, 1984), others argue that grouped items facilitate respondents' cognitive processing (Harrison & McLaughlin, 1996). For the latter reason, Bagozzi (1994a) advises to group questions that tackle similar subjects, in order to "reach the proper address in memory" and to maintain respondents' attention (: 41). So, by bundling the items per content domain, we judged that respondents could better frame the –sometimes complicated– questions, which would in turn enable them to fill out the rather long questionnaire more easily. In addition, specific methodological literature on Web surveys recommends dividing a long survey into several separate Web screens (Dillman & Bowker, 2001). For instance, Couper et al. (2001) found that the completion of a Web survey consisting of multiple items per screen takes significantly less time than the completion of a survey in which a single item per screen appears¹³.

Consequently, nine additional Web pages appeared consecutively: the first three pages measuring the independent variables, a page tackling the dependent variable, followed by five pages on the moderators (culture, cross-functional information dissemination, chain information potential, structure, and chain innovation potential). We followed Salancik & Pfeffer's (1977) advise to reduce common method bias by ordering the items on the questionnaire, such that the dependent variable followed, instead of preceded, the independent variables.

On top of each of the pages a textual progress indicator appeared, informing respondents about the number of screens they already had completed, in function of the total number of

¹³ Consistent with Harrison & McLaughlin's (1996) findings, Couper et al. (2001) found that correlations between items appearing together on a screen are higher than items divided across several screens. Yet, the difference in correlations was rather small and was not found to be significant.

screens of the questionnaire (Couper, 2000; Couper et al., 2001). For example: “This is page 6 of 9”.

Below this progress indicator, the substance of the questions appearing on the page was briefly explained, a procedure which has been recommended by Bagozzi (1994a). For example, for the recognition-measure the following introductory sentence was included, “*The following questions measure the degree your BU (firm) applies general mechanisms in order to gather more information about the market/customers. Please tick the box that applies most to the situation in your company/BU.*” [translated from Dutch]. We included this explanation since several participants in the pilot test complained about, in their view, too similar questions across the different content domains; they felt being controlled and this reduced their motivation to fill out the entire questionnaire. They also indicated that it sometimes stimulated them to adopt corrective or affirmative answer behaviours. Furthermore, these reactions proved that questions were not well understood/framed. By separating the different content domains and by introducing each of them, questions were better contextualized. Furthermore, Andrews (1984) found that this kind of a medium-length introduction (16-64 words) in combination with medium-length questions (16-24 words) yields the highest data quality.

Concerning the answering categories, all moderator-items were measured by means of 5-point Likert scales, in order to be consistent with most of the existing scales used. Answering categories corresponded to a ‘fully agree - fully disagree’ range. Likewise, for the newly developed measures (independent variables and dependent variable) 5-point Likert scales with the same labeling were used, following previous empirical research on formal company (marketing) practices (Reinartz et al., 2004).

An additional ‘not applicable’ category was added to all questions. The box could be ticked if respondents felt they did not have sufficient knowledge to provide a correct answer, or if they thought that the question did not apply to the specifics of their company/business unit. This box was added in order to avoid the ‘missing alternative error’ in questionnaire design (Hunt et al., 1982). The inclusion of an explicit ‘not applicable’ option leads to a higher validity, lower method effects and lower residual error (Andrews, 1984). Furthermore, because of technical requirements, respondents were compelled to fill out an entire page (all questions) before the following page could be downloaded. The inclusion of the ‘not applicable’ category could hence prevent respondents from random answering in order to be able to proceed with the survey.

The corresponding meaning of all six answer categories was repeated on top of each Web page. After each item, six radio buttons (one for every response option) were shown; the 5 buttons for the Likert categories were horizontally aligned, beside them, though separated by a blank space and a black line, the ‘not applicable’ button was shown. We did so because research has shown that a non-substantive response option should visually be separated from the substantive options, since respondents consider the visual midpoint of the scale as the conceptual midpoint (Tourangeau et al., 2004).

On the final (twelfth) Web page respondents were thanked for their co-operation. As research on industrial response rates has shown that the non-monetary incentive of offering the study results can positively influence the likelihood of response (Diamantopoulos & Schlegelmilch, 1996), respondents could leave us their name and e-mail address to receive a summary report of the research results. As already mentioned, this information was not

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compulsory, as we wanted to guarantee entire anonymity and confidentiality to the respondents (Umbach, 2004; Diamantopulos & Schlegelmilch, 1996).

3.6.2.3 Sampling strategy

While pretesting procedures can help to reduce measurement error, sampling strategy is of major importance to issues of sampling error, noncoverage error and nonresponse error (see Figure 3.3).

3.6.2.3.1 Respondent type

We already mentioned self-reports as one of the most prominent data collection methods in social and management science. In addition to the use of self-reports, the strategy literature is characterized by the frequent use of *single* respondents to make inferences about an organization's situation (strategy, environment, processes, etc.) (Cycyota & Harrison, 2002). More specifically, management researchers often rely on top-level managers as key informants of organizational processes (Venkatraman, 1989). The most cited references used to justify the use of these single respondents are the contributions by Snow & Hrebiniak (1980) and Hambrick (1981). These authors argue that a CEO or highplaced manager are the best positioned respondents to describe the entire organizational system, since they typically do have access to information about how the total system operates, whereas lower-placed managers do not (Snow & Hrebiniak, 1980). In similar vein, Parcel et al. (1991) argue that for organizational-level data employee reports are more erroneous than manager reports. Consequently, also in the marketing literature, surveying marketing managers/executives to examine an organization's marketing (knowledge) processes and strategy has been a popular data collection technique (e.g., Hult et al., 2005; Slater & Olson, 2001; Han et al., 1998; Joshi & Sharma, 2004; Reinartz et al., 2004; Tsai & Shi, 2004).

Following these arguments, marketing managers or persons in charge of marketing strategy seemed to be the best placed respondents in the context of our research questions, something we had also experienced during the qualitative research phases. One could moreover argue that if even people in charge of the organization's marketing strategy were not able to answer the questionnaire, probably nobody else in the organization would be (Mathews & Diamantopulos, 1995).

In the concrete, the questionnaire was administered to one person per organization or business unit; namely, the person who was in charge of marketing strategy. In large organizations this is usually the marketing manager; in small companies, setting the marketing strategy often comes within the CEO's area of responsibility. Powell (1992) and Zahra & Covin (1993), amongst others, argue that in small, specialized or diversified businesses CEOs are appropriate single respondents (Bowman & Ambrosini, 1997; Norburn, 1989). In the telephone survey (cfr. *infra*) it was ensured that all respondents did indeed meet the aforementioned respondent condition.

Although in our study marketing managers seemed to be the most appropriate respondents, we still do acknowledge the potential bias in single-informant self-report studies. For example, Bowman & Ambrosini (1997) warn for the use of single respondents as they found that answers among different members of an organization's management team may

be inconsistent. The potential incongruence between the theory's level of analysis (organization/BU) and the level of analysis of measurement (the individual marketing manager) may lead to biased results (Klein et al., 1994). The measures of the independent constructs measured the actual application of deliberate strategic learning mechanisms; these questions thus left little interpretation to respondents. However, the dependent variable and moderators were more susceptible to interpretation heterogeneity among organizational members. Even though respondents were explicitly asked to answer all questions at a company/BU level of analysis, their personal interpretation (and knowledge) of organizational and environmental characteristics may have shaded their answers. Hence, level of analysis bias was most likely to occur regarding the measurement of the dependent variable and moderators.

Ideally, we should have incorporated the answers of several respondents per organization. Before analyzing the data, measures of internal consistency could have been calculated per organization. If these proved satisfactory, an average score of all respondents' answers could have been calculated per organization, and this score could have been used in the final data analysis. If, on the contrary, answers lacked internal consistency, these data (this organization) should have been excluded from the final analysis (Bowman & Ambrosini (1997). Yet, the telephone survey and steps 3, 5 and 6 of the pretesting procedure suggested possible response rate problems in the target sample. In addition, already in the qualitative phase we experienced problems of participation. In order to optimize the usability of the research data we accordingly decided to limit the survey to a single-respondent study. With hindsight, this decision proved to be the correct one. When taking into account the relatively low response rates we obtained, even when using only one respondent per organization (see later, Table 3.10), including the requisite of several respondents per organization would probably have led to an even lower amount of usable data. This does however not change the need to treat the single-responses with caution.

3.6.2.3.2 Construction of the sample

We opted for a probability-based Web survey, more specifically a 'pre-recruited panels of Internet users' method (Couper, 2000: 487-488). In this approach, firstly a probability sample of the target population is drawn. Non-Internet methods (e.g., a telephone survey) are then used to elicit initial cooperation and to obtain e-mail addresses. Persons who agreed to further cooperate on the Web survey are then sent an e-mail request to participate in the Web survey (Couper, 2000).

In the concrete, a telephone survey took place from June, 17 until July, 7 2003 in the context of the overall research project. Although this survey tackled the phenomenon of SI its results are of no further interest to the current research questions¹⁴. The telephone survey is nonetheless of importance to the sampling of the Web survey, since we could not approach the sample directly by means of e-mail (we did not have a list of marketing managers' e-mail addresses). In addition, the telephone survey could be used as a pre-notification instrument, which is a response-inducement technique highly valued by industrial respondents (Diamantopoulos & Schlegelmilch, 1996).

For the *telephone* survey the sample was constructed as follows. Firstly, the population of all Dutch industrial companies was selected based on BIK-codes. From this population a

¹⁴ The results of this research have been published elsewhere, see Matthyssens et al. (2004).

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stratified, proportional random sample (the proportion of each stratum within the sample is the same as its proportion within the population; within each stratum the sample is randomly selected) of 2970 companies, or one third of the population, was extracted. 8 strata were defined: both industrial product and service companies (based on BIK codes) were classified into 4 categories of company sizes (number of employees (FTE): 1-99, 100-199, 200-499, +500). Companies were selected from the DMCD company database; this database is proprietary of Marktselect and contains more than 95% of all Dutch companies, which makes it a frequently used database for sampling in the context of Dutch business-to-business research.

During the telephone survey it was checked whether the respondent was indeed in charge of the organization's or business unit's marketing strategy. In addition to several questions specific to this telephone survey's research topic, respondents were asked about general company demographics. At the end of the telephone conversation, respondents were asked whether they were willing to participate in a subsequent Web survey. It was also verified whether they had access to the Internet to do so. These persons provided us with their e-mail address. One could still argue that response rates could have been increased if we had asked all telephone respondents' e-mail address without formally asking for their participation in the Web survey. All these persons could then have been invited to participate in the on-line survey. Yet, chances are low that individuals who declared themselves not willing to further take part in a Web survey, would eventually have done so when being sent an e-mail invitation. Furthermore, researchers have been warned to especially take the ethical issues of Web surveys into account. Some people consider unannounced e-mails to participate in a Web survey irritating or even threatening, which may in turn lower response rates (Umbach, 2004). Furthermore, with hindsight, a fairly high percentage of respondents to the telephone survey expressed their willingness to further participate in the study (75.5%, or 616 out of 816 persons, see Table 3.10 further in the thesis).

Mid July 2003 all persons who had volunteered to take part in further research were sent an e-mail invitation to participate in the Web survey. This e-mail message was very simple (text format instead of HTML) and explained briefly the research purpose, the sponsors and the time needed to complete the survey. We decided to provide this information in the invitation e-mail since, in contrast to a traditional written questionnaire, respondents could not, before deciding to participate, examine the contents of the questionnaire (Crawford et al., 2001). The message also contained a reference to the previous telephone survey where persons had expressed their willingness to co-operate, the Website link to the on-line survey and a personal authorization code to enter the Website. This code was randomly created and assigned and could only be used once. All persons received a similar e-mail message as research has demonstrated that personalization of the e-mail contact does not affect Web survey response rates, in contrast to findings in the context of traditional paper surveys (Porter & Whitcomb, 2003).

3.6.2.3.3 Coverage and sampling error

Coverage error is an often cited threat to Web surveys. A coverage error is a mismatch between the target population, about which one wants to make inferences, and the frame population, a subset of the target population based on method of access (Couper, 2000;

Henry, 1998). The frame population could thus be considered as a sort of operationalization of the target population; the frame population consists of the records from which the sample is drawn in order to represent the target population (Grandcolas et al., 2003; Dillman, 2000). Coverage error thus occurs if not every unit in the survey population has a known, non-zero chance of being included in the sample. In other words, the list from which the sample is drawn (the frame population) does not include all elements of the population (Dillman, 2000).

As all respondents were first approached by telephone, the frame population for the telephone (and for the Web) survey consisted of all Dutch industrial companies having a telephone number that have been included into the DMCD database. Since the DMCD database is one of the most comprehensive lists of all Dutch companies and since it is plausible to assume that almost all of these companies have a telephone number, the frame population is a reasonable approximation of the target population. From this frame population a stratified sample was selected for the telephone survey. Since all Dutch industrial companies of the DMCD database having a telephone number had an equal chance of being sampled for participation in the survey, the noncoverage rate is small; coverage error did occur for the less than 5% of companies that have not been included in the DMCD database or that do not have a telephone number.

In contrast to coverage error, sampling error relates to the fact “that certain members of the population are deliberately excluded by selection of the subset of members for which responses were obtained” (Dillman, 1991: 227). Following this definition, a sampling error¹⁵ may have occurred for the Web survey as having an e-mail address and access to the Internet were conditions to participate. Yet, as only 8 respondents to the telephone survey willing to take part in the Web survey did not have an e-mail address and Internet access, this source of sampling error is minimal. In addition, the proportionate stratified sampling method we used for the telephone survey is said to reduce sampling error (Henry, 1998). Still, the Web sample rests upon telephone respondents who expressed their willingness to take part in the subsequent study. It is plausible to assume that respondents who have a larger interest in the study’s object would be more willing to further participate. They may belong to companies that are either very active in SI, or that, in contrast, experience the need to become more active in SI. Although topic salience can be considered as an inherent threat in survey research: no matter how large our sample, its representativeness of the target population may be threatened because of this reason (Umbach, 2004; Grandcolas, 2004).

In addition to an incomplete sample, the inclusion of answers of respondents who were not included in the population may also pose a threat to a representative sample. This is exactly why an authorization code was used. This code prevented persons not included in the sample from participating to the survey, and limited hence this source of sampling error (Umbach, 2004).

Finally, as sampling error is also determined by the relative number of responses, the issue of nonresponse error will be tackled in the following section.

¹⁵ Couper (2000) wrongly calls this a coverage error. This would have been a coverage error only on the condition that the sample were *drawn* based on e-mail addresses instead of on telephone numbers.

3.6.2.4 Nonresponse error

Nonresponse error is “a discrepancy between the frequency of a population characteristic and that estimated by the survey that occurs because some people did not respond” (Dillman, 1991: 229). It may endanger the generalizability of findings (external validity) and the inference quality (internal validity) of conclusions (Sills & Song, 2002; Henry, 1998). Nonresponse error is a function of both the rate of nonresponse and of the differences between respondents and non-respondents to a survey (Couper, 2000) in terms of demographics, attitudes or the variables of interest in the study (Umbach, 2004). We will first tackle (non)response rate.

3.6.2.4.1 Response rate

In order to be able to generalize survey results to a population, the sample should accurately reflect the true population (Cobanoglu et al., 2001). As a consequence, researchers should try to obtain high response rates.

Although studies on response rate (and response quality) in traditional mail surveys, let alone in Web surveys in particular, still lack clear findings and recommendations, overall, the literature agrees on the value of monetary incentives, advance notification and follow-ups (Diamantopoulos & Schlegelmilch, 1996; Deutskens et al., 2004). Yet, these findings on traditional mail surveys are not per definition generalizable towards Web surveys (Deutskens et al., 2004). Furthermore, the majority of these (sociological and consumer marketing) studies apply to individual-level contexts involving consumer, public and employee opinions and attitudes. The assumption that findings about the effects of response enhancing techniques in these areas can automatically generalize to firm-level surveys of company executives remains very doubtful and has been rejected by several studies (e.g., Roth & BeVier, 1998; Cycyota & Harrison, 2002; Tomaskovic-Devey et al., 1994). This has been exemplified by Diamantopoulos & Schlegelmilch’s (1996) observation that in industrial surveys, the use of monetary incentives is rare and is not highly valued by industrial respondents as an effective response inducement instrument. Since, in addition to this finding, the project’s budget did not leave room for monetary incentives, we decided not to include them.

The response inducement techniques we did use were: a non-monetary incentive (resume of the research results), pre-notification calls (the telephone survey, cfr. supra) and follow-up reminders (Umbach, 2004). We did so since these instruments have been found to be very effective in either industrial samples (Roth & BeVier, 1998; Diamantopoulos & Schlegelmilch, 1996; Erdogan & Baker, 2002; Jobber & O’Reilly, 1998) or on-line surveys (Deutskens et al., 2004).

Concerning the follow-ups, we adopted Couper et al.’s (2001) guidelines with regard to Web surveys to send an initial e-mail notification, followed by 2 reminder e-mails. No guidelines have been developed about the exact time period between the initial request and the follow-up reminders. In general, since response time in an on-line survey is relatively short, the reminder follow-ups should be sent early (Deutskens et al., 2004). Still, we wanted to make sure that most of the technical problems were solved before sending reminders. Due to the Summer period, many of the Web programmers however went on holidays, which considerably retarded the fixing of technical problems. In addition, the fact that several respondents were to be expected to be on holidays as well, the average

response time was extended. Therefore, we decided to leave enough time between subsequent reminders. Consequently, after 4 weeks (mid of August 2003) a first reminder e-mail was sent to all persons (as total anonymity had been guaranteed, we could not trace who had already responded and who had not). Another 90 persons responded to this reminder. After another four-week period (mid September 2003) a second, final reminder e-mail was sent, which resulted in 26 additional respondents. A total of 339 persons responded to the Website survey. Details of response rates can be found in Table 3.10.

Table 3.10: Response rates telephone and web survey

TELEPHONE SURVEY	
Sample size	2970
Sample size relative to population	2970/8984=33.1%
Number not deliverable	598
Effective sample size (= sample size - number of undeliverable)	2372
Telephone surveys answered	816
Raw response rate (= surveys answered/sample size)	816/2970=27.5%
Adjusted response rate (= surveys answered/effective sample size)	816/2372=34.4%
WEB SURVEY	
Sample size (= persons willing to participate in web survey)	616
Sample size relative to population	616/8984=7%
Sample size relative to original telephone sample	616/2970=21%
Sample size relative to effective telephone sample	616/2372=26%
Effective sample size (= sample size - number of undeliverable):	616 - 8 (not having e-mail address) - 11 (incorrect or obsolete e-mail address) =597
Web surveys completed first wave	223
Web surveys completed after first reminder e-mail	90
Web surveys completed after second reminder e-mail	26
Total Web surveys completed	339
Raw response rate (= surveys answered/web sample size)	339/616=55%
Adjusted response rate (= surveys answered/effective web sample size)	339/597=56.8%
Response rate relative to effective telephone sample	339/2372=14.3%
Response quality of raw web sample (% of respondents who completed the entire survey)	188/616= 30.5%
Response quality of effective web sample (% of respondents who completed the entire survey)	188/597=31.5%
Response quality relative to effective telephone sample	188/2372=7.9%

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Since the survey contents was developed from interviews and focus groups with the same type of respondents (persons in charge of marketing strategy) and since the topic proved to be relevant to these executives during the telephone interview, we can reasonably assume that a sufficient degree of topic salience existed among the sample (Tomaskovic-Devey et al., 1994). Furthermore, we applied popular response-inducement techniques (pre-notification, follow-ups). Still, as can be seen in Table 3.10, the response rate remained relatively low. Only (339/2372) 14.3% of the original effective telephone sample responded to the on-line survey. The response rate relative to the web sample (i.e. the telephone respondents willing to further participate in the web survey) showed however better figures: a raw response rate of 55% was obtained; the effective response rate amounted to no less than 56.8% (see Table 3.10). Yet, response quality showed a far worse picture; due to incomplete responses only 188 of the 339 questionnaires (30.5% of the raw web sample, 31.5% of the effective web sample) were usable. This implies that only approximately 8% (188/2372) of the effective telephone sample could be used for further analysis.

Overall, (also Dutch) response rates have shown a long-term decline over the years (Shaw et al., 2002). Particularly in the context of organizational and business studies (executive populations and firm level issues), nonresponse is considered as a common problem (Dillman, 2000; Tomaskovic-Devey et al., 1994; Cycyota & Harrison, 2002). Low response rates are typical in industrial mail surveys due to for example respondents' time pressure or company policies that prohibit employees' participation in surveys (Paxson, 1992). More precisely, an organizational survey differs from an individual one in that participation is not only determined by individual willingness but in that it also lies within the organizational processes that determine a respondent's authority (dependent subsidiary versus independent establishment or headquarters), capacity (knowledge may be dispersed which may increase the survey's time burden) and motive (organizations in a specific type of sector may be more interested in the research topic, employee identification with firm goals may be higher in smaller firms which may increase response rate, etc.) to respond (Tomaskovic-Devey et al., 1994).

Hence, while suggested response rates for traditional mail surveys of the general public range from 50% to even 80% (Roth & BeVier, 1998), for industrial mail surveys, estimated response rates fall in the range of 10-20% (Paxson, 1992). Since few exact guidelines exist, we also examined by ourselves recent publications in prominent marketing journals and found that in studies where surveys of marketing managers were used, on average, a response rate of 15-20% was obtained for traditional mail surveys (e.g., Menon et al, 1999; Reinartz et al., 2004; Joshi & Sharma, 2004). This is also what Baker (1992) considers a 'good' industrial response rate in Europe (Erdogan & Baker, 2002). "Such low response rates are typical and accepted [...] researchers surveying business and industry also consider low response rates to be inevitable and acceptable" (Paxson, 1992: 195).

Still, the problem of low response rates becomes even worse in the context of on-line surveys. Web surveys have been found to show, in general, lower response rates than traditional paper-and-pencil surveys (Couper, 2000; Umbach, 2004). Although to date, research lacks a deep insight into the specific causes of nonresponse in Web surveys, typical factors found include membership to a racial and ethnic minority, low education

and limited financial resources (Zhang, 1999). These findings are however based on studies of the general public and do hence not apply to the marketing executives we targeted. Another hypothesized cause of Web survey nonresponse is related to Internet surveys' technical complexity (Couper, 2000); inadequate Web browsers, unreliable connections and other technical problems may discourage persons from completing the survey (Umbach, 1999). Based on respondents' e-mail reactions we received, we can hypothesize that technical complexities and breakdowns were indeed a main cause of nonresponse or incomplete response. Finally, Grandcolas et al. (2004) posit that low on-line response rates are due to an over-surveying effect, similar to this found in telephone surveys. This so-called over-surveying effect is probably even more present among industrial respondents (like the ones we targeted) than among the general public; Or, as Diamantopoulos & Schlegelmilch (1996: 509) put it: "Executives of major companies [...] are practically inundated with questionnaires from academic researchers".

Furthermore, it has been demonstrated (Couper, 2000) that nonresponse is a major drawback specifically in the type of Web survey we applied. "Nonresponse is likely to be the biggest concern and can occur at many stages of the process. Initial nonresponse to the RDD survey [...] Further sample losses may occur during the telephone interview, where respondents (deliberately or otherwise) claim not to have Internet access or fail to provide a valid e-mail address. Finally, even among those who have Web access and agree to do the Web survey, many may fail to do so when sent the invitation" (Couper, 2000: 488). Couper (2000) further refers to Flemming & Sonner (1999) who report that on average, only 36% of persons contacted by telephone provide their e-mail address for a further Web survey. Of these 36% of people only one third does eventually complete the Web survey, which leads to an overall response rate of only 12%. In our case (see Table 3.10), the adjusted response rate for the telephone survey was only (816/2372) 34.4% which considerably limited the sample size of the on-line survey. Still, no less than 75,5% of the telephone respondents wanted to participate (616/816). More than half of these people eventually did so (339/616), which amounted to (339/816) 41.5% of the telephone respondents, or (339/2372) 14.3% of the original effective telephone sample. Because of incomplete responses, the final usable response rate relative to the total number of telephone respondents was (188/816) 23%, which is still much higher than the amount Fleming & Sonner (1999) predict. Flemming & Sonner (1999) do however not provide any guide number on the usable number relative to the effective telephone sample; this was only (188/2372) 8% in our case. In conclusion, the largest data losses occurred because of the low response rate to the telephone survey and the large number of incomplete surveys.

To conclude, the low response rate we obtained seems still acceptable given the specificities of the survey context: a Web survey, where firm-level data are gathered from a sample of busy marketing executives. Thomaskovic-Devey et al. (1994: 456) even state that "because most organizational research relies on case studies or very limited samples, it should be remembered that even a sample survey with a low response rate is likely to produce more generalizable results than a design that does not attempt to contact a general sample at all". We remain however cautious about the potential response bias (and consequently the threats to external and internal validity) a small response rate can produce. We are also mindful of this low response rate as being indicative of low respondent involvement. Low involvement respondents are said to respond in a more

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effort-saving way, potentially resulting in stronger item-to-item consistencies and carryover effects (Feldman & Lynch, 1988; Tourangeau & Rasinski, 1988 in Harrison & McLaughlin, 1996). On the other hand, since participating to the survey was not compulsory and since topic salience can be assumed, respondents who did respond could also be considered as being *more* involved than non-respondents (Harrison & McLaughlin, 1996).

Statistical techniques to analyze research data are only appropriate to the degree that the research data come from a probability sample (Gentry & Hailey, 1981). Since nonresponse occurred, the likelihood exists that the responses obtained are not randomly distributed in relation to the target population (respondents may possess distinct characteristics than the original probability sample). Consequently, the quality of probability sampling may be lost. This implies that response inducement techniques do not automatically improve the accuracy of survey results by increasing response rates. Inducement techniques may even generate sample composition bias when they urge only some specific type of respondents who systematically differ from the sample frame. Consequently inducement techniques may also *increase* response bias (Jones & Lang, 1980.) Since this can threaten the validity of results, even for response rates as high as 90%, it is crucial to also compare respondents to nonrespondents (Miller & Smith, 1983).

3.6.2.4.2 Differences between respondents and nonrespondents

First, we will compare the sample compositions in the different survey stages. Then, differences between respondents and nonrespondents to the Web survey are tested.

Of the original telephone sample size of 2900 companies 598 respondents could not be reached because of wrong telephone numbers or premature bankruptcy. Of the effective sample size of 2372 companies (2900-598), only 816 did participate in the telephone survey (see Table 3.11). As could be expected, quite a large number (866) refused to participate for lack of time, company policies or an over-surveying effect. 22 did not master the Dutch language, and the remaining 668 persons could not be reached (no answer on telephone, answering machine or busy signal).

Table 3.11 shows the proportion of each stratum in the total response to the telephone survey (column 1) and compares this to the proportion of the stratum in the population (column 4). Population estimates are based on the Amadeus database (2004). Studying these figures makes clear that product companies are relatively over-represented in the telephone data, with the exception of product companies with more than 500 FTEs. These findings are supportive of the hypothesis that the probability of survey responding decreases with firm size (Cycyota & Harrison, 2002); in large firms information is more dispersed (which decreases respondents' capacity to respond) and employee identification with firm goals is lower (which decreases respondents' motive to respond) (Tomaskovic-Devey et al., 1994). Yet, this line of reasoning makes the very large under-representation of small service companies even more remarkable.

Table 3.11: Sample composition (strata): telephone and web respondents

Stratum	Telephone response relative to total telephone response	Persons willing to participate in Web survey	Usable Web response relative to total usable Web response	Proportion relative to total population
Products 1-99 FTEs	17.9%	17.2%	18.3%	5.2%
Products 100-199 FTEs	21.9%	22.4%	15.0%	6.7%
Products 200-499 FTEs	21.7%	21.9%	14.2%	7.4%
Products +500 FTEs	5.1%	4.7%	15.0%	5.4%
Services 1-99 FTEs	8.0%	8.0%	14.2%	47.4%
Services 100-199 FTEs	9.8%	10.7%	5.8%	9.4%
Services 200-499 FTEs	9.4%	9.1%	10.0%	10.3%
Services +500 FTEs	6.1%	6.0%	7.5%	8.2%
Total	100% = 816 cases (total telephone response)	100% = 616 cases (total tel. respondents willing to participate in Web survey)	100% = 188 cases (total usable Web response)	100% = 8984 cases (total population)

a) Sample composition: Web volunteers versus non-volunteers

Concerning the telephone respondents, we can compare persons willing to participate in the subsequent Web survey to the non-volunteers (Couper, 2000) on stratum and position in the supply chain. Table 3.11 (column 2) shows the characteristics of marketers willing to take part in the Web survey. The over-representation of product companies (1-499 FTEs) and the under-representation of small service companies (1-99 FTEs) among the telephone respondents remain in the group of persons willing to participate in the Web survey (see column 2). Consequently, since the latter group will function as the final Web sample, chances are quite high that the final Web survey data will be biased towards (in particular, small) service companies and that they might apply more to product than to service companies.

As regards the position in the supply chain both the telephone respondents and the web volunteers (population data not available) show a slight over-representation of midstream companies, at the detriment of the number of upstream companies (see table 3.12).

Table 3.12: Chain position: telephone respondents and web respondents

Supply chain position	Proportion of telephone respondents	Proportion of persons willing to participate in Web survey	Proportion of usable web responses
Upstream	23.7%	24.7%	32.4%
Midstream	42.3%	42.7%	35.1%
Downstream	34%	32.6%	23.4%
Total	100% (816 cases)	100% (616 cases)	100% (188 cases)

b) Sample composition: Telephone respondents versus Web respondents

Firstly, response bias to the Web survey could be examined by comparing telephone survey respondents to the usable Web survey respondents¹⁶ (188 cases, see chapter 5, section 5.1) on general company characteristics (Couper, 2000). Once again, they were compared on stratum and position in the supply chain.

The stratum should however be interpreted with caution. In the telephone survey we knew the official stratum of each respondent. In contrast, in the Web survey we did not know to which stratum the respondent's company *officially* belonged. We could not trace the stratum from the telephone survey as we guaranteed complete anonymity to the Web respondents. We tried to estimate the stratum since the web survey explicitly asked whether participants worked for a service or product company. Yet, we did not know the exact company size, as we asked for the size of the *BU*. This means that for multi-unit companies, respondents provided us with the size of their *BU*. This implies that the mean company size given in the Web survey will be smaller than the strata figures in the telephone survey. As was expected, the spread of the final Web respondents among the different strata shows a different pattern than those of the telephone respondents and the Web volunteers (see Table 3.11, column 3). The expected increase in small companies was however only demonstrated for the amount of small service companies, which remained small in comparison to population data, though their under-representation became less sharp. All product companies were over-represented in the final dataset, including the very large product companies (+500 FTEs). This means that of the respondents willing to further participate in the study, far more marketers of very large product companies actually did so. Also, medium-sized service companies (100-199 FTEs) became less well represented in the final data set. Still, the final data set parallels the telephone respondents and Web volunteers as regards the overall ratio of product versus service companies: the final dataset too seemed more representative of Dutch industrial product than service companies.

Table 3.12 also shows that the final data set is more equally spread across up-, mid- and downstream companies. Even though the relative share of midstream companies is largest, overall, companies are well spread among the different supply chain positions.

¹⁶ We could however not compare respondents to the telephone survey who had also completed the Web survey to respondents who only had completed the telephone survey, because in order to guarantee total anonymity to the Web respondents we could not trace the specific persons who had completed both the telephone and the Web survey among the telephone respondents.

In order to compare the final Web respondents and nonrespondents in a more profound way, scores on the theoretical variables of interest should be compared as well. Yet, the telephone survey did not gather information on these constructs; obtaining data on the theoretical constructs had motivated the conduct of the Web survey in the first place. It was hence impossible to conduct a more precise statistical analysis of nonrespondents by comparing the telephone and the web respondents. In order to do so, early and late respondents to the Web survey were compared.

c) Comparison of early and late respondents to the Web survey

Firstly, several nonrespondents were randomly contacted and asked for the reason of their nonresponse. Lack of time was the main motive for *complete* nonresponse; (persistent) technical problems were the underlying reason of *incomplete* response.

Then, we tested nonresponse bias statistically. After having removed missings and outliers which may distort the analyses, we assessed the non-response bias of the final dataset (182 cases, see chapter 5).

A generally accepted estimation method for nonresponse bias is to compare early versus late respondents (Van der stede et al., 2005). Comparing early respondents to late respondents is a time trend extrapolation test, which rests on the assumption that respondents who respond less readily (i.e. answering later or requiring more prodding to answer) are similar to non-respondents (Armstrong & Overton, 1977). If information obtained from late respondents compares favorably to information from early respondents, it can be assumed that the received responses are representative of a probability sample of the population (Gentry & Hailey, 1981).

The only drawback of this method is that, so far, a standardized definition of ‘early’ or ‘late respondents’ does not exist. We hence initially wanted to follow Lindner et al.’s (2001) guidelines to operationalize late respondents as respondents to the last wave (last follow-up, i.e. after the second reminder) and to compare these to respondents to the first wave (i.e., those having answered before a reminder was sent). Yet, in order to ensure sufficient statistical power each group should consist of at least 30 respondents (Lindner et al., 2001). After the removal of missings and outliers the third wave-group only consisted of 14 cases, and would thus have too limited statistical power. In this case, Lindner et al. (2001) propose to define the late respondents by combining responses of the last two waves. This makes sense as both these groups needed to be urged to respond in contrast to the first wave of respondents. We hence compared the respondents of the first wave (118 cases) with respondents of the last two waves ($50 + 14 = 64$ cases).

As already mentioned, not only the comparison of company demographics can provide insight into the quality of sample response (e.g., service firms might be more interested in the research subject than product firms), but also values on specific variables of interest may explain the willingness of specific respondents to cooperate to the study (Gentry & Hailey, 198; Couper, 2000; Dillman, 1991). Accordingly, we compared both groups on general company characteristics (size, position in the supply chain, product or service company by means of chi square tests) and on all theoretical constructs as well (PLS construct scores and average moderator values, see chapter 5, by means of independent samples t-tests). Results showed no significant differences on any variable ($p_{2\text{-tailed}} > 0.05$). We repeated the extrapolation analysis by splitting the entire sample into three equal

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groups and compared the first one-third of respondents to the last one-third (Joshi & Sharma, 2004). The analysis yielded similar –insignificant– results. Results hence suggested that a threat of non-response bias could not be discerned.

3.6.2.5 Characteristics of the final data set

In Table 3.13 the characteristics of the final data set are shown.

Table 3.13: Characteristics final dataset

		Category	Percent
Company/BU size (in FTEs)			
		Small (1-99)	30.4
		Medium (100-199)	21.7
		Large (200-499)	25.2
		Very large (+500)	22.6
Main activity type			
		Products	59.9
		Services	40.1
Main activities	Products	Raw material	3.8
		Finished materials & semimanufactures	12.6
		Machine components & semimanufactures	7.1
		Finished machines & devices	15.9
		Equipment, Manufacturing supplies & Spare material	3.8
		Office supplies	0.5
		Finished consumer products	11.5
		Other	4.4
	Services	Maintenance, Repair & Installation	9.9
		Control (security, technical)	0.5
		Transport, Storage & Logistics	1.1
		Wholesale & Dealership	2.7
		Consultancy, Counseling & Training	15.4
		Other	10.4
Position in supply chain			
		Upstream	33.0
		Midstream	34.6
		Downstream	32.4

Business units (firms) in the different size categories are more or less evenly distributed in the final data set. Company size proportions reflect well population distributions (Amadeus database), with the exception of the under-representation of small companies. This under-representation is quite notable since population data are based on company sizes whereas

sample data are based on BU (or firm) sizes (see section 3.6.2.4.2 b), the latter probably being smaller.

Concerning the BU's main activities the final data set consists of more product companies than service companies. Particularly, when contrasted to population data (only 25% product companies) this over-representation seems in fact more severe.

When compared to population data, type of activities are relatively well spread, with the exception of an under-representation of 'consumer products' companies, 'transport, storage & logistics' and 'other services' companies. In contrast, 'consultancy, training & counseling' companies represent a larger share in the survey data than they do in the population. Finally, all positions in the supply chain do more or less equally appear. Population data on supply chain position were not available.

In sum, bearing in mind the findings of the nonresponse analysis and the data in Table 3.13, findings of subsequent analyses may be biased in favor of product companies. In addition, findings may apply less to small service companies. Nonetheless, results of further analyses will be generalizable to all positions in the supply chain and to all values of the theoretical variables of interest. For example, findings will not be restricted to companies with a high/low SICap, a specific organizational culture, specific deliberate strategic learning mechanisms, etc.

3.6.3 Analysis

The data we gathered during the QUAN-phase were analyzed by means of structural equations modeling (SEM).

3.6.3.1 General characteristics of structural equations modeling

SEM is known by many (sometimes confusing) names, amongst others 'covariance structure analysis', 'latent variable analysis', or even 'LISREL analysis' (LISREL is a popular software package for executing SEM analyses). SEM actually originates from a combination of several research traditions.

Firstly, it is rooted in a psychometric perspective where concepts are being considered as latent variables. A latent variable is then defined as a 'hypothetical construct' (McDonald, 1996), or "an unobservable construct [which] is a theoretical notion that is not directly measurable, but is useful nonetheless. [...] (Iacobucci, 1994: 279-280). Being not directly observable, a latent variable can only be inferred from multiple measured variables (also called manifest variables, indicators, or observed measures).

SEM further stems from an econometric approach, resting on a strong theoretical specification as a condition to the estimation of parameters and prediction (Chin, 1998a). Since SEM requires a clear definition of constructs and functional relationships, it adds a degree of precision to a theory (Hulland, 1999).

Thirdly, it shares with the sociological tradition the notion that theoretical variables are ordered, and that types of effects can be decomposed (Falk & Miller, 1992). SEM can consequently be used in order to study more complex theories and frameworks.

Basically, SEM answers typical multiple regression research questions involving factors. In its simplest form, where all variables are directly observed (no latent variables) and

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where only one dependent variable is taken into account, SEM is in fact nothing different from a multiple regression (Rigdon, 1998). However, the major advantage of SEM lies in its possible extensions; it is a collection of statistical techniques that permit to estimate multiple and interrelated dependence relationships (Hair et al., 1998). This means that SEM simultaneously tests a series of separate, interdependent multiple regression equations (the so-called ‘structural equations’) while also being able to simultaneously study more than one dependent variable (Shook et al., 2004).

In addition, as already mentioned, *latent* variables can be included into these relationships. A SEM model thus consists of a set of linear equations among latent (or observable) variables (Rigdon, 1998), with some parameters fixed and others free to be estimated.

Because of the mathematical complexity of this method, many scholars prefer the use of a graphical representation. In the most well-known convention (e.g., Bagozzi, 1984) observable variables are enclosed in rectangular boxes. The latter are then linked to ovally represented latent variables, which are in turn linked to each other by an arrow. The arrowhead represents the direction of the relationship, with a single-headed arrow indicating a recursive (or directional) relationship and a double-headed one meaning a reciprocal relationship.

A SEM model contains two –conceptually separated– parts. The relationships between the latent variables and their respective manifest indicators (i.e., the link between observations and theoretical constructs) are referred to as the ‘measurement model’ or ‘outer model’. The relationships among the latent variables (path model) are called the ‘structural model’, or ‘inner model’ (Williams et al., 2003; Falk & Miller, 1992). As the model is split into these two different parts, the assessment of the psychometric quality of the measurement model is explicitly included in the model testing process (Williams et al., 2003). In this way, reliability and validity of the measures are tested in the same context that is being used for assessing the structural relationships (Ullman, 2001). This is an important advantage over traditional methods (e.g., multiple regression) where the assumption is that once scales have been proved to be sufficiently reliable and valid they are ‘portable’ to other theoretical contexts. Yet, studies have refuted this assertion and it is now more and more believed that the measurement quality of latent variables should be addressed in each specific research context separately (Barclay et al., 1995). Researchers wanting to take full advantage of this SEM feature should hence better make use of multiple-item measures for each construct in their model. Including only one indicator per construct ignores unreliability of measurement, which is specifically one of the problems SEM was designed to solve (Baumgartner & Homburg, 1996). Further advantages of multi-item measures include the ability to average out the specificity of each individual item and the ability to distinguish respondents between more groups than the number of answering categories (Churchill, 1979).

SEM can hence be used for testing measurement issues, for testing structural relationships, or for both simultaneously (Baumgartner & Homburg, 1996).

Since the development of a general SEM methodology and, in particular, since the development of different SEM-software programs, SEM has become a popular research method in the behavioral and social sciences (Baumgartner & Homburg, 1996). The use of SEM in management research dramatically increased from the 1980s onwards (Scandura & Williams, 2000). This growing interest in SEM probably stems from the method’s

benefits in assessing complex theoretical models (webs of relationships among multiple constructs), as well as from its potential to assess measurement issues (Bagozzi & Baumgartner, 1994; Steenkamp & van Trijp, 1991). Moreover, SEM's recent extensions offer good prospects for even more complicated research questions, such as the study of measurement invariance in multi-sample research (Vandenberg & Lance, 2000), the estimation of method variance, and the use of hierarchical moderated regression models (Scandura, & Williams, 2001) and multidimensional constructs (Edwards, 2001)¹⁷.

In marketing research, the method's popularity has undoubtedly flared thanks to Bagozzi's numerous contributions. In prominent marketing journals (e.g., *Journal of Marketing*, *Journal of Marketing Research*, *International Journal of Research in Marketing*) covariance-based SEM ranks today among one of the most popular methods.

Yet, in the strategic management field, the technique's popularity is still of more recent date (Shook et al., 2004). Shook et al. (2004) explain the increasing popularity of SEM by the growing prominence and theoretical sophistication of (strategic) management theory, requiring more advanced research methods. Core strategic constructs (e.g., capabilities, strategy) are often multidimensional and unobservable. In addition, relationships among these variables are complex. Given SEM's characteristics, Shook et al. (2004) believe that its opportunities for strategic management research are vast.

3.6.3.1.1 A digression on the outer model: reflective versus formative indicators

In the measurement model, indicators can be modeled either in a reflective, or in a formative way.

When measures are specified as 'reflective' (also called 'mode A') the underlying premise is that the corresponding latent variable produces a certain behavior that is captured by means of the manifest indicators (Williams et al., 2003). The variance in each indicator is a linear function of the underlying latent variable plus error (Diamantopoulos, 1999; MacCallum & Browne, 1993). Measures are thus considered as 'reflections' of the underlying latent variable; "the underlying latent variable determines its indicators" (Bollen & Lennox, 1991: 306). This implies that a change in a latent variable will result in an equal change in all of its indicators (Diamantopoulos, 1999). Modeling indicators in a reflective way rests on the domain-sampling strategy of classical test theory (Diamantopoulos, 1999): indicators are inter-changeable (Bollen & Lennox, 1991). Reflective indicators show high positive inter-correlations (Bollen & Lennox, 1991) because of the latent variable being a common cause to the indicators (Cohen et al., 1990). A reflective measurement model hence rests on a 'principal factor model' (Jarvis et al., 2003). This makes the (traditional) assessment of unidimensionality¹⁸, validity and reliability all meaningful (Steenkamp & van Trijp, 1991). On the contrary, when measures are treated in a 'formative' mode ('mode B'), they are believed to 'form' the latent construct. A change in a latent variable does not automatically result in a simultaneous

¹⁷ Further extensions of SEM include longitudinal and multilevel analysis (Ullman, 2001). More and more, SEM is also applied in the context of experimental research designs (Bagozzi & Yi, 1994).

¹⁸ To be methodologically correct we need to remark that in PLS not a real common factor, but a first principal component is being extracted (cfr. infra). This is why a PLS analysis does not permit the assessment of unidimensionality.

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change in all of its indicators. Yet, if any of the indicators changes (with the others staying the same), this is accompanied by a change in the latent variable (Diamantopoulos, 1999). Variation in the measures hence *causes* variation in the construct (Williams et al., 2003). This is exactly where synonyms for formative indicators, such as ‘cause’ or ‘causal’ indicators (e.g., Bollen & Lennox, 1991; MacCallum & Browne, 1993) stem from. In the case of formative indicators, the omission of an indicator may consequently change the meaning of the construct (Bollen & Lennox, 1991). In addition, indicators should not share any specific relationship among each other (Diamantopoulos, 1999); correlations should not necessarily share a specific pattern of signs (positive or negative) or magnitude (high, moderate or low) (Diamantopoulos & Winklhofer, 2001).

Hence, the nature of the indicators (formative or reflective) causes the causal direction in the model to differ: in the case of reflective indicators the latent (independent) variable causes the observed (dependent) variables. This causal direction is reversed in the case of formative indicators; here, the observable variables serve as independent variables to the dependent, unobservable variable. While a collection of reflective indicators could be considered as a scale; formative indicators involve the creation of an index (Bollen & Lennox, 1991).

A central feature of a formative measurement model is that it rests on a ‘composite latent variable model’ instead of a principal factor model (Jarvis et al., 2003). This means that error variance is entirely associated with the prediction of the latent variables; it is represented by the latent variable’s disturbance term (Diamantopoulos, 1991: 447). This implies that formative, manifest variables do not include measurement error by themselves; error in the latent variable is captured by its residual (the part of the latent variable unexplained by its indicators) (Williams et al., 2003). In other words, a formative measurement model provides an estimate of the overall amount of random error in the collective set of items, rather than an individual error estimate for each item individually (Jarvis et al., 2003). Given that the recognition of measurement error is central to the traditional definition of a latent variable, MacCallum & Browne (1993) assert that the term ‘latent variable’ is actually a misnomer for a construct entirely measured by means of causal indicators. They hence propose to use the term ‘composite variable’ (instead of latent variable); Cohen et al. (1990) advice the use of ‘emergent variable’. We, on the contrary, will use ‘latent variable’ to refer to a construct measured by either reflective or formative indicators. We have opted to do so because, so far, the term ‘composite variable’ or ‘emergent variable’ is not yet an established expression in the context of SEM.

3.6.3.1.2 Two types of SEM

In fact, two types of structural equations analysis exist: the covariance-based and the variance-based approach. The first, covariance-based SEM (e.g., Jöreskog, 1973), is the most widely known. It is primarily used to test the adequacy of a theoretical model; it is tested whether “the hypothesized model represents a reasonable approximation to the data” (Bagozzi & Baumgartner, 1994: 401). Parameters (path coefficients, variances and covariances of independent variables) are estimated in such a way that a population covariance matrix can be created. The underlying logic is that the model is good if this estimated matrix is close to the sample covariance matrix. Popular software packages for covariance-based SEM include LISREL, EQS and AMOS. Covariance-based SEM adheres to true score test theory (Vandenberg & Lance, 2000) by making use of a factor

analytic measurement model (Iacobucci, 1994). It enables researchers to correct for random and specific measurement error as the latent variables used in the calculation of the model's structural parameters represent 'common factors'.

Notwithstanding the aforementioned qualities of the SEM method, especially covariance-based SEM rests on stringent assumptions. Therefore, "there are many pitfalls that can make SEM a dangerous tool in the hands of inexperienced researchers" (Baumgartner & Homburg, 1996: 140). In similar vein, Cohen et al. (1992) argue that covariance-based SEM is even more sensitive to deficiencies in the operationalization of theoretical models than other methods of data analysis, since the method provides many different options for assigning meaning to covariances.

In Hulland et al. (1996) and Baumgartner & Homburg (1996) the use of covariance-based SEM by marketing researchers (during the period 1977-1994, 1980-1994 respectively) has been evaluated in a meta-study. The authors' findings were fairly similar: namely that, in general, researchers do not follow the method's statistical assumptions and guidelines to a satisfactory degree. Both these studies revealed the frequent use of single-indicator constructs, low item loadings, too small sample sizes (in relation to the number of parameters estimated), little attention paid to outlier detection and to the assessment of multivariate normality, an over-reliance on the chi-square statistic (instead of the use of complementary alternative indices of fit), and specification searches primarily motivated on statistical grounds (no theoretical foundation for 'ad hoc' modifications, infrequent model comparisons and cross-validation). Hulland et al. (1996) further critiqued the lack of replicability of published studies, due to incomplete reporting of the input (covariance or correlation) matrix.

In the strategic management field, Shook et al. (2004) performed a similar study. They assessed the quality of 92 strategic management studies where covariance-based SEM had been applied. The articles all appeared in one of nine prominent management journals (e.g., *Academy of Management Journal*, *Strategic Management Journal*, *Journal of Management*) during the period 1984-2002. Methodological quality of these studies was checked in six areas: data characteristics, reliability & validity, evaluating model fit, model re-specification, equivalent models and, finally, the quality of reporting. Their findings were disappointing, and even alarming. Concerning data characteristics, they found that cross-sectional studies remain the most frequently used application and have even grown in importance. This makes the often used synonym 'causal modeling' for SEM even more inappropriate. Shook et al. (2004) further found that in 81% of the studies authors did not mention whether the indicators they used were multivariate normally distributed. Even more troubling was that a majority of authors paid little attention to reliability and validity issues of their measures. Concerning model fit evaluation, most authors did report multiple fit indices, but the issue of power was only discussed in 2 of the 92 studies. Although model re-specification was reported in almost half of the studies, the existence of equivalent models was explicitly acknowledged in only one. Finally, all the investigated studies lacked complete reporting on the analysis and on statistical procedures (e.g., software program used), which has prevented other researchers from replicating their findings.

Despite their disappointing observations, the authors of the three aforementioned studies all keep a firm belief in SEM's potential for future research. Guidelines for better application have been listed in their articles.

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Since not all restrictive assumptions of covariance-based SEM could be met in our study (cfr. *infra*, section 3.6.3.4), we applied the second form of SEM: variance-based SEM. As this form of SEM is less well known, we will briefly discuss the main characteristics of this method.

3.6.3.2 Variance-based SEM: Partial least squares

The partial least squares (PLS) approach to latent variable path modeling has its origins in the work by Wold (e.g., Wold, 1980) and Lohmoeller (e.g., Lohmoeller, 1989). Further developers include, amongst others, Falk & Miller (1992) and Chin (e.g., Chin, 1998a). Basically, PLS operates as a series of interdependent ordinary least squares regressions and presumes no distributional form (Fornell & Bookstein, 1982). The restrictive assumptions about measurement, distributions, sample sizes and theory required in traditional covariance-based SEM do not have to met. For this reason, the method has also been referred to as ‘soft modeling’ (Falk & Miller, 1992). Another important feature of PLS is that it rests on a principal component analysis, whereas covariance-based SEM is based on a common factor analysis (Chin, 1995).

Software programs to execute PLS are LVPLS 1.6 and 1.8 (Lohmoeller, 1984), PLS-Graph 3.0 (Chin, 2001), and of very recent date, SmartPLS 1.0 and 1.01 (Hansmann & Ringle, 2004).

3.6.3.2.1 The estimation procedure

A PLS program uses composite weights to create latent variable scores and to optimize linear relationships between independent and dependent constructs.

The actual estimation procedure can be described as a series of fixed point estimations. All parameters in the model are divided into subsets that are estimated by means of simple or multiple ordinary least squares regressions. These regressions involve the values of parameters in other subsets. By means of an iterative method, per subset, consecutive approximations of the estimates for weights and structural parameters are then provided (Fornell & Bookstein, 1982). So, PLS is a ‘partial’ procedure in that in each step of the procedure residual variance is minimized with respect to a selection of estimated parameters, while proxies given to other parameters are fixed (Chin, 1998a). Because the model is partitioned, smaller sample sizes are required to obtain estimates (Falk & Miller, 1992).

Barclay et al. (1995), Chatelin et al. (2002), Chin (1998a), Falk & Miller (1992), and Tenenhaus (1999) describe the algorithm in more detail. The relationships between a latent variable and its respective indicators are known as a ‘block’. At each iteration of the program, weights for each block of manifest variables are solved one at a time.

First, the overall model is partitioned into the specified blocks, and an initial estimate for each latent variable is calculated. This step is called the ‘outside approximation’ of the latent variable: indicators are aggregated to obtain a composite score for the latent variable, with a variance set equal to one.

After these initial estimates for the constructs are made, the estimated latent variable scores are then used in a new iterative estimation procedure, which is called the ‘inside approximation’. Component scores of all adjacent latent variables are combined to calculate a proxy for a specific latent variable. Various weighting schemes exist to create

these proxies: centroid weighting, factor weighting and path weighting. The latter scheme takes account of the directionality in the structural scheme; it differentially weights adjacent latent constructs depending on whether they are precursors (weighted by multiple regression coefficient) or consequents (weighted by correlation coefficients) to the latent construct under consideration. For this reason, the path weighting scheme is preferred for models with hypothesized directional relations (Chin, 1998a), like ours.

After latent variables are replaced by proxies, a new round of outside approximation starts. New weights are calculated by regressing the indicators on these proxies. These weights are then consecutively used to calculate new component scores. These new component scores are, in turn, used to calculate new proxies in another inside approximation, and so forth.

Hence, PLS continues to iterate back and forth between outside and inside approximation and hence minimizes all variables' residuals, until the parameter change (e.g., change in R^2 's) after an iteration becomes extremely small. At this point, the estimated parameters are considered to be stable, and residuals are considered to be minimized.

During the estimation procedure, simple or multiple regressions are executed, depending on the measurement specification and the weighting scheme. Mode A (reflective indicators) requires simple regressions whereas mode B (formative indicators) requires multiple regressions in order to obtain the indicators' weights. Proxies calculated by means of a path weighting scheme are also based on multiple regressions. Because of the 'partial' character of the estimation procedure, the required sample size is this which is required for the largest multiple regression in the model. This means that the required sample size should equal ten times the largest of two possibilities: a) the block with the largest number of formative indicators, or b) the dependent construct with the largest number of precursor constructs (Barclay et al., 1995; Chin, 1998a).

3.6.3.2.2 Specification of the outer model: reflective or formative indicators

As scores for latent variables are determinate, PLS leaves researcher the opportunity to model measurement relations in mode A or in mode B, with the same ease. Due to the complexities of using traditional covariance SEM for index construction, the use of PLS is particularly beneficial to further research in the creation of formatively specified constructs (Diamantopoulos & Winklhofer, 2001).

Apart from taking into account a method's technical constraints for modeling observed indicators, the choice for a specific measurement mode should above all be justified on theoretical grounds. Fornell & Bookstein (1982) and Chin (1998a) list several issues which are to be considered before choosing a measurement mode.

Firstly, the *intention of the study* matters greatly. If the study is designed to explain observed variances reflective indicators should be opted for. In a reflective mode PLS minimizes the residuals on the manifest variables; it minimizes the residual variances in the outer (measurement) equations (Fornell & Bookstein, 1982). This is based on the assumption that theory is less precise ('softer') than empirical observations. By minimizing residuals on manifest variables, the prediction of composite scores is optimized. Since prediction and parameter accuracy cannot be optimized simultaneously, a reflective specification deemphasizes structural parameter estimation (paths between constructs) (Falk & Miller, 1992). In contrast, formative indicators are the best choice if one wants to

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explain abstract, unobservable or ‘component-level’ variance. Formative indicators are not used to account for observed variances or covariances, but they are used to minimize residuals in structural relationships in the inner model (Fornell & Bookstein, 1982). Indicators in each block are weighted optimally in order to maximize the variance explained at the component level (Chin, 1998a). Furthermore, both modes could also be combined in a so-called ‘mode C’. “[...] if one intends to explain variance in the observed criterion variables by way of the unobservables, the indicators of the endogenous construct should be reflective and those of the exogenous construct should be formative” (Fornell & Bookstein, 1982: 442). Performing a PLS analysis on this kind of model equals a redundancy analysis, since the mean variance in the indicators of the dependent latent variable is predicted by a linear composite of the indicators of the independent latent variable (Chin, 1998a).

Secondly, the *theoretical conceptualization of the latent constructs* should be taken into account (MacCallum & Browne, 1993). If constructs are viewed as underlying factors giving rise to something that can be observed (e.g., the construct of attitude gives rise to certain observable behaviors), indicators should be modeled in a reflective way. If, on the contrary, constructs are determined by an explanatory mix of variables (e.g., the construct of marketing mix), one should opt for mode B. Chin (1998a) advises researchers to ask themselves whether a change in the underlying latent variable will necessarily result in a similar change in all of its indicators. If this is not the case, the construct should be modeled in a formative mode. Similar criteria have later been specified in a more detailed way by Jarvis et al. (2003).

Finally, *empirical contingencies* sometimes restrict a researcher’s choice, such as sample size and multicollinearity among formative indicators (cfr. infra). Modeling indicators in a reflective mode minimizes these problems as parameter estimates are based on simple regressions.

In case the aforementioned guidelines lead to contradictory choices, Fornell & Bookstein (1982) further advise to test the model twice, once in each measurement mode.

Since formative indicators do not rest on a domain-sampling strategy and should, by definition, not be positively correlated, traditional measures of internal consistency, and of convergent and discriminant validity are totally irrelevant (Jarvis et al., 2003; Bagozzi, 1994b). “Internal consistency is of minimal importance because two variables that might even be negatively related can both serve as meaningful indicators of a construct” (citation of Nunnally & Bernstein, 1994: 489 in Diamantopoulos & Winklhofer, 2001: 271). This is because in classical test theory or factor analysis it is implicitly assumed that the latent variable determines its indicators (Bollen & Lennox, 1991), whereas a formative specification reverses these causal relationships. “Researchers relying on factor analysis or the examination of correlation matrices for selecting indicators may be overlooking valid measures of a construct if the indicators determine the latent variable. Consequently, “always using internal consistency as a criterion can have dire consequences” (Bollen & Lennox, 1991: 307).

Though clear guidelines have been developed for scale construction (e.g., Churchill, 1979) alternative approaches suited for index construction are scarcely out of the egg. In Diamantopoulos & Winklhofer (2001) a first attempt has been made to formulate specific steps that should be undertaken in order to assess the quality of indexes based on formative indicators (for an excellent illustration, see Arnett et al., 2003).

First, the *content specification* of the construct the index is intended to capture should be well specified. Whereas specifying the construct domain is also crucial in the development of scales (Churchill, 1979), in index construction this danger becomes even more prevalent; a failure to include all relevant aspects of the construct will lead to incomplete measurement of the construct and hence to a failure to capture the entire scope of the construct.

Secondly, content specification should be intertwined with the correct *specification of indicators*: “the items used as indicators must cover the entire scope of the latent variable as described under the content specification” (: 271). Since an index does not rest on a domain-sampling strategy and since the latent variable is entirely determined by its indicators, Diamantopoulos & Winklhofer (2001) stress the need to be sufficiently inclusive. Bollen & Lennox (1991) argue for the use of a so-called ‘census’ of items of the construct’s content domain.

A third issue of concern is *indicator multicollinearity*. Since the indicator’s weights are determined by a multiple regression¹⁹, their stability is affected by sample size and indicator inter-correlations. In the case of multicollinearity, precise estimates of the separate effect of each formative indicator (independent variable here) on the latent construct (dependent variable here) cannot be obtained (Allison, 1999).

Diamantopoulos & Winklhofer (2001) finally point to the issue of *external validity*. The decision to keep indicators (with the risk of ending up with too many indicators which is unfavorable from a practical perspective) or to eliminate them (with the risk of changing the construct’s meaning) should be a well-considered one. To simplify this decision three different methods can be applied. Firstly, each indicator could be related to another variable (e.g. an item that summarizes the construct) and could then be inspected for significance. Insignificant items should be removed. A second option is to estimate a so-called MIMIC model (‘Multiple Indicators Multiple Causes’, see e.g., Bagozzi et al., 1981). A third, and final, validation method consists in linking the index to another (reflective) construct to which the index can be theoretically related (e.g., antecedents and/or consequences). This model should show a good fit and the structural parameter linking the index to the other construct should be significant and of the expected sign.

Undoubtedly, Diamantopoulos & Winklhofer’s (2001) contribution can be considered as a valuable attempt to fill a gap in the existing measurement literature. Williams et al. (2003) however criticize their third and fourth issue (multicollinearity and external validity). According to Williams et al. (2003) these issues could imply the elimination of indicators, possibly resulting in an altering of the construct’s meaning (which in itself conflicts with their issues of content and indicator specification). Yet, Diamantopoulos & Winklhofer (2001) have refuted this criticism in their own article, by urging caution in the elimination of formative indicators: “Indicator elimination – by whatever means – should not be

¹⁹ As indicated in section 3.6.3.2.1, in a reflective measurement specification only simple regressions are involved.

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divorced from conceptual considerations when a formative measurement model is involved” (: 273). The authors mean by this that as all indicators point to different facets of the construct; removing some might jeopardize content validity.

3.6.3.2.3 Assessing the measurement model

Low reliability of measures may cause structural paths to falsely appear non-significant, regardless of whether the links do exist in reality (Shook et al., 2004). Yet, contrary to covariance-based SEM, PLS does not correct structural path estimates for attenuation. Hence, if measures are less reliable and theory only tentative, Hair et al. (1998) propose to follow the two-stage model, in order to maximize the interpretability of both measurement and structural model. For this reason, a PLS model is usually assessed by a two-stage model (Anderson & Gerbing, 1988); it is hence analyzed and interpreted in two phases. More specifically, the reliability and validity of the measurement model are ascertained before the structural model is evaluated (Hulland, 1999).

Assessing the psychometric qualities of the measures shows much resemblance to the way this is done in the context of covariance-based methods. Individual item reliability is evaluated by examining loadings for reflective indicators and by checking statistical significance of the weights for formative indicators (Chin, 1998a). Low loadings could point to low reliability, a methods factor or a multidimensional construct (Barclay et al., 1995). The latter problem can occur since PLS, based on a principal component analysis, is not decisive about unidimensionality of constructs.

Also, internal consistency and average variance extracted (Fornell & Larcker, 1981) are calculated to test for convergent validity. Discriminant validity is assessed by comparing average variance extracted to the squared multiple correlation between two constructs. In addition, by inspecting the loadings of all (reflective) indicators it should be ensured that no indicator loads higher on another construct than it does on the construct it was intended to measure in the model.

3.6.3.2.4 Assessing the structural model

PLS does not provide the researcher with a global measure of fit. “Where is [are] the goodness of fit measures?” has become the 90s mantra for any SEM based study. Yet, it should be clear that the existing goodness of fit measures are related to the ability of the model to account for the sample covariances and therefore assume that all measures are reflective. SEM procedures that have different objective functions and/or allow for formative measures (e.g., PLS) would, by definition not be able to provide such fit measures” (Chin, 1998b: xii-xiii). Furthermore, the covariance-based SEM algorithm takes the specified model as true and estimates parameters in order to re-produce the sample covariances. Measures of fit only indicate how well these parameter estimates match the observed covariances. They do not indicate how well the constructs or observed measures are predicted. Consequently indicators’ error terms may be increased in order to better match the sample variances and covariances (Chin, 1998b). Bagozzi (1977) warns that probabilities as low as 0.1 have been shown to establish a good fit.

In contrast to covariance-based SEM, the evaluation of ‘fit’ in PLS follows a logic similar to regression analysis (Fornell & Bookstein, 1982). PLS provides the amount of variance accounted for (R^2) by the specified relationships in the model. In addition, the strength of the paths among latent variables determines to what degree the hypothesized, theoretical

model can be considered as true (Chin, 1998a). Paths between theoretical constructs are standardized path coefficients (beta weights). The structural paths are hence evaluated by inspection of their size and significance (cfr. a traditional regression analysis). For a model with a reflective measurement specification Fornell & Bookstein (1982) advise researchers to use the Stone Geisser Q^2 measure of redundancy (measures the power of the independent constructs in predicting the dependent ones). In a model with formative indicators jackknifed or bootstrapped standard errors can be studied, or Miller's F-test (tests the statistical significance of the predictive power of the structural model, without regard to the measurement model) can be applied. In addition, one can study the size of correlations between constructs where there are no relationships hypothesized (Falk & Miller, 1992). High correlations may then point to the existence of additional paths.

3.6.3.2.5 An evaluation of PLS applications by management scholars

In Hulland (1999), four strategic management studies (of beginning 90s) that used PLS have been evaluated. Hulland's conclusions appeared to be very similar to the previously mentioned evaluations of covariance-based applications (see section 3.6.3.1.2). Though Hulland stresses PLS' potential to methodologically enrich strategic management research, so far, some strategic management researchers apparently lack the ability to apply PLS in a consistent and appropriate way.

More specifically, Hulland (1999) found that some researchers did not specify their theoretical model well in advance. Furthermore, the operationalization of constructs lacked precision: multi-dimensional constructs were treated as though they were unidimensional and constructs were measured by single-item measures. In two of the four studies, items with low item reliability and constructs showing low internal consistency were retained for the final analysis. Furthermore, discriminant validity was not clearly demonstrated in all studies. Concerning the measurement specification, many authors failed to justify the epistemic relationships between measures and constructs; their choice for modeling in a formative or reflective mode was not well documented and argued. Finally, the evaluation of the model by the R^2 value for all endogenous constructs was incomplete in some studies. Hulland (1999) concludes from his review that strategic management researchers should meet the "the level of rigor and clarity" (: 203) that PLS requires, in contrast to the requisites of more traditional methodological approaches.

3.6.3.3 Covariance- versus variance-based structural equations modeling

Anderson & Gerbing (1988) view the distinction between the covariance- and variance-based structural equations approach primarily as one between a full information (ML or GLS) estimation approach in conjunction with a common factor model, versus a partial least squares estimation approach in conjunction with a principal component model.

Basically, the difference between a common factor model and a principal component model is related to the way variance of manifest variables are treated in the analysis.

The variance of a manifest variable always equals common variance (variance it shares with other indicators of the same construct) and unique variance. This unique variance, in turn, consists of measure-specific variance (valid variance of the indicator that is not shared with the other indicators) and measurement error. In a common factor model only *shared* variance is extracted. All else, namely the specific variance and measurement error variance, is contained in the uniqueness (or error) term of the indicator (Stephenson &

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Holbert, 2003). In this way, random error variance and measure-specific variance are excluded from the definition of the latent constructs. In a common factor model correlations between the measurements are accounted for in the latent variable; a common factor analysis maximizes the reproduction of the *covariances* among variables (Falk & Miller, 1992). In other words, a latent variable explains all covariation among its indicators (MacDonald, 1996). As a latent variable has by definition an unobservable nature, it can never be expressed as a composite of a finite number of indicators. This is exactly why, in a common factor model, the latent variable is treated as a common factor to its indicators. Hence, if a researcher wants to understand the latent structure of a set of manifest variables, as is often the case, the common factor model is to be preferred over the principal components model (Conway & Huffcutt, 2003). Furthermore, as unique (specific and error) measurement variance is explicitly separated out of the model, the attenuation of structural estimates due to measurement unreliability can also be avoided (Steenkamp & van Trijp, 1991). Stephenson & Holbert (2003), for example, produced proof that path coefficients are greater to the degree that error is extracted from the data.

Yet, because of the assumption of random error and measure specificity the method does not provide any case values (scores) for the latent variables; an infinite number of scores consistent with the parameter estimates can be found. This is what is understood by ‘factor indeterminacy’ (Fornell & Bookstein, 1982). Due to the latter, the method does not permit researchers to estimate values for the underlying latent variables, and predict from it values for measured variables (in the case of reflective indicators).

The latter deficiency is exactly one of the strengths of PLS. Resting on a principal components model, PLS does not differentiate between common and unique variance. A PCA extracts a maximal amount of *total* variance (common and specific) from the observed indicators into the components (Conway & Huffcutt, 2003; Iacobucci, 1994). Parameters are estimated in such a way that variance explained in the observed indicators (reflective mode) or in the latent constructs (formative mode) is optimized. As latent variables (the components) are considered as linear combinations of their observed measures, PLS offers the opportunity to calculate component scores.

This advantage is nonetheless at the expense of the assessment of unidimensional measurement and efficient statistical parameter estimates. Since components contain both common/shared variance and unique variance (the latter being measure-specific variance and measurement error), measurement error is not explicitly separated out. As a component is considered a linear composite of its indicators, technically speaking, a component does not yield a latent variable, since it contains a mixture of both common and unique variance (Conway & Huffcutt, 2003). Consequently, in the context of PLS, Falk & Miller (1992) –correctly– speak of a ‘component’ or a ‘composite variable’ instead of using the term ‘latent variable’. Also, MacDonald (1996) warns to avoid the confusing convention of referring both to common factors (common factor model, cfr. covariance-based SEM) and to composites (principal component analysis, cfr. PLS) as latent variables. They assert that composite variables are often interpreted in applications as though they were common factors, “even though there is no clear justification for such an interpretation, since they cannot explain the covariation of their indicators except approximately” (MacDonald, 1996: 240). Even though we explicitly acknowledge the –conceptual and mathematical– difference between a common factor and a composite

variable, we will nonetheless maintain the term 'latent variable' in the remaining discussion on PLS, in order to be consistent with other authors' usage.

In conclusion, PLS permits the calculation of component scores, but these scores may be inconsistent because they are aggregates of manifest indicators and may still include measurement error (Chin, 1998a).

Furthermore, since PLS makes no distributional assumptions, regression estimates are not asymptotically efficient. Still, PLS estimates are said to be 'consistent at large'²⁰, meaning that they become asymptotically correct under a large sample size and a large amount of indicators per latent variable²¹ (Anderson & Gerbing, 1988; Barclay et al., 1995; Fornell & Bookstein, 1982). If the condition of consistency at large is however not met, it often leads to the over-estimation of correlations between indicators and their constructs and to the under-estimation of correlations among latent variables in PLS (Dijkstra, 1983 in Anderson & Gerbing, 1988). On the contrary, in covariance-based methods the only way low observed correlations can be compensated for is by assigning low loadings to the indicators. When correlations among indicators are low, the estimated covariances between latent variables increase; this is the so-called disattenuation effect in covariance-based methods. Hence, Chin (1998a) asserts that if the researcher believes that both the structural model is correct and that the indicators only covary through their respective construct, credence can be given to the covariance-based structural estimates. Yet, under conditions of low theoretical knowledge, the more conservative PLS estimates for structural paths may be more appropriate. For example, in misspecified models the PLS estimates for wrongly hypothesized structural paths will not be as large as the equivalent estimates provided for by a covariance-based analysis (Chin, 1995). In similar vein, Fornell & Bookstein (1982: 450) note that: "If one had reason to doubt the accuracy of the theoretical model and/or the validity of the indicators, the LISREL estimate would be exaggerated and more credence could be given to the PLS estimate".

The statistical inelegance of PLS is however compensated for by greater data, measurement and sample flexibility. The segmented procedure in PLS requires considerably smaller sample sizes. As already mentioned, the required size is one that would support the largest multiple regression involved in the model. Furthermore, since solutions are calculated in a 'partial' (partitioned) way and since scores for latent variables are calculated and constrained to have unit variance, a model can never be under-identified (Falk & Miller, 1992). In addition, PLS puts no restrictions on the measurement scale; it can be used with nominal, ordinal or interval scales (Anderson & Gerbing, 1988).

Yet, as PLS is not a population-based method (whereas the covariance-based method is) it rests on a nonparametric estimation procedure. This implies that PLS does not provide significance tests based on statistical distributions. Instead, resampling (bootstrap or jackknife) procedures can be used to calculate the empirical distribution of the estimated

²⁰ "A consistent estimator is one that converges in probability to the value of the parameter being estimated as the sample size increases" (citation of Kotz & Johnson, 1982 in McDonald, 1996: 248).

²¹ The inclusion of more indicators would normally enrich the empirical content and would consequently ameliorate the researcher's ability to capture the latent construct. It also decreases standard errors (Chin, 1998a).

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parameters, instead of assuming a probability distribution. Then, the standard deviation for parameter estimates and t-approximates for these estimates can be computed (Anderson & Gerbing, 1988). In a bootstrap procedure a large number of samples (in PLS this is often 100, 200 or 500) are created as random subsets from the original sample; the original sample actually serves as the population for sampling purposes. Each of these samples is obtained by sampling with replacement from the original data set. Then, each parameter in the PLS model is re-estimated using each of these N samples, so N estimates for each parameter are obtained²². This vector of N parameter estimates is used to compute the final parameter estimates as the average of the parameter estimates across all the samples. Standard errors (as the standard deviation of the estimated means) are then used to calculate the confidence interval. Parameters can hence be evaluated in terms of significance without assuming a statistical distribution of the parameters (Hair et al., 1998; Chin, 1998a).

In conclusion, the above-mentioned discussion demonstrates that the statistical superiority of the covariance-based technique over PLS should not be called into question. Next to the advantage of the underlying common factor model, relying on a full-information approach, covariance-based parameter estimates are in fact more efficient and the method also provides a measure for overall model fit. The problem, however, lies within its stringent restrictions that are very hard to meet in social science research. As a consequence, covariance-based statistics may lead to false conclusions. Falk & Miller (1992: 2) exactly criticize covariance-based SEM for this reason: “These [assumptions of covariance-based methods] are unrealistic assumptions of most social science data and, in order to produce results, researchers often must make computational and theoretical compromises”. The latter compromise means that researchers are often tempted to adapt their research questions to fit this method (and its assumptions), instead of doing the reverse. The application of covariance-based SEM has made, for example, researchers in marketing over-emphasize theory-testing rather than theory-construction, though both are necessary for a research field to advance (Hulland et al., 1996).

An overview of the main distinctions between covariance- and variance-based structural equation modeling can be found in Figure 3.5

²² Jackknifing creates samples without replacement. Every new sample contains the original sample with each time a different observation omitted. Each sample contains N-1 observations and the total number of new samples created is equal to the original sample size N. If the sample size is not large enough, the amount of newly created samples can be insufficient to calculate confidence intervals. Although both methods are quite similar, more confidence is given to the bootstrap procedure (Hair et al., 1998).

Figure 3.5: Main distinctions between covariance- and variance-based SEM

COVARIANCE-BASED	VARIANCE-BASED
<ul style="list-style-type: none"> • Theory-oriented (test of well-specified theoretical model) • Accounts for <i>observed</i> co-variances → parameter estimates to minimize the fitting function between sample correlations and those implied by the model • Close to the theory • Theory confirmation • Assessment of overall fit by means of chi-square (Ho = hypothesized model) • Statistical precision: full information approach (mostly ML or GL) • Common <i>factor</i> model: <i>shared</i> variance → Specific variance & measurement error separated out: 'real latent variables' → Structural coefficients adjusted → Risk of overestimation of path estimates • Random error & measure-specific variance → factor indeterminacy: loss in predictive accuracy • Stringent assumptions: Identification Multivariate normality Continuous measurement scales Moderately large sample Correlated error terms possible • Simple model (risk of non-convergent or improper solutions) • Reflective measurement specification (formative possible but complicated) • Recursive or non-recursive relationships 	<ul style="list-style-type: none"> • Prediction-oriented • Accounts for <i>observed</i> (mode A) or <i>unobserved</i> (mode B) variances → parameter estimates to minimize the residual variance of the dependent variable • Close to the data (guided by theory) • Theory development (possible precursor to covar-based analysis) • Assessment of predictive power (cfr. regression analysis) • Less parameter efficiency: fixed point estimation [<i>partial</i>/LS] → 'consistency at large' (standard errors via jackknifing or bootstrapping) • Principal <i>components</i> model: <i>all</i> variance → Irrelevant variance (specific & systematic measurement error) separated out: 'components' → Risk of underestimation of path estimates • Components are completely defined by their indicators → component scores: predictive accuracy • Few assumptions: No identification problem No distributional assumption (jackknifing or bootstrapping for estimation of standard errors) Nominal, ordinal or interval scale possible Small sample size possible Uncorrelated error terms assumed • Complex model (many variables, paths, indicators possible) • Reflective or formative measurement specification • Mostly non-recursive relationships

Figure based on: Anderson & Gerbing (1988), Bagozzi & Yi (1994), Barclay et al. (1995), Chin (1995), Chin (1998a), Falk & Miller (1992), Fornell & Bookstein (1982), Hulland (1999), McDonald (1996)

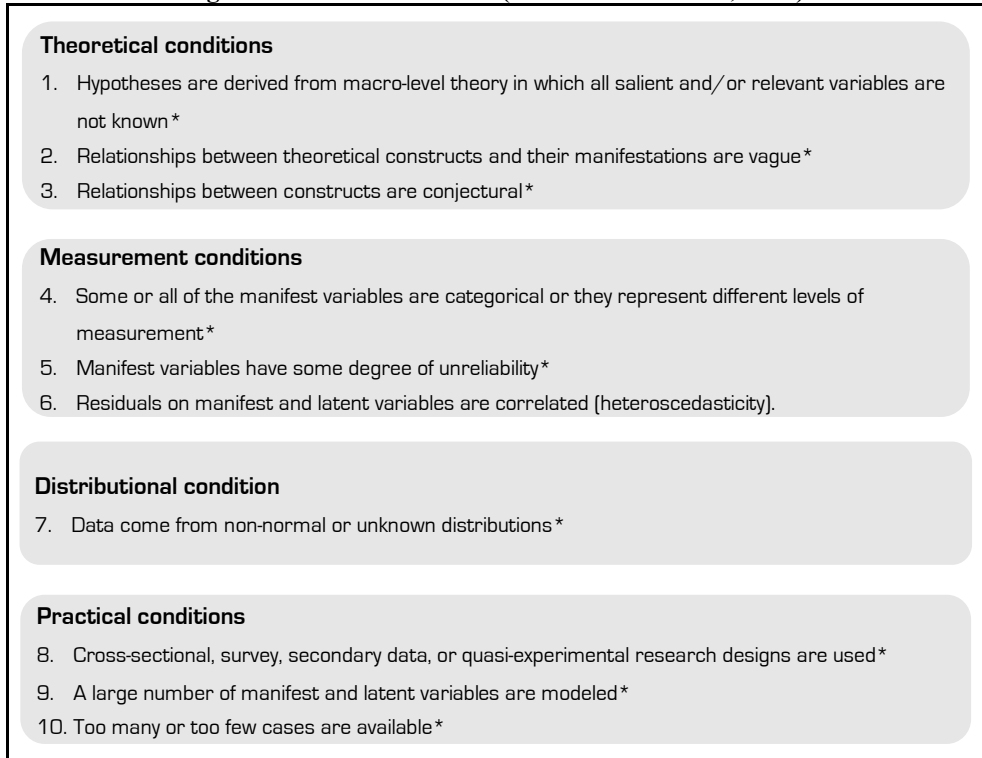
3.6.3.4 Justification of our choice for PLS

The above mentioned distinction between covariance- and variance-based SEM clarifies Fornell & Bookstein's (1982) advice against the use of covariance-based methods. They discourage researchers from using covariance-based SEM unless "(1) its objectives are consistent with the objectives of the study and (2) its assumptions are verifiably true; if they are not, PLS is a feasible alternative" (Fornell & Bookstein, 1982: 451). In the same vein, Baumgartner & Homburg (1996) assert that covariance-based techniques are best

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used for well-defined theoretical frameworks of moderate complexity, where constructs are measured by a relatively small set of indicators. They consequently discourage researchers from its use for exploratory purposes; when relationship patterns among constructs are not yet crystal-clear and when measurement structures of constructs are not well established. Falk & Miller (1992) list detailed conditions and circumstances that may call for the use of PLS. We will justify our use of PLS by applying their list of considerations (see Figure 3.6) to the specificities of our research. In Figure 3.6, the conditions that apply to our research have been indicated by an asterisk.

Figure 3.6: Conditions PLS (after Falk & Miller, 1992)



a) Theoretical conditions

In covariance-based SEM the exclusion of possibly relevant variables can seriously bias estimates for structural parameters. In contrast, PLS does not aim for invariant structural parameters, but, by minimizing residual variance, it tries to optimally predict a specified set of variable relationships. In our research, constructs such as absorptive capacity and SI are theoretically not well delineated. Let alone the fact that this entire research area suffers from robust and consistent empirical findings. Furthermore, an inherent characteristic of organizational behavior research in general is the influence of many endogenous and exogenous variables on the specified relationships. Although we try to control for several organizational and environmental specificities, the failure to consider all relevant variables is still quite probable.

Secondly, in covariance-based SEM constructs are operationalized by homogeneously valid representations of the construct. Indicators are assumed to share in common only the latent construct (nonrandom measurement error should be minimized). In regard to our previous discussion: if established scales or indexes do not exist and if measures are hence considered to be not entirely valid and reliable, prudence is called for in accepting the estimated (disattenuated) structural path coefficients of a covariance-based structural equation analysis. Since the constructs in our theoretical model have not yet been operationalized in the literature, we were forced to develop our own measurements. Risks of unreliability and invalidity are hence probable. For this reason, the use of PLS seems to be more appropriate. In PLS, all common variance (principal component based) is extracted from the (reflective) measures and in this way constructs maximally predict the variance in the observed indicators. Therefore, PLS is said to be 'close to the data' (Chin, 1998a).

Furthermore, we will demonstrate later (section 4.3.3) that the independent variables in our model should be conceptualized as criterion variables to the indicators (formative mode), more than as underlying causes giving rise to the measures (reflective mode). In management studies, measures are modeled in a formative mode when they describe different facets or aspects of a general concept (Williams et al., 2003). Jarvis et al. (2003) argue that especially managerial constructs in marketing research (e.g., market intelligence) are frequently conceptualized in a formative mode and should hence also be modeled accordingly. Rossiter (2002) even posits that for most marketing constructs formative indicators would be the most appropriate measurement specification. Furthermore, Bagozzi (1994b) asserts that the use of formative indicators is particularly meaningful when the unit of analysis is the firm or group because it has much relevance for dealing with organizational and social constructs. Modeling the measurement model in a formative mode is far less complicated in PLS than it is in covariance-based SEM. The complicated requirements of using mode B in covariance-based SEM have many researchers, using covariance-based SEM, made model their constructs in a reflective way. Diamantopoulos & Winklhofer (2001), for example, show several existing marketing constructs that have been measured by means of reflective indicators, though, in the authors' view, a formative measurement approach would have been far more appropriate. In Cohen et al. (1990) a similar list of wrongly measured constructs is shown. Jarvis et al. (2003) found that almost one third of constructs appearing in the top-four marketing journals, over the period 1977-2000, were modeled incorrectly. These authors warn for "potentially serious consequences of measurement model misspecification". Measurement model misspecification may not only lower construct validity, but may also bias structural estimates (Jarvis et al., 2003).

Finally, as research on deliberate strategic ACAP learning mechanisms and SI is still embryonic, theory and previous empirical findings only allow us to specify conjectured relationships among the constructs of interest. Relationships among the constructs we defined have never been empirically studied. Consequently, our aim is not to offer a complete description of the theory and to test an overall model against empirics (i.e. to test hypothesized covariances against a sample covariance matrix). Instead, our goal is to study the effects (variance explained) of deliberate strategic learning mechanisms on an organization's (BU's) SIcap. This, however, does not mean the analysis is theoretically meaningless. Falk & Miller (1992: 31) assert: "because we have soft theory, arrows between circles tend to be conjectural and not necessarily firmly held relationships. They

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represent relationships and may be thought of as paths of influence. [...] lacking the precision necessary to make invariant structural interpretations does not negate the importance of theoretically blocking manifest and composite variables and specifying relationships between constructs. This type of specification improves our understanding, and we see this approach as moving us closer to the precision needed for future causal analysis.” Moreover, in this respect the accepted theoretical supremacy of covariance-based methods could be questioned as well. Radically different theoretical models, suggesting entirely different relationships among latent constructs, while being tested on the same data set, may still yield equivalent levels of fit (Shook et al., 2004). This leads MacCallum et al. (1993) to assert that the existence of equivalent models could call into question the conclusions drawn from most covariance-based studies as well.

b) Measurement conditions

Covariance-based methods (and the maximum likelihood statistic) assume continuous data. Nonetheless, continuous methods can be used with little worry when variables are interval data with at least four categories (Bagozzi, 1994a; Bentler & Chou, 1987 in Bagozzi & Baumgartner, 1994; de Heus et al., 1995). As all measures of the theoretical constructs we studied consisted of 5-point Likert scales, measurement requirements would not have prevented us from using covariance-based SEM in the basic analyses. However, the control variables we used were categorical variables which would have led to measurement problems in a covariance-based analysis.

As regards the second measurement condition, because we used many newly developed measures unreliability problems could be expected.

Finally, Falk & Miller (1992) warn that heteroscedasticity (correlated residuals) could lead to identification problems in covariance-based methods. In PLS, identification constraints do however not exist.

c) Distributional conditions

As we have already indicated, most statistics in covariance-based methods assume multivariate normality of the data distribution. Checking the assumptions of the exploratory factor analyses we performed (see chapter 5), we found that that even the assumption of univariate normality was violated for some variables in our sample. PLS, in contrast, does not assume any distributional form. Drawback of this quality is however that additional resampling procedures, such as bootstrapping or jackknifing techniques, are required in PLS to estimate standard errors.

d) Practical conditions

Falk & Miller (1992) assert that limitations of non-experimental research in drawing general causal conclusions are implicitly recognized in PLS. In contrast to covariance-based results, PLS results are restricted to predictive inferences. We do however not entirely share this point of view. Firstly, inferring causality from a non-experimental method is always dangerous. The popular synonym ‘causal modeling’ for SEM has however led to some confusion concerning the qualities of SEM. When used in a cross-sectional study SEM does by no means infer causality, being essentially based on correlational data. This applies to both covariance- and variance-based SEM. Attributing causality is hence more of a design issue than of a statistical issue (Ullman, 2001; Scandura & Williams, 2000). Secondly, also in PLS studies researchers’ aim is always to

generalize their conclusions beyond the sample studied. Hence, we do not believe PLS is a more legitimate method for a survey design than is covariance-based SEM, contrary to what Falk & Miller (1992) contend.

Concerning the second practical condition, complex models involving many variables and indicators often cause problems in covariance-based software. Complex models may lead to identification problems, improper solutions (e.g., negative variances, correlations larger than one) (Barclay et al., 1995; Fornell & Bookstein, 1982) and computational problems. PLS, being a partial method (it partitions complex models into segments) that furthermore makes use of the highly efficient least squares algorithm, avoids this problem. On the other hand, the additional bootstrapping procedures in PLS require much computer capacity. Since the model we specified is relatively simple and since the number of indicators we used is rather limited, we believe that, as for model complexity, the use of a covariance-based method would have been possible. Nevertheless, as already indicated, covariance-based SEM would have much complicated the formative specification mode we used on the independent variables.

Finally, sample size requirements in covariance-based methods are much more stringent since covariances are less stable when estimated from small samples (Ullman, 2001). Furthermore chi-square statistics used to evaluate overall model fit are quite sensitive to sample size. A minimum sample size of 200 (Ullman, 2001) is advised for small to medium models. As a general rule of thumb, Tabachnick & Fidell (2001a) propose a sample size of 300, or 10 cases per variable; Rigdon (1998) even calls for 5-10 cases per estimated parameter. As the estimated effect size and the distributions of the measured variables influence the power of the analysis, Ullman (2001) claims that fewer than 10 cases per estimated parameter may only lead to stable results on the condition that the estimated effect size is large and that variables follow a multivariate normal distribution. In MacCallum et al. (1996) tables of adequate sample sizes for goodness of fit tests are provided. In our study, with outliers and missing values removed, the effective sample consisted of 182 respondents and 27 observed variables. The ratio of cases to observed variables would hardly be seven. The ratio of cases to estimated parameters would even be much lower; a ratio that would not have been satisfactory given our data were not multivariate normally distributed. On the contrary, analyzing our model by means of PLS does not pose any problem. Following the PLS rules of thumb of sample size needed (cfr. supra), the largest multiple regression in our model is related to the formative indicators of the construct 'recog' (see chapter 5). As this block consisted of eight formative indicators, a sample size of only 80 respondents would have sufficed.

In conclusion, especially theoretical and practical conditions made us opt for PLS. Choosing PLS as the method of analysis however implies that we compromised ourselves with lower statistical elegance. Even though the main purpose of the QUAN phase was to test the theoretical model, both the specifics of our sample and the conceptual and empirical development of our study object made it appropriate to do this testing still in a rather exploratory way. We hence remained 'close to the data' and theory was tested in a prediction-oriented, rather than in an entirely theory-oriented way (see Figure 3.5). Using PLS to test our theoretical model hence implies that, in a sense, we followed a sort of mid-way between the full theory development purposes of the conceptual and QUAL research phases and the full theory testing purpose that is normally associated with quantitative testing methods (such as covariance-based SEM).

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CHAPTER 4

FINDINGS OF THE QUALITATIVE PHASES

As indicated in the methodological chapter, the qualitative phase served to refine and operationalize a nascent theory on ACAP and SI, making it amenable to statistical testing procedures in the QUAN phase. More specifically, the main purposes of the qualitative phase within the entire research design were threefold: 1) to select and refine relevant constructs for the theoretical model, 2) to develop hypotheses and additional research questions, and 3) to design quantitative measurement instruments. Given these purposes, the theoretical core of the qualitative phase centered on QUAL2, where strategic innovators, and their capacity to systematically create SI initiatives, were further studied. QUAL1 served the subgoal to select these strategic innovators.

As SI, by definition, entails a deviance from the industry recipe, in QUAL1 industry recipes had to be uncovered in order to select SI initiatives and strategic innovators for further study. Since QUAL1 functioned, in this respect, only as an input to QUAL2 (and is as such no full, stand-alone phase) we will restrict ourselves here to a summary of the main findings.

4.1 FINDINGS OF QUAL 1

4.1.1 Industry recipes

In chapter 1, we explained how the mutual enactment of socially-constructed beliefs among industry parties presses toward a shared mental model (Porac & Thomas, 1990, Hodgkinson, 1997): a ‘macro-culture’ (Abrahamson & Fombrun, 1994), or ‘industry recipe’ (Spender, 1989). This industry recipe comprises the common perceptions that gradually arise among industry parties (Huff, 1982). These perceptions, reflecting common assumptions about appropriate strategies and competitive boundaries (Porac & Thomas, 1990) restrict the strategic possibilities considered by an individual firm (lowered information recognition and initiation of SI). In this way, industry recipes intensify imitative tendencies (Diamaggio & Powell, 1983). In chapter 1 we emphasized that the central idea of SI is however one of strategy *divergence* (Markides, 1997), where firms play a new and different strategic game (Baden-Fuller, 1995). Furthermore, firms play this different game in order to produce dramatic improvements in customer value (Schlegelmilch et al., 2003). SI initiatives hence entail the creation of new and substantially superior customer value by deviating from the industry recipe (see our definition of SI in chapter 1).

We employed desk & expert research and methods of semi-structured interviewing (focus groups-1 and expert interviews) to uncover managers’ shared assumptions (see chapter 3, section 3.4.2). These are both popular methodological approaches to study cognition on an industry level (e.g., Spender, 1989; Porac et al., 1989; Huff, 1982).

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We did not consider conformity or deviation from industry rules as a binary choice (Miller & Chen, 1996), but in line with Huff (1982) and Porac et al. (1989) we took intra-industry variation (firm-level) in core beliefs as a given. Still, in our empirical and secondary data we looked for central core beliefs and assumptions that were widely shared and often repeated across all sources investigated. In all industries, we were able to identify some common perceptions about the competitive arena, i.e. the industry recipe. SI could then be assessed relative to this industry recipe.

Table 4.1 summarizes the industry recipes of the five industries studied²³: functional food (FF), trucks & trailers (T&T), graphics printing, traffic management systems (TMS) and energy (limited on electricity). In line with Spender (1989), the industry recipe is depicted along several dimensions (the rows in Table 4.1). We felt that the core strategic beliefs structuring parties' strategic choices (Spender, 1989) involved beliefs about the role/mission of each party, beliefs about the traditional, current critical success factors (products and services to be offered and appropriate business model) and, given the dynamism in each industry, beliefs about the new and future critical success factors and parties' missions (appropriate reactions to industry tendencies). We hence focused on 'de facto' norms, i.e. observable norms of competitive behavior in an industry (Miller & Chen, 1996). In addition, the mental models about the competitive arena that form the basis for competitive battles (Hodgkinson, 1997) also involve beliefs about power relationships and vertical and horizontal competitive relationships. These beliefs also manifest themselves in the sort of co-operation efforts industry parties undertake.

In Table 4.1-part 1 and Table 4.1-part 2 the main strategic roles and beliefs are summarized. The terms in italics indicate the metaphors parties generally use to depict themselves and other parties in their industry. In simple words they make clear the role/mission industry parties are believed (and expected) to play now and in the future and, in this respect, largely affect companies' strategic choices. In Table 4.1-part 3 we describe the perceived center of power and the power play in all industries studied. Part 3 also demonstrates where pressure is mostly felt along the chain and indicates the main victims of it. In addition, the vertical and horizontal relationships along the supply chain are typified and the nature of co-operation efforts is indicated.

Given the limited theoretical value of QUAL1 in the entire research project, we restrict ourselves to a short description of the findings. We summarize the overall findings across the five industries. For an extensive discussion of these five industries, see Matthyssens et al. (2004) and Berghman et al. (2004a-e).

²³ We would like to stress that the industry recipes provided in Table 4.1 reflect the recipes at the moment of study (i.e. 2003). Given the highly dynamic character of many of the industries studied (e.g., energy), it is reasonable to believe that these industry recipes have been evolving meanwhile.

Table 4.1: Industry recipes-part 1

		Functional Food	Trucks & Trailers	Graphics Printing	TMS	Energy
Perceived traditional role/mission of parties	up	Technological innovation: technological know-how (R&D); technological risk <i>'the technologist'</i>	Technological production and innovation: technical and process know-how <i>'the jobber or the technologist'</i>	Technological expertise <i>'the large machine producer'</i>	Subcontracting, technological innovation <i>'the stubborn technologist'</i>	Generate energy <i>'the producer'</i>
	mid	B2C product development & branding, create consumer demand; consumer knowledge, market risk <i>the product creator'</i>	Technological innovation, brand value, direct chain (up & down) <i>'the assembler'</i>	Logistics, distribution, product, and downstream customer knowledge <i>'the intermediary'</i>	Main contracting, director of the order, installation and contracting expertise <i>'the powerful opportunist', 'the untrustworthy commission agent'</i>	Transport energy <i>the distributor'</i>
	down	Create B2C shopping place, create shop loyalty; consumer knowledge, distribution knowledge <i>'the supermarket'</i>	Import and sell Importer: national marketing, steer retail Retailer: sell end product Prey to cyclical market <i>'the truck/ trailer seller'</i>	Create quality prints, contact with end customer <i>'the good, old craftsman'</i>	Tendering, power play, order specification (design, conceptual and technical product development), functional and technological expertise: 'delegation without responsibility' <i>'the rigid, slow boffin', 'the commander'</i>	Supply energy to consumer <i>'the supplier'</i> → up-mid-down: one company: <i>rigid and rich technological regional monopolists'</i>
Perceived critical success factors	up	High-price, innovative, tested and approved of ingredients, patent management, scale	Efficiency (automation), technological innovation, quality, logistical performance (JIT, location)	Product innovation (high-quality machines), technology push, scale, niche strategies, profit model based on supplies, repair and maintenance	Low-price, differentiated and technologically innovative products, relationship management	Technological product innovation (green energy), scale, generation of energy at fair/high margins
	mid	Incremental product innovation, innovative production techniques and preservation methods, fair-price and local products, internal efficiency, scale	Efficiency, scale, pivoting role in industry, branding (Trailer constructors: specialty trailers)	Logistical performance, product knowledge, regional operation	Scale, efficiency, relationship management	Efficiency (fixed tariffs and volume at fair margins)
	down	Distribution efficiency, low-margin-high-turnover, scale	Scale, customer loyalty (contact), focus on high-margin sales	Local presence, high quality-low price, technical orientation (solution = new machine), price competition (let machines render)	Strict technical specification of tenders	Increase market share at any price (price competition)

Table 4.1: Industry recipes-part 2

		Functional Food	Trucks & Trailers	Graphics Printing	TMS	Energy
Perceived new and future CSFs/ future mission	up	Up- and downstream partnerships, radically innovative & exclusive ingredients, consolidation and exclusivity contracts to spread technological risks, patented technological innovation (specialization), demand-driven development, large customers <i>'the technological expert'</i>	Efficiency and technological differentiation, complete modules/systems (partner OEM), application or capacity player, functional instead of technical requirements, close vertical co-operation (co-development, co-engineering) <i>'the efficient technologist'</i>	Application-based technologies, more R&D (alliances), consolidation, move to technology pull: interference in downstream (own distribution, direct customer contact), even stronger focus on maintenance service <i>'the mastodon application technologist'</i>	More application-based technologies, focus on software, sign in as main contractor of tenders, scale (often swallowed up by large construction/installation companies), performance contracting (after-sales trajectory, maintenance) <i>'the technological application innovator'</i>	Smart trading, efficiency, balance supply-demand (guarantee supply), technological product innovation, scale (European M&As) <i>'the powerful, smart trader'; but... 'prey to foreign energy giants?'</i>
	mid	Consolidation, faster product innovation, focus on marketing (outsourcing production, rationalization of supplier base), direct marketing, few, strong brands, try to direct agri/food from push to pull <i>'the global brand creator'; 'the marketing company'</i>	Shorten time-to-market, efficiency, new materials, specialization, telematics, direct chain (make more demand-oriented, outsource production to upstream, intervene in downstream), stronger focus on brand value (market knowledge) <i>'the chain director and educator'; 'the powerful brand guard'; 'the commander'</i>	Independent distributors disappear (no added value) Dealers; multi-brand, knowledge of complex combinations hardware, software, media, become value added resellers (technical application knowledge) <i>'the smart value-added reseller'</i>	Consolidation (alliances & acquisitions), upstream integration, focus on maintenance (compete on total-cost-of-ownership, full-service contracts: design, installation, maintenance) <i>'the large, powerful, opportunistic full-service provider'</i>	Transmission in governmental hands, distribution strongly regulated: not much room for growth (but fair margins); expectant until further privatization new private parties: APX and independent energy brokers <i>'expectant (but milking cow of energy company)'</i>
	down	Consolidation, backward integration: private labels (fight with food companies), be price fighter versus create product variation and shopping sensation, demand-based pull: try to direct entire chain and use preferred suppliers <i>'the hostile, international, powerful B2C fighter'; 'the wannabe chain director'; 'the necessary evil'</i>	Consolidation (price pressure leasing & transport companies), refocus on repair, maintenance not on sales, focus on lifetime costs, service differentiation (leasing, finance, one-stop-shopping) <i>'the marketer'; 'the professional service provider'</i>	'Consolidate, differentiate or die' Nimble or big, low price, high quality, short delivery time, differentiate in upstream (press) or downstream (finishing) and even internal outsourcing (printing brokers): one-stop-shopping, different media, niche strategies (specialization), focus on B2B <i>'the graphi-media company'; 'the survivor, the fighter'</i>	Reorientation: leave more technical initiative to industry: delegation with responsibility, functional instead of technical requirements, balance own role of customer against this of technical developer Try to lift on private initiatives, public-private alliances <i>'the director'</i>	Supply guarantee, consolidation, internal efficiency (back office), cautious attempts to differentiate on product (eg. green energy) or on service bundling (eg. telecom), branding/image, customer service; price, flexible contracts, segmentation, alliances with parties outside industry (eg. installation) <i>'the wannabe nimble B2C player'; 'the still- arrogant, cumbersome inert company'; 'prey to foreign energy giants?'</i>

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Overall, upstream parties are believed to emphasize technological development ('technologists, engineers'). Especially in the printing, TMS and energy industry, upstream parties traditionally try to 'push' technological innovations. Hedging against industry tendencies, upstream parties seek even more refuge in technological innovation. In addition, commoditization tendencies make them simultaneously foster their internal efficiency (T&T), scale (FF, TMS, Energy), or market-driven innovation (T&T, printing, TMS). The harmful consequences of power plays and commoditization tendencies are felt most fiercely upstream (FF, T&T, TMS). Upstream competition is yet still 'professional' (with the exception of the T&T industry). Despite their often weak position, upstream parties have fairly good relationships with other links in the chain. Yet, they complain about being squeezed out by more downstream positioned supply chain links. "*Our technical expertise is not valued enough*" and "*we are held hostage by the OEMs*" are statements that were frequently mentioned by diverse upstream parties. Upstream companies try (and often are compelled) to co-operate with midstream companies, although this co-operation chiefly remains ad hoc and limited to the R&D area.

Midstream companies, often OEMs, are usually the pivot of the industry. They take up a bridging function between the upstream technologists and the downstream sellers, being the 'product creators' (FF, T&T, TMS). Fast incremental product innovation, scale and internal efficiency are key competitive factors. In this sense, they form the breaking point of the chain; both downstream and upstream parties 'look along the chain up to them' and expect a pioneering and leading role from them (FF, T&T). Their scale and knowledge of both technology and market makes them powerful players and chain directors (FF, T&T). Nonetheless, this does by no means imply that these parties are entirely spared the profit squeeze that is felt along the entire supply chain. Midstream competition is oligopolistic and harsh. In the regulated monopolistic energy and in the technology-driven printing industry, power rests (rested) primarily with upstream parties. However, industry tendencies in both these industries are gradually shifting power centers more midstream as well. In many industries, midstream parties are starting to realize that a closer focus on 'down' might be fruitful: they are all interfering in downstream activities in an attempt to come closer to the end market, clashing with traditional downstream parties (FF, T&T, TMS). They have come to emphasize marketing competencies over manufacturing, which is outsourced to upstream companies. Likewise, midstream parties try to 'reform' the entire supply chain into a more demand-driven one, closely directing, and co-operating with, their upstream suppliers (FF, T&T).

Downstream parties form the link with the end customer. In the T&T and TMS industry end customers are corporate, whereas in FF downstream parties are real B2C players. The energy and printing industry serve both consumer and business markets. For downstream companies, distribution and customer knowledge are competitive weapons. Their knowledge in these areas makes them especially 'interesting' to midstream (FF, T&T) and upstream (TMS, printing, energy) parties, who are trying to come closer to end customers. In all industries, downstream parties experience how product commoditization sharpens price competition, which is –partly or largely– passed on upwards in the supply chain, putting the entire chain under pressure. Downstream parties themselves seek salvation in consolidation or in service differentiation. Only few downstream companies are fierce price fighters (energy, FF); most seek to profile themselves as full-service or one-stop-shopping providers (FF, T&T, TMS, printing, energy). Downstream companies do seldom if ever initiate structural co-operations with other –more upstream– supply chain parties.

The power they exert on other industry parties is dependent on their traditional scale and professionalism; in the TMS and FF industry they are powerful parties, whereas they are the weakest link in the printing and energy industry. In the T&T industry, large (midstream) OEMs are gradually hauling the downstream industry segment (often by means of concession and franchising formulas).

4.1.2 Selection of strategic innovation initiatives and strategic innovators

The selection of strategic innovators was based on two methods. Either way we tried to map SI initiatives to strategic innovators, or strategic innovators to SI initiatives.

On the one hand, we inventoried the various SI initiatives mentioned in the course of QUAL1. Departing from the ‘true’ initiatives selected, we looked for their initiators and checked whether these business units (firms) had recently launched several other SI initiatives than the one inventoried. On the other, we inventoried the names of business units (firms) that had been mentioned during the different QUAL1 phases as business units (firms) known in the industry for launching several SI initiatives. For these strategic innovators, we looked for additional information on the SI initiatives they recently launched and checked whether they satisfied the criteria of true SI (see chapter 1).

We found that the detection of SI initiatives was far from straightforward. Firstly, they consist of strategic ‘embryo’s’ that are difficult to detect, even by industry insiders. Second, since SI implies the deviance from traditional industry conventions and assumptions, the identification of ‘real’ SI initiatives (and hence real strategic innovators) required a systematic contrasting with the industry recipe, and could hence not be entirely left to the respondents, being often industry insiders. The inclusion of industry experts (such as consultants) in QUAL1 proved especially useful in this respect. Nevertheless, QUAL1 yielded an unequal harvest of true SI initiatives and strategic innovators across the different industry contexts studied.

The following initiatives are exemplar:

- *Functional food*: In co-operation with an IT company, an ingredient producer created a database to let small and mid-sized food manufacturers experiment fast and easily with more than 2000 diverse tastes and smells for new food products they want to develop. The customer can retrieve information about price, regulation, safety, etc. for specific ingredient combinations.
- *Functional food*: A pharmaceuticals company, a biotech company and a food packaging specialist formed a triple alliance. Bundling their expertise in diverse areas enables them to sell a total solution to food manufacturers (optimizing vitamins, legal assistance, prolonged shelf life, better taste & processing)
- *Graphics printing*: Three independent printers formed a joint venture to bundle their specialized experiences. The integrated back-office increases their efficiency and scale, enabling them to economize on investments and to participate in public tenders for large assignments. On the other hand, their diverse specializations offer the customer a combination of scale, efficiency, flexibility and high expertise in very diverse printing techniques.
- *TMS*: A system producer entered into a partnership with a city to sell video images of traffic behaviors on intersections and roundabouts (recorded by a traffic

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system) to a producer of motorcycles. In this way, the motorcycle producer gets deep insights into motorcyclists' driving behavior. He pays part of the system investment to the system producer and pays the city for the images.

- *Truck & Trailer*: Cave-in dangers of yard cellars in a large Dutch city complicated the supply to cafés located in the city center. A trailer producer and several transport companies put their heads together and jointly invented the 'booze boat'. They developed a 'rolling container' system to enable bi-modal transport/supply. These rolling containers are easily transferred from a truck to a ship. Café owners are since then supplied over the water.
- *Truck & Trailer*: Confronted with a decreasing market for damage repair, a coating producer jointly invented a franchise concept with its customer-body shops. The coating producer acts as the franchisor, whereas body shops take up the role of franchisees. The new damage repair service targets private persons with small car damages that are generally not covered by car insurances. Private persons use fixed price menus to have their car repaired cheaply and fast.
- *Energy*: An energy supplier developed a franchise concept, involving local and regional service/maintenance companies. The private customer is offered a total solution, including purchase/lease/rent of central-heat boilers, installation and maintenance of appliances (e.g. air-conditioning), subscription to a 24h-emergency damage repair service (incl. completion of home insurance), and a broad range of other subscriptions (e.g. unblocking drain pipes). The energy supplier-franchisor takes care of the entire back-office, provides training, takes care of branding, and controls the franchisees' service performance.

As already mentioned, for each strategic innovator we explicitly checked whether their SIinitiatives met the defining criteria of SI (see chapter 1). The following index cards exemplify (in a summarized form) how the characteristics of the SIinitiative were contrasted with the industry recipe, and indicate how the SIinitiative creates new and substantially superior customer value. Per industry, we provide one illustrative example (index card) of a strategic innovator and one of its recent SIinitiatives.

FUNCTIONAL FOODS INDUSTRY	
<p>Company: Large, international chemical company Business unit: Food specialties (The Netherlands)</p>	
<p>Confrontation of the Slinitiative with the industry recipe:</p>	
Traditional industry assumptions and conventions	Slinitiative
<p>Invent, develop and produce radically innovative ingredients Sell ingredient or ingredient license (often exclusivity contracts) to food manufacturers Margin on product (or license)</p> <p>Focus on technological innovation, research alliances, patent management; control technological investment & legal risks, demand-driven development (co-operation with food manufacturers), large customers → technological application expertise (limited market knowledge)</p> <p>Vertical chain view: sell ingredient to large, powerful food manufacturer (price pressure) Ad hoc co-operation with upstream parties (research centers, biotech companies, other ingredient producers) and with customer (demand-driven ingredient development)</p> <p>Margin pressure (commoditization ingredients & end products)</p>	<p>Develop and produce finished sports drink (invention & production of active ingredient, production of drink, design of packaging, publicity product) Sell license for complete product concept to (sports) food company Margin on total concept (incl. co-branding)</p> <p>Focus on technological and product innovation, control technological, legal and market risks → consumer market(ing) knowledge, knowledge of end-product</p> <p>Horizontal & vertical view: sell to traditional customer, but partnerships with outside parties (e.g. Sports Federation) Exclusive finished product concept with market demand: increased power v.-à-v. food companies (e.g., co-branding)</p> <p>Good margin (leverage own technological and market knowledge, which were already required for demand-based innovation)</p>
<p>New and substantially superior customer value</p>	
<p>Take over market and legal risk from food manufacturer (complete patented end product concept sold, market demand already created).</p>	

TRUCK & TRAILER INDUSTRY	
<p>Company: Large, international chemical company Business unit: Car coatings (Europe)</p>	
<p>Confrontation of the Slinitiative with the industry recipe:</p>	
Traditional industry assumptions & conventions	Slinitiative
<p>Automotive paint development & production (& gradually own distribution) Sell paint to body shops Margin on paint (customer loyalty by free training programs & technical support)</p> <p>Focus on product quality (technical/application product innovation) → technical application knowledge</p> <p>Vertical chain view: Ad hoc R&D co-operations with upstream parties Power over artisanal (dying) body shops but squeezed out by large body shop chains</p> <p>Margin pressure exerted by demanding end customer and large body shop chains, shrinking market share (diminishing damage)</p>	<p>Direction of entire accident management process: direct different repair and claim management parties & processes Sell this service to fleet/leasing/ rental companies Margin on total service package</p> <p>Focus on service efficiency, project management, relationship management → knowledge about entire accident management process + about end customer</p> <p>Horizontal view: main contractor but for realization partnerships with outside (insurance companies) and inside (body shops) parties Steer entire process, direct end customer contact</p> <p>Good margin: no commodity (leverage own knowledge in repair management)</p>
<p>New and substantially superior customer value:</p>	
<p>Take over (non-core) time-consuming, awkward and complicated accident management process from end customer. Fast efficient accident management improves customers' up-time significantly.</p>	

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GRAPHICS PRINTING INDUSTRY	
Company: Large, international hardware producer Business unit: Services (Benelux)	
Confrontation of the Slinitiative with the industry recipe:	
Traditional industry assumptions & conventions	Slinitiative
<p>Hardware production & maintenance Sell hardware + maintenance contract to corporate customer Margin on supplies & maintenance (Organizational separation of hardware sales and maintenance)</p> <p>Focus on technological (application-based) product innovation, efficient maintenance/repair service → technological application knowledge, efficient back-office</p> <p>Strong vertical chain view Ad hoc R&D co-operations with upstream parties Relative strong power v-à-v other supply chain parties, but demanding end customer: price pressure</p> <p>Strong margin pressure (commoditization + IT competitors)</p>	<p>Offer integral document management: optimize costs & flow of total process of document management Sell integral service to corporate customer Margin by means of performance contracting (in function of customer's cost savings) (integrate sales & maintenance departments)</p> <p>Focus on complete project management, consultative selling → end customer knowledge, organizational knowledge (BPR), IT knowledge (networks), hardware knowledge</p> <p>Horizontal view: strategic alliances with outside parties (IT & consulting companies) Increased power v-à-v end customer (total solution, no commoditization)</p> <p>Good margin (leverage own knowledge of technology/applications and customers, which was already required for maintenance)</p>
New and substantially superior customer value:	
Increase efficiency (cost savings) and effectiveness (BPR) of customers' document flow (non-core activity for customer)	

TRAFFIC MANAGEMENT SYSTEMS INDUSTRY	
Company: Dutch hardware producer Business unit: Traffic systems	
Confrontation of the Slinitiative with the industry recipe:	
Traditional industry assumptions & conventions	Slinitiative
<p>Develop, produce and/or assemble traffic systems: primarily hardware (gradually more software embedded) Sell systems to national (RWS) and municipal traffic management departments Margin on system (gradually by means of performance contracting, incl. maintenance, in function of system's up-time)</p> <p>Focus on technological innovation, product differentiation, low price (internal efficiency & vertical integration) → technical knowledge</p> <p>In the grasp of traffic management departments (especially on a national level) Squeezed out by large installation/construction companies Hybrid and opportunistic project-driven co-operation with all supply chain parties</p> <p>Fierce margin pressure (commoditization hardware, tendering procedures)</p>	<p>Provide traffic information (collect real-time traffic information from existing, installed traffic systems, bundle information, analyze information, report information) Sell (real-time) traffic information reports to municipal traffic management departments Margin by means of yearly fee in function of information used by municipality (plan to commercialize information to private parties too: travel information)</p> <p>Focus on technical integration of diverse systems (complicated software), relationship management (with municipalities, parties outside industry, competitors), advise/consulting in pre-development phase → technical knowledge (software interfaces), customer knowledge (needs), marketing & commercial knowledge</p> <p>Co-operation with outside parties (ANWB, BP...) and inside parties (other system suppliers, IT software development companies) Sole provider of this service: increased power v-à-v customer, skirt price competition of tendering procedures Service extendable to private customers (no tendering)</p> <p>Good margin: no commodity (leverage own installed hardware base, software knowledge to provide content services without much capital investment)</p>
New and substantially superior customer value:	
Customer gets real-time insight in the city's traffic flows. Based on this information, customers may inform their citizens, implement dynamic traffic management (diversions) and implement more effective traffic policy measures.	

ENERGY INDUSTRY	
Company: Large Dutch energy supplier (ex-regional monopolist) Business unit: Retail (i.e. consumer supply)	
Confrontation of the SInitiative with the industry recipe:	
Traditional industry assumptions & conventions	SInitiative
Supply energy (and guarantee supply) to consumer Sell to consumer (general public, retail) Margin on energy supplied (consumed) Focus on attaining large market share, efficiency (back-office), product differentiation → knowledge (forecasting) about energy consumption, energy market Vertical, closed chain view Focus on retail commodity market (no corporate customers) Strong margin pressure (commodity + liberalization + growing international competition)	Offer total energy management service: scan & monitor energy consumption on-line via IT-expert system, advise & implement measures for energy savings, hardware leasing & installation, purchasing (brokering), maintenance, invoicing Offer service to corporate customers (2/3 not former customer of energy or installation company) Margin by means of performance contracting (in function of customer's energy savings realized) Focus on efficient project management, market segmentation, consultative selling → knowledge about facility management, energy systems (installation), IT-systems, customer knowledge Horizontal view: joint venture with outside party (installation company) Personal contact with corporate end customer Good margin: no commodity (leverage/ bundle own knowledge in energy, facility management & installation)
New and substantially superior customer value:	
Take over (non-core) time-consuming and technically complicated total energy management (purchasing, invoicing, saving measures, etc.) from end customer-facility managers. Effective energy management leads to fundamental cost savings for customer.	

The ‘real’ strategic innovators, selected during QUAL1 were further studied during the QUAL2 phase.

4.2 FINDINGS OF QUAL 2: FINDINGS PER INDUSTRY

As indicated in the methodological chapter 3, QUAL2 consisted of a focus group session and additional interviews with strategic innovators (and their customers) for each industry (see chapter 3, section 3.5 for more details). The interview data were triangulated on two levels. First, we applied within-method triangulation. More specifically, the in-depth interviews with strategic innovators were triangulated by means of additional organizational documents about the organizational structure and processes. Since the issue of new and superior customer value creation is a pivotal element in SInitiatives, we additionally studied customer documents and, wherever possible, interviewed customers (and other parties) involved in the SInitiatives. In addition, we applied between-method triangulation and combined the interview findings with findings from the focus groups-2 per industry. Finally, we made a cross section of the findings of all five industries in order to select and refine relevant constructs, to formulate hypotheses and additional research questions, and to develop appropriate measures.

In this section we show the findings of the focus groups-2 and the interviews per industry. In the following section, we make a cross-section of these findings across all five industries in order to develop the theoretical model (incl. appropriate measures) to be tested in the QUAN phase.

Tables A-E in Appendix III present a summary of the major findings per industry. The findings related to the basic independent variables were categorized based on the conceptual findings of chapter 2. Findings about deliberate strategic learning mechanisms for recognition, assimilation and transformation appear in the first part of each table. Findings related to potential effects of organizational and supply chain characteristics are shown in the second part of each table. They were structured along the main categories of critical organizational and supply chain characteristics derived from the literature review in chapter 2. More specifically, findings were attributed to the conceptual categories: organizational culture, organizational structure, cross-functional information dissemination, supply chain information potential, and supply chain innovation potential.

4.3 GENERAL RESULTS OF THE QUALITATIVE STUDY

After having studied the findings per industry, we made a cross-section of all QUAL2-data across all five industries. This cross-section served to identify and refine relevant constructs, to formulate hypotheses & additional research questions and to develop the measurement instruments to be used in the subsequent QUAN-phase. In the next sections, we will frequently use quotations to better illustrate our interpretations (Morse, 1994). Due to space limitations, citations are exemplar and do obviously not cover the full data set. All citations were translated from Dutch.

4.3.1 Identification and refinement of relevant constructs

4.3.1.1 *The basic constructs: independent and dependent variables*

Regarding the dependent variable, both the defining elements of SI were central during discussions. All customers spontaneously stressed the deviant character of SI initiatives vis-à-vis the industry recipe. For example, a TMS customer (city) states: *“in fact, the system in itself is not that innovative, but the fact that a market party offers this kind of system is...well...to be called quite revolutionary in this industry”*. The aspect of creating new and substantially superior customer value shimmered through in all discussions as well. The following citation of a strategic innovator in the truck & trailer industry is exemplary: *“we don’t just produce coatings...our core business is damage repair; our mission statement is to help our customers grow”*.

Across all five industries, managers mentioned the importance of recurrent experimentation, as captured by the concept of SI capacity. A printer notes: *“you learn by doing it [SI]. You develop knowledge about setting up new concepts and gradually you become better at it”*. This view is echoed by another printer: *“go to the market and see what happens, sometimes it works, sometimes it doesn’t; new initiatives are established by experimentation and experience”*. In turn, a TMS systems supplier remarks: *“we learnt the most out of failed SIs”*. In the truck & trailer industry, a supplier kept going on about experimenting: *“try, try, try, and keep on trying in the market. The only way to succeed is to continuously take up new ideas. By the way, life cycles of SI initiatives are not any longer than those of product innovations; other parties are always on the lurk, so what you need is a continuous flow of new initiatives”*.

A comparison of all separate industry analyses (Appendix III: Tables A-E) validated the relevance of strategic learning mechanisms for recognition, assimilation and transformation. In fact, similarities largely outplayed the different industry characteristics. Independent of the industry, interviewees stressed the importance of recognition, assimilation and transformation. For example, an installation company (strategic innovator) was indignant about many energy companies' lack of SICap: *"they [energy companies] just dive into the market. They invest a lot of money in the market, because money they have plenty of. But they simply don't understand how the market works. They don't know anything about the market! They acquire companies for too much money. They submit offers to the market for a price that is far too low and they consequently spoil things for other industry players. That's a pity. And it costs them a lot, a huge lot of money. Instead, they'd better first look, study and think before offering it to customers!"*. In a similar vein, a printer says: *"you should develop deep customer insight, and know what the market is like, now and in the future. It takes an awful lot of energy to deeply think about this, to think beyond your traditional business. But it is crucial, very crucial...only then you can tailor your offer to this and adapt your organization in turn"*.

Furthermore, the deliberate establishment of mechanisms fostering the organization's recognition, assimilation and transformation capacity was being emphasized as well. Strategic innovators mention the value of a structured approach to crank up the organization's recognition, assimilation and transformation capacity. For example, one strategic innovator (printer) remarks: *"the radical strategic newness that is so typical of SI, stimulates us to structure things internally better. Maybe this sounds rather paradoxical, but it is the success formula"*.

For recognition, popular mechanisms are CRM-tools and the invitation of innovative customers. Often, recognition aspects are incorporated within performance appraisal criteria of sales (account management) and maintenance people. Non-sales people (e.g. marketers, strategic planners) take a lot of time to join account managers on customer visits and to talk with users.

Strategic innovators also stress the need to structure and deliberately stimulate the assimilation process. A supplier in the truck & trailer industry remarks that *"this [assimilation] can't be done once in a while, in-between daily business. Then, there is never time to do this. This should be stimulated structurally"*. Another strategic innovator in the truck & trailer industry notes: *"Time to reflect, especially on market and customer information, is crucial. You should involve sales people in this process, but sales people are no thinkers, they are doers. It is an awkward and time-consuming process to find the right formula for this. Especially SMEs do often not find the energy to put a systematic effort in this activity"*. A strategic innovator in the food industry emphasizes that a structured stimulation of assimilation is also important since it prevents the BU to be too enthusiastic about particular ideas; i.e. to offer concepts to customers without preparatory reflections about the market. In all the strategic innovating firms studied, strategic learning mechanisms often take place as periodical cross-functional meetings where, amongst other functional areas, especially sales, BU management and marketing are represented.

Finally, most strategic innovators prefer a structured approach to transformation stimulation. A truck & trailer supplier remarks that the process of SI should be routinized as soon as possible. He argues that routinization fastens internal anchoring, which in turn speeds up the roll-out of a SI initiative, and hence its time-to-market. As such, many

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strategic innovators are in favor of a ‘transformation blueprint’ that describes new processes beforehand. Changes are specified and explained up to the lowest level. A graphics printing systems supplier argues: “*‘creating the future’ and ‘proactive behavior’, that is plain management language. You should know what this means in reality, you should create action plans for your entire organization. [...] Good channeling of market signals and discussions about this may create awareness, but executing it is a different story. You should translate a change management program in a simple language so that every employee in the organization understands the strategy. You’ll understand, it should become one complete, coherent picture*”. Still another strategic innovator tries to deliberately foster transformation by the appointment of a ‘transformation manager’.

The data analysis did not only reveal the benefits of deliberate strategic learning mechanisms, it furthermore confirmed the (in chapter 2 assumed) semi-structured character of these mechanisms (cfr., Feldman & Pentland, 2003). Overall, the data laid bear the general, steering nature of the mechanisms used. In this way, the mechanisms stimulate specific goals, but do not specify in detail how these goals should be reached. Practices for recognition, assimilation and transformation are hence not blindly followed but stay open to constant change.

For example, to stimulate recognition, a BU manager took the time to explain to all of the BU’s 600 service engineers, face-to-face in small groups of 6 engineers, the importance of noticing customer signals, of careful listening to the customer and user, and of 1:1 relation management. He gave examples to them how this could be done, but in practice, service engineers are free to decide how they handle this. They are additionally trained in commercial and communication skills and in entrepreneurship. In turn, an energy service provider said they are convinced one should be as close as possible to the market, especially to innovative customers and non-customers, to know what their problems are, what their worries are. So, the company tried anything to invite and visit them but they were hard to reach. In the course of time, the company learnt how to tout for them and is now organizing conferences about specific industry topics, with well-known international speakers as customer baits. He argues that as the market changes, one should always look for new ways to approach it. As regards strategic learning mechanisms for assimilation, a technical manager of a food ingredient supplier explained how she meets cross-functionally every six weeks with marketing, sales and management executives to discuss the business unit’s market and marketing approach. Even though the meeting appointments are fixed, she stresses how they jointly try to regularly change the formula (e.g. by inviting external people) to stir things up, to breathe new life into the meetings, in order to prevent the process from getting rusted. Finally, the semi-structured nature of strategic learning mechanisms is also manifested in the area of transformation. Although a strategic innovator in the printing industry speaks of the creation of a ‘written organization’, he adds that enough freedom is left to deviate from general rules. A truck & trailer supplier shares this viewpoint. “*we create a sort of scenario script, a blueprint you could say, which details how procedures might be changed as part of the initiative. It’s always best to describe processes in detail beforehand. This prevents chaos, you know. Still, these are of course general guidelines and local deviation is possible, dependent on specific organizational and market requirements. In fact, it is about establishing best procedure ‘patterns’. We learn from one SI to the other and adapt the blueprint to the lessons learnt*”. Exactly the same remark was spontaneously brought up by a TMS systems supplier, a food

ingredients producer and an energy services company. A truck & trailer supplier indicates the use of detached, temporary cross-functional teams to launch initiatives (before they are incorporated within the organization). How these teams function and who they consist of, is however dependent on the specifics of the initiative.

In conclusion, the cross-industry analysis demonstrated the value of semi-structured strategic learning mechanisms for recognition, assimilation and transformation to foster Sicap.

However, this is only part of the story. Our discussion in chapter 2 additionally highlighted the stimulation of path-breaking focus areas in a company's recognition, assimilation and transformation capacity. The QUAL2-data enabled us to reveal the focus areas that were given high attention by strategic innovators. As regards the contents of the basic independent variables, insights from the literature (see chapter 2) were refined.

Across all five industries, a pattern arose where *similar* path-breaking contents areas were deliberately stimulated (see Appendix III, Tables A-E). The data hence suggested that these content areas did not depend on specific industry characteristics. Even though one individual strategic innovator may stress one particular area to a greater or lesser degree than another strategic innovator, overall similar areas are being stimulated.

As regards recognition, strategic learning mechanisms primarily stimulate insight into:

- future customer needs
- industry tendencies
- deep customer insight
- general environmental information (macro-tendencies, regulation, etc...)
- innovative customers
- other industries
- end customer
- non-customers

The focus on future customer needs and industry tendencies matches SI authors' stress on the development of industry foresight (e.g., D'Aveni, 1994; Markides, 1999a).

In contrast to Christensen's assertions (e.g. Christensen et al., 2002), strategic innovators do stress the need to deeply study *existing* customers and to build a 1:1 learning relationship with them. However, many strategic innovators emphasize the need to focus primarily on the most innovative customers to acquire innovative ideas. For example, many firms indicated they use special user groups, where they invite a limited number of innovative customers to jointly discuss their problems and suggested solutions. Strategic innovators share the view that personal, deep customer relationships increase a proactive market interpretation. The following quotations were typical: *"everything is about a good interaction between supplier and customer, not only about technical issues, but also about real needs"*, *"show him you know his processes and show him where these processes touch your own core competences"*, *"study the customer's business process and take over the bottleneck activities that are non-core to him"*, *"if you want to sell something, talk to the customer about his business, his processes, not about technologies and machines"*. A customer (document manager) of a strategic innovator says: *"this printer [the strategic innovator] often chatters with me: How are you doing this, how does this work then? How*

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could we do this or that? We could do it this way for you, what do you think about that? This is really unusual for a printer; most printers are too busy scoring printing assignments. I never see them. Yes, when they sign the contract and when they supply the prints. Account managers are very crucial in the introduction of new concepts and in hearing and seeing our real needs. Relations fail because of this, never because of the quality of their prints". However, some (not all) strategic innovators mention the value of a market push. They use expressions such as 'sticking your neck out', 'taking initiative' and 'precede the market'. A printer notes: "*you should know the customer's needs and problems...but the solution, the concept... this is something you should develop by yourself. If you await his question, you are slaughtered in this market*". Others (independent of the industry) stress the use of customers to *jointly develop* pilots for SI initiatives. In addition, all strategic innovators strongly reject the value of large-scale market research. They share the view that it never reveals world-shattering information and new innovative ideas, and that it is too time-consuming. It is usually used *ex post*, as a kind of confirmation of the usefulness of existing initiatives. A truck & trailer supplier even takes up a more radical position: "*Darn it, large-scale market research, I don't believe a damn thing about it*". In this respect, data tend to confirm the more traditional B2B marketing literature, stressing personal deep learning relationships with customers (e.g., Day, 1999; Ford et al., 1997).

In line with the literature on SI (e.g., Markides, 2004b), no one strategic innovator indicated the value of centralized gatekeeping functions for recognition. Especially the role of the marketing department was somewhat marginalized in this respect. "*Marketing aspects grow in importance, but we have no separate marketing function. I am convinced that all people in the entire process of SI development should possess marketing competences. The core of marketing is the entire organization*" (printer). "*We don't use the marketing department. A marketing department is good at 'packaging' new concepts, but not at inventing them. They are too far away from the market, too theoretical, too model-driven. You may never make the mistake to think that what marketing says is holy.*" (energy company). "*Marketing is too far away from what is happening in the market. They need the market information from sales*" (food ingredients producer). Strategic innovators stress the responsibility of the entire organization for recognition activities: "*During years, service was considered the necessary evil, now they are the market information antennas*" (graphics printing systems supplier). "*We don't have a marketing department, but the joint development of new concepts with customers is our top priority and it is everyone's responsibility to know what is happening outside. In fact, we all do marketing. Only, we prefer not to use the word 'marketing'. In a technical company, it still has a bit the wrong taste, you see*".

Finally, strategic innovators indicate the importance of gaining insights into the end-customer, non-customers and innovative industries. For example, a system supplier in the graphics printing industry tries to enter into partnerships with printers with the sole aim of knowing the end customers' needs better. An energy services provider developed a detailed scheme of all its non-customers, categorized them and linked per category the reasons why they are not interested in the firm's services. These findings show the importance of peripheral vision (e.g., Day & Schoemaker, 2004a).

Concerning strategic learning mechanisms for assimilation, interviewees mentioned the stimulation of:

- critical reflections on customers
- critical reflections on markets
- critical reflections on the marketing approach
- keeping alive past critical reflections on customers & markets
- sharing critical reflections on customers & markets

Findings reflect the conceptual insights, developed in chapter 2, quite well. Strategic innovators stress the need to broach discussions about customers, the market and the business unit's marketing approach (cfr. Tripsas & Gavetti, 2000; Markides, 2004b). An energy service provider mentions: *"thinking and discussing about market developments has become almost part of our daily business"*. Even though all strategic innovators studied pay attention to the deliberate stimulation of assimilation, many indicate these activities should be developed even more. A supplier of printing systems argues: *"In a B2C market you fragment yourself completely color-blind; in a B2B business, you should deeply think about who you approach, why and how. And believe me; this is even more required when considering a SI"*

Critical reflections do not only tackle long term market developments and new customer needs, but often focus on a new market segmentation, new customer approaches, new advertising methods, new pricing mechanisms and new distribution methods as well (cfr. Markides, 1997, 2004b). Sometimes, the entire industry and supply chain is being discussed and topics such as: 'how far to interfere downstream?', 'should we stay away from our customer's business?', 'in fact, what is our business?', 'how to deal with the exclusivity issue of SI?' and 'how to manage the incompatibility of the SI and the traditional business?' are dealt with.

Strategic innovators furthermore emphasize the need to involve people with perspectives as diverse as possible (cfr. Weick, 2002, Thomas et al., 2001, Markides, 1997). Often, assimilation activities take place as periodical, cross-functional meetings, but sometimes external parties such as customers, specific user groups, partner-companies, or university professors are involved as well. Strategic innovators indicate that different perspectives deepen discussions and help develop market scenarios for the future. A printer remarks: *"Internal soundboards are extremely important. They let you think, hear other visions. They keep you 'on edge'"*. A truck & trailer supplier talks about "cross-fertilization".

Besides the temporary external participants, the discussion boards consist of a few core persons. Most often these are marketers, sales people and business unit managers. The central core helps to keep alive the past reflections and the insights learnt from previous discussions and SI initiatives. In multinational companies, discussions also take place cross-regionally to exchange the reflections and lessons learnt between different regions.

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Data showed that strategic learning mechanisms for transformation primarily stimulated the following areas:

- adapt the organizational structure
- support new initiatives, even to the detriment of existing business
- adapt procedures
- replace skills (competencies)
- change the way of working
- prevent organizational chaos

The demarcation of these six areas makes the transformation aspect (related to SI) much more concretized than the relatively vague transformation aspects currently available in the SI-literature (see chapter 2).

Almost all SI initiatives imply an adaptation of the organizational structure. Many strategic innovators mention the set-up of detached temporary project teams (with members selected from other units in the organization). These teams take care of marketing and commercial aspects (they usually consist of marketers and sales people); for other issues they hire resources from the existing units. Afterwards, project teams are disbanded and initiatives are gradually incorporated within existing units, or the temporary project teams grow out into fully separate units. Interviewees mention that especially the latter approach limits and smoothes a sudden, drastic structural adaptation. In a limited number of companies SI initiatives set into motion a complete restructuring of the organization in units better fitted to serve specific product-service markets. For example, a truck & trailer supplier realized that many of its SI initiatives would be better backed if the organizational structure reflected a distinction between the commercial vehicles and personal vehicles end-market. The managers interviewed indicate that this structural change was well supported by the organization, since it was felt as a natural reaction to market developments, and not as a sudden, unexpected change imposed by the top of the organization.

The incompatibility of SI initiatives with traditional business, in terms of market image, is an often-cited problem. For example, a producer of printing hardware mentions the difficulty to profile itself as an independent full service provider, while traditionally producing and selling one specific hardware brand. A business unit manager of an energy company remarks: *“In order to gain credibility in the market, you should have both the knowledge, which you have as an insider, and an independent image, which you do not have as an insider. This implies a paradox that is very difficult to manage for most parties”*. Despite these problems, interviewees highly emphasize the need to carry initiatives through. They also indicate support from the top for new initiatives. Strategic innovators largely share the view that SI initiatives should be evaluated on their market potential; interference with existing business is to be considered as ‘a secondary problem’. Most strategic innovators warn against brand interference; in all cases but one (an energy company), SI initiatives are consequently put on the market with a different brand name. Initially, even other industry parties do hence not realize that the initiative is launched by this well-known incumbent.

Furthermore, a printer indicates: *“you should continuously revise your procedures; it’s just a question of reacting to market needs”*. A printing supplier mentions the use of an advanced CRM/knowledge management-system, where new procedures are detailed to the letter. Employees are stimulated to add needed revisions to the system. In addition, deep

and frequent communication with employees, he says, signals the need to adapt procedures. New procedures are reformulated in the system and communicated. The data base hence serves as a –frequently changing– manual. An energy company uses operational meetings with customers and franchisors as an input to update and optimize its back-office procedures.

New SI initiatives often also involve new and different, sometimes company-foreign, skills and competencies. To fill in new skills, almost all interviewees deliberately recruit new, external people experienced in different industries. A printer says: “If you want to do something different with your core competences in a structured way, you’ll need other people, with different skills”. For example, a truck & trailer supplier hired people from the insurance sector, a printing producer engaged IT experts, and an energy company recruited FMCG-marketers. Often, the own employees are mixed with the newly employed ones. In some highly technical companies, company courses are used to train technical and maintenance people in marketing, commercial and softer skills, such as communication and entrepreneurship. Only one TMS supplier mentions they adapted the recruitment criteria for developers: more stress is put on their market insight and entrepreneurial competences than on their technical knowledge.

SI initiatives imply new ways of working. For example, a printer started to work with cross-functional teams per product/market segment. All strategic innovators mention the value of strong top-down communication to convince and persuade people about the need to think and act differently. A manager of an energy installation company says: “*you can not solve an organizational problem, just by implementing a tool like SAP*”. Managers emphasize how they continuously proclaim that “*people are the new production system*” (printing supplier), and that “*to win outside is to start inside*” (printer). The CEO of an energy service provider mentions the use of joint project teams, involving the customer’s employees: “*I keep hammering so that people who work here feel as if they work at the customer’s*”. The CEO tells that he frequently draws the employees’ attention to the fact that in the near future he wants part of his people to be actually employed by the customer. Furthermore, in many companies the development and set-up of new initiatives is included in the formal performance evaluation criteria of, not only marketing and business unit managers, but of sales and technical managers as well. Strategic innovators also stress the need to involve people early in the process to increase commitment. For example, a graphics printing supplier stresses the value of involving lower levels in the development of the blueprint, in order to enlarge the supportive basis. A similar approach is mentioned by a truck & trailer supplier and an ingredients producer: “*to stimulate sales to execute initiatives in the market we need to involve sales and marketing already in the phase of concept development, in the past they were only involved at the end...we have to get used to that*”.

Strategic innovators strongly agree that chaos should be avoided because it worsens market credibility and considerably retards implementation and roll-out: “*There’s one key principle: Avoid chaos at all times*” (energy company). Many interviewees spontaneously bring up that behavioral change is a long-winded process. A TMS producer says: “*the launch is quick, but the execution takes time*”. Therefore, strategic innovators seem to agree on the benefits of a gradual, careful and structured approach to manage behavioral change. A printer remarks: “*setting up initiatives is not a storm, it is a babbling process*”. The use of a strict project-driven approach (with process patterns, demarcated phases, and fixed evaluation points) and the set-up of separate units is frequently mentioned as a highly

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valuable tool in this respect. One strategic innovator notes: “*we try a lot, but if we take up something we do it seriously and in a structured way*”. Hence, the earlier mentioned use of blueprints is especially important to run things smoothly. Only one strategic innovator (a food ingredients producer) developed a separate unit of business development where initiatives are invented, fully developed, crammed and launched, in order to be implemented only afterwards in the existing units for further roll-out. Likewise, a truck & trailer producer remarks that using temporary project teams are less risky and interfere less with daily business. A truck & trailer supplier appoints a ‘project support manager’ to take care of the roll-out and marketing aspects of the initiative.

4.3.1.2 Critical organizational and supply chain characteristics

The conceptual study (chapter 2) revealed the potential influence of some organizational and supply chain characteristics. Likewise, the QUAL2-data suggest that these organizational and supply chain characteristics might strengthen or weaken the effects the strategic learning mechanisms have on SIcap. This means that, statistically, these ‘side conditions’ may be modeled as interaction effects. Therefore, these characteristics may be placed under the heading of ‘moderators’.

Findings were classified into the following broad conceptual categories derived from the literature in chapter 2 (section 2.6): organizational culture, organizational structure, cross-functional information dissemination, supply chain information potential, and supply chain innovation potential.

The cross-industry analysis enabled us to further refine these categories of moderators.

As regards the category of cultural characteristics, two subcategories arose out of the data. On the one hand, managers mentioned the importance of an innovative mindset. A TMS supplier says: “*New things always cost a lot of time and energy, but we are convinced they will eventually work out*”. A food ingredients producer remarks: “*anyone here is convinced innovation is needed*”, and a truck & trailer supplier notes: “*people here should be able to cope with continuous change and they all should expose the right mentality for innovation. If they can not, they can not stay; such a mentality may destroy entire departments*”. Many strategic innovators indicate that people are not punished when SI initiatives do not succeed because of the market risk inherent to SI. However people are reprimanded when their effort and commitment to the initiative were below par. An energy service provider: “*people really like working on new things, they even spend their evenings and weekends on it! Commitment is far more important than technological knowledge. They [employees] know they are not punished if ideas don’t work out, what’s important is the right atmosphere, an innovative atmosphere*”. Many strategic innovators stress the leader’s (often this is the business unit manager’s) responsibility in stimulating such an innovation-minded culture. A printer says: “*the director determines the culture, the atmosphere. And it is the atmosphere that determines your innovation potential in the end*”.

On the other, strategic innovators stressed a risk-taking attitude. A truck & trailer supplier says: “*every SI is risky, it is a new venture, it is unknown territory, you go off the beaten track to a market you don’t know*”. The verb ‘dare’ is frequently brought up; strategic innovators talk about “*dare to change your business*”, “*dare to lose customers, if there is an opportunity to gain others*”, “*dare to interfere with your customer*”, “*dare to clash with other industry parties*”, etc. A printer: “*you set off on an adventure and you don’t know*

where it is going to bring you". A hardware producer in the printing industry remarks "sticking your neck out and starting something completely new is far more important than defending your traditional market". However, most of them talk about taking smart and calculated risks (e.g. in terms of brand interference). A truck & trailer supplier says: "you need SI to escape price competition, to gain profits. But next to this, you still need the traditional business, to spread risks. It's just a matter of not putting all eggs in one basket". Some mention to pay explicit attention to clear budgeting and calculating net present values. Only one energy company explicitly says "in fact, in our business unit, we are a bit like cowboys".

Concerning organizational structure, both the aspects of centralization and formalization arose from the data. Especially the structural effects of (de)centralization were highly emphasized. Yet, and contrary to chapter 2, the findings regarding the benefits of decentralization as emphasized in the literature on SI, provide a mixed picture. On the one hand, strategic innovators mention the importance of a flat structure when SI initiatives are developed. All interviewees mention the importance of a strong bottom-up approach. Strategic innovators indicate that ideas arise everywhere in the organization: in all functional areas and at all hierarchical levels. A printing supplier says: "often, the sting is within the management, not within the people who are in the market. They see what is happening and needed out there. So, it is evident they should come up with ideas". Strategic innovators stress the value of short lines. In addition, especially interviewees of larger or multinational companies stress the strategic freedom of the specific business unit vis-à-vis the corporate level. An energy company says: "we have almost entire strategic freedom to launch new SIs in our BU, and it should be this way". On the other, the use of blueprints and process patterns seem to point to a more centralized and formalized approach. Interviewees furthermore mention that 'walking the right channels' is important, and that the actual implementation decision is largely dependent on the business unit management. For instance, a truck & trailer supplier indicates how the number of SI initiatives effectively launched improved drastically after a switch in the business unit's management.

Thirdly, the value of the cross-functional dissemination of market information throughout the organization was highly emphasized because of several reasons. First, all strategic innovators indicate that the wealth of customer and market information sales people dispose of, should be disseminated across the business unit. This is because "sales people have the market information, but developing concepts and setting things up is however not their [sales people's] strongest point, here marketing comes in. But marketing is too far from the market. So, a close and frequent information exchange between sales and marketing is requisite" (truck & trailer supplier). A printer notes "there is a continuous feeding of market and customer information from sales". Secondly, cross-functional information dissemination is a condition to effective assimilation. We already mentioned the value of discussions and reflections cross-functionally. Thirdly, cross-functional information dissemination speeds up the set-up of SI initiatives. An energy service provider says: "most SIs arise between people". A printing hardware producer says: "the development of SI initiatives is in fact one process of customer information reaction. Sure, everyone has his own role in this process, but it remains one interlinked process with, obviously, much cross-functional information sharing [...] every employee should know

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how and what the customer thinks". A truck & trailer supplier hence indicates they put much effort to structure and formalize internal information dissemination in order to make market information available to everyone in the organization. A TMS supplier stresses the need of market information dissemination in order to avoid "*the trap of being technology-driven*".

Regarding the supply chain information stimulus, strategic innovators mentioned primarily the usefulness of information that can be obtained through working relationships with (direct) customers and (direct) suppliers. Essentially, customers provide valuable information about market developments and competitors; suppliers about competitors, new regulations, technological developments and potential industry entrants. Strategic innovators mention that these data help to gain new SI ideas and to predict market and industry reactions towards SI initiatives. For example, a truck & trailer supplier tells about a customer who informed him that the customers' branch federation was selling a benchmark service similar to the one the supplier was planning to offer (in a more advanced format) to its customers for free, as part of a total business solution. In this way, the supplier received an early warning about potential hostile reactions of the branch federation. The total business solution was consequently marketed under a different name, and it took the branch federation months to find out the solution was sold by this incumbent.

Fifthly, interviewees mentioned the impact of a (dis)encouragement and co-operative innovation attitude of customers and, albeit to a lesser extent, of suppliers.

The relationships that business units have with their customers may considerably stimulate the development of SI. A hardware producer in the graphics printing industry remarks: "*the fact that we are innovative is for sure dependent on our own innovation capacity, but, above all, we have good customers*". Many strategic innovators indicate the benefits of joint SI development with customers. Sometimes, SIs are developed as an extension to a normal working contract. Close co-operation within the scope of the working contract increases trust between both parties, and it locks in the customer. In this way, the BU is given a head position for subsequent SI-development with this customer and the customer's free-riding behavior is constrained.

Benefits of joint SI development are essentially related to the spread of investment risks, the possibility to refine a concept, and an increased power base vis-à-vis other industry parties. Furthermore, in the case of joint development interviewees note it is easier to convince a customer about the potential benefits of the SI initiative. Indeed, many interviewees indicate that some customers tend to adhere to the 'not invented here syndrome', and interviewees stress that the issue of gaining the credibility to offer SI is extremely important. However, the exclusivity many customers require in the case of joint development prevents a further roll-out of the SI towards other market parties.

As such, customer behavior may also become an obstacle. Strategic innovators emphasize the importance of customers' openness towards SI. For example, in the food industry, retailers are adherents to the "efficiency mantra", which limits their acceptance of SIs. Many interviewees indicate that the customer's purchasing department should be willing to think non-traditionally. A truck & trailer supplier notes: "*you want to make life easier for your customer, but some just want to keep doing it the old-fashioned way*". Another supplier remarks: "*My dream is that when I'm 50, my customers won't think in terms of*

components anymore". The importance of investing in customer education is hence highly stressed throughout the data. A TMS supplier additionally remarks: "*Smart relationship management of our customers [cities] is necessary. It takes up a lot of time but it may prevent the largest bottleneck in this industry: free-riding behavior*".

Besides the values of different forms of customer cooperation, interviewees mention the value of close relationships with suppliers as well. Suppliers really stimulate strategic innovators to jointly innovate, but apart from the printing industry, where supplier-OEMs really push printers into the development of new and better offers to the end customer, co-operations are primarily confined to technological areas. However, strategic innovators mention the indirect value of supplier cooperation forms. Early supplier involvement (conceptual & design phase) prevents many practical technical problems in later phases. Furthermore, since SI has often a technical component as well, innovative suppliers indirectly facilitate SIs. A truck & trailer supplier remarks: "*suppliers push us to outsource part of the production, this frees up resources to develop new market concepts*". Furthermore, some parties mention the benefits of involving non-traditional suppliers in the early phases of concept development. For example, an energy service provider jointly developed an advanced energy expert system with an American software firm. This expert system has become one the backbones of its total energy solution. TMS suppliers mention the input of German software suppliers, used to operate in one the most advanced TMS markets of the world.

Next to the direct innovation stimulus supply chain partners may exert, the QUAL2-data suggest that SIcap is also stimulated or curbed by the general climate of the supply chain. A printer tells that, due to the increasing hostility in the industry, many innovations are not welcomed by industry parties. Several strategic innovators remark that the traditional market has become so small and commoditized that the majority of incumbents fear that "*one man's breath is the other one's death*". A truck and trailer supplier says: "*in our industry, every party watches the others with Argus' eyes*". Interviewees assert that this hostility considerably obstructs innovative efforts: many parties are 'expectant' or even reluctant to take up SI, out of fear of acts of revenge by other industry parties. This view is echoed by a TMS supplier who complains that the trust between public and private parties has gone since long. He remarks that, still, trustful co-operation is key for the industry's development in the longer run. Strategic innovators hence stress to 'manage' carefully all stakeholders along the entire supply chain, even if there are no real strained relationships among the different parties. In addition, apart from conflicts with 'traditional enemies', new SIinitiatives sometimes elicit clashes with new, different enemies (e.g. insurance companies) as well. The potential hostile reactions from other supply chain parties (e.g., from customers, branch federations) explains why most of the SIinitiatives studied have been launched under 'hidden' names.

4.3.1.3 Control variables

The previous discussion shows that the QUAL2-findings revealed striking similarities across the different industries, both in terms of strategic learning mechanisms, and in terms of moderators. As we wanted to test the heterogeneity between companies/BUs as regards

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SIcap, we still wanted to control for additional homogenization effects. A closer study of the qualitative findings showed a potential influence of three additional variables.

More specifically, some interviewees shared the opinion that a company's SIcap is largely influenced by its size. Size is indeed one of the most frequently studied structural characteristics by researchers on strategy and organizational behavior (Liao et al., 2003). The role company size plays in stimulating SIcap seems to pull in opposite directions. Resource dependency arguments on the one hand and institutional and bureaucratic views on the other conflict each other (Miller & Chen, 1996).

Some authors argue that most strategic innovators consist of small niche players or new entrants that are less weighed down than large players by the burden of structural, cultural and mental inertia (Crossan & Berdrow, 2003; Henderson & Clark, 1990), by the specifics of the value network (position in the marketplace, system of use and product performance offered) in which they have been operating (Christensen & Rosenbloom, 1995), by the fear of cannibalizing or destroying current business (Stringer, 2000; Christensen & Overdorf, 2000; Markides, 1999a,b), or by an impatient, risk-averse financial environment eager for short-term results (Lynn et al., 1996). These arguments in favor of new entrants are also backed by Dimaggio & Powell (1983), arguing that the greater an organization's dependence on other organizations (in a specific organizational field, e.g. an industry), the more similar it will become in structure, climate and behavioral focus. In addition, the longer an organization has been exposed to a specific industry recipe, the more likely it will conform to it (Miller & Chen, 1996). Furthermore, it has been argued that contranormative innovations (i.e., those deviating from the industry recipe) tend to diffuse among firms in a 'trickle-down' way, i.e. from low- to high reputation organizations (Abrahamson & Fombrun, 1994). This is because high-reputation organizations are not willing to adopt an innovation that puts their own reputation in the industry at risk, whereas low-reputation firms do take these risks with the view of economic rents or an improved reputation. Other scholars assert that the underlying problem established companies cope with is not size in itself, but the organizational hubris that goes with it, the so-called 'paradox of success' (e.g., Miller, 1994; Tushman et al., 1986). Companies grow because of (past) success; size then constitutes a barrier to strategic resilience to the degree that the delusion of self-perpetuating success prevails in these organizations (Hamel & Välikangas, 2003). Past success has thus determined managerial cognition (Rajagopalan & Spreitzer, 1996; Shimizu & Hitt, 2004). In other words, underlying corporate values and processes have evolved in these organizations to support the status quo (sustaining innovations instead of disruptive innovations) (Christensen & Overdorf, 2000). The perspective that highlights the inert nature of established organizations most is the population ecology model (Leavy, 1997). Population ecologists believe that inertia to change is endemic to large companies, and that any change effort is an abortive attempt. Industry change only takes place on the population level by a variation-selection-retention process that favors better-fitted newcomers at the detriment of established, outdated companies. The paradox in this process is however that in the short and medium-term, selection processes favor 'reliable' organizations, whose structure is difficult to change (Hannan & Freeman, 1984).

Yet, others have pointed out that there is mounting evidence that also large complex established organizations can change (e.g., Baden-Fuller & Volberda, 1997; Volberda et

al.'s (2001a) illustration of ING's and Rabobank's renewal processes)²⁴. Indeed, empirics have shed doubt on the universality of the pro-convention (legitimacy) argument propounded by institutionalists (Greenwood & Suddaby, 2006), showing that especially large and diversified organizations can largely benefit from unconventional strategies (Miller & Chen, 1996). Some scholars even argue that established companies can not afford *not to strategically* innovate, if only out of defensive motives, i.e. to pre-empt others from destroying them by their respective SIs (Markides, 1999a,b; Kim & Mauborgne, 1997; Govindarajan & Gupta, 2001). It was actually shown that also incumbent firms, whenever threatened by innovative new entrants, may react and pre-empt fiercely (Charitou & Markides, 2003).

Founding their argument on empirical research, Kim & Mauborgne (2004) hence assert that incumbents are not at the disadvantage when it comes to creating new market spaces. Their early studies (1997) had already indicated that the discriminating factor between high-growth and low-growth companies was the firm's strategic logic; no significant differences were found between start-ups and established companies. In later empirical research (2004) their findings were even more convincing in that they showed that most innovations come from within and not from beyond the traditional industry. Govindarajan & Trimble (2005) and Hamel (1999) have put forward the same argument. They explicitly argue that incumbents are at the advantage over start-ups because of their capital, brand, distribution and human resources.

Empirics have however not yet given a decisive answer to the question whether company size is favorably related to technological innovation (Scherer, 1992), let alone how it affects a company's market creation and strategic innovation capacity. "The theoretical quandary of whether firm size is a source of inertia or a source of resources for strategic flexibility, remains unanswered" (Rajagopalan & Spreitzer, 1996: 48-49). Jaworski et al. (2000) consequently consider this as an important avenue for future research.

Indeed, the theoretical quandary proved itself in the QUAL2-data. On the one hand, strategic innovators regularly warn against brand interference between SI initiatives and the traditional business, which is proof of the arguments developed by Stringer (2000), Christensen & Overdorf (2000), and Markides (1999a,b). On the other, strategic innovators do not consider such brand interference as an insurmountable problem, and mention the importance of careful brand and image management. The stimulating or hindering power exerted by traditional customers, suppliers and the general chain climate (see the previous section) do however point to the influence of the existing value network (cfr. Dimaggio & Powell, 1983; Christensen & Rosenbloom, 1995). Yet, we found no real evidence of Miller's (1994) 'paradox of success'. The fact that several incumbents were selected as strategic innovators in the industry takes the edge off Miller's argument and enfeebles the population ecology model. A strategic innovator remarks indeed: "*Thinking about tomorrow, beyond the daily business, is the hardest part...it all comes down to the CEO,*

²⁴ In the context of *technological* innovation, also Schumpeter (1942) replaced his original 1912-belief in small, entrepreneurial firms as innovative leaders, by the conviction that it is especially large, established (often monopolist) companies, favored by e.g. economies of scale, deep pockets and attractability towards the labor market, that innovate more intensively than do small, pioneer firms (in Scherer, 1992).

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but he has of course so many other things on his mind...and well, daily business comes first, you know...or tomorrow is even out of the question for these companies". The quotation: "our right to exist is justified by setting up new SI concepts, to redefine the industry" comes from a large, multinational truck & trailer supplier. Accordingly, Kim & Mauborgne's (2004) assertion that *institutional factors are of minor importance* and that it is a firm's strategic logic that is key, seems quite plausible.

In contrast, *we did find evidence of the bureaucratic inertia* large companies have to cope with: "If you are at the level of decision power about new offers and new market approaches, you're often at the level where there is no market sensing at all" (energy company). A printer marks: "I am convinced that flexibility stops at 60 [persons]", and an energy service provider remarks: "You should remain small; we couldn't do this with more than 100 persons". A municipal traffic manager of a large city (i.e. a TMS customer) indicates that large ponderous organizations are often slower to come up with market-based innovations than smaller or mid-sized players.

Large companies' relative resource advantage was however highlighted as well. For example, an adhesives supplier to the truck and printing industry asserts: "being a large company, we have the capital to try things out. When business is bad, there is less money for innovation but...yeah...bad is relative here...we still have a considerable budget for this kind of initiatives". A 2nd-tier supplier in the truck & trailer industry notes: "the others know we're not Tom Thumb, we're big and we're powerful. When we launch something...they know we have the capital to really make it work...and if it comes to the worst, well...we just do some acquisitions". A supplier of TMS: "since we're merged with X [a large construction & contracting company], I feel our power base and credibility in the industry has considerably increased. It has really been a boost for the development of new initiatives...that's because we have deeper pockets and we can also rely on the competences of our mother company, yes, I must say that others [potential customers] realize this quite well".

In conclusion, size seems an important factor. Even though interviewees mentioned the effect of size on a business unit's capacity to create and launch SI initiatives, much to our surprise, size apparently only influenced the dependent variable. Indeed, smaller companies stressed the value of deliberate strategic learning mechanisms to promote recognition, assimilation and transformation capacity to the same extent as had done the larger companies²⁵. Smaller strategic innovators also applied blueprints, strict project management, fixed meeting appoints etc. Only, cross-functional information dissemination was *formalized* to a lesser extent in smaller companies. However, this variable is considered as a moderator and not as one of the strategic learning mechanisms.

Given these findings, we decided to control for size effects on the dependent variable SIcap.

Besides the issue of size, data suggested that the extent to which market behaviors can be shaped seem not so much determined by the specificities of the industry the firm operates in, rather than by the specific position a firm takes up in the industry supply chain. Upstream companies' distance to the end-market and their (traditionally) technological mindset may prove SI more difficult for them than for mid- and downstream companies. A

²⁵ This finding is consistent with Chaston et al.'s (2004) findings that also small firms largely recognize the importance of formalized knowledge management programs.

TMS supplier notes: “we consciously try to be not technology-driven and that’s not so easy for a technological company upstream in the chain”. A producer of printing hardware says: “We’re a machine producer, we are far away from the end market. We really do anything to come as close as possible to the end market. Many of the co-operations we start up with printers are only to serve this one goal, to get end customer information, to feel this end market”. In addition, as indicated in the previous section, interviewees highly stress the stimulating or impeding role customers may play in the development of SI initiatives, and upstream companies (traditionally more technology-focused) may hence be harder to persuade about the values SI may bring to them. Upstream companies supplying to other upstream companies may suffer from this. Avlonitis & Gounaris (1997) found furthermore that industrial companies, compared to consumer companies, are less inclined to develop a market orientation. Following this finding, Jaworski et al. (2000) argue that more traditional business-to-business markets are probably less amenable to altering customer behaviors, and point this out as an important avenue for future research. In this sense, mid- and downstream companies could be at the advantage to achieve higher levels of SIcap.

Hence we controlled the effects on the dependent variable for the business unit’s supply chain position.

Finally, the fact whether a company is a product- or service firm may affect its SIcap. Although empirical studies that compare product and service firms are scarce (Coviello et al., 2002), in general, manufacturing and service companies have been attributed a different way of innovation adoption (Damanpour, 1991). Both types differ moreover in the type of activities and in their future strategic emphasis (Parasuraman & Varadarajan, 1988). In service firms outputs are intangible and the producer is very close to the client (Damanpour, 1991). Empirics confirm indeed that business-to-business service firms apply more relationship marketing practices than do business-to-business product firms (Coviello et al., 2002). Customer interaction is in turn considered to positively influence the discovery of customer value opportunities (Carrillat et al., 2004). As service firms rely more on person-to-person interactions, market-oriented strategies have shown better results in service firms than in manufacturing markets (Cano et al., 2004). Since SI implies the creation of new value propositions, the previous line of logic would suggest that service firms are at an advantage over manufacturing firms in terms of SIcap. In addition, some interviewees mention the ease and speed at which new services can be created, in contrast to the long and awkward process of product development: “Services are much easier to launch than new products; you sign a few contracts with some parties and you’re off” (truck & trailer supplier). A manager of an energy company consequently complained about the difficulty of his marketing department to ‘think in terms of services’, which is often crucial in the development of SI-total solutions: “Furthermore, SI often involves services, total solutions, and marketers find it tricky to think in services. They are not trained to think in terms of services. Product thinking is much more theoretical, whereas services involve day-to-day worries and much practical organization, and this is something they find extremely difficult to consider”. Furthermore, services are less tangible, more perishable, and the fulfillment of customer needs requires a higher degree of customization in service firms than in manufacturing firms (Kirca et al., 2005). Therefore, service firms may also be at a disadvantage in terms of SIcap. Hence, ‘business unit type’ (i.e. product or service firm) was added as a third control variable to the model.

4.3.2 Development of hypotheses and additional research questions

4.3.2.1 Hypotheses regarding the basic model

Our main research objective was to detect organizational mechanisms that could foster SICap. Referring to the discussion in chapter 2, we proposed that deliberate strategic learning mechanisms fostering specific path-loosening elements of recognition, assimilation and transformation capacity would increase SICap. As the previous discussion indicates, the QUAL2-findings showed the relevance of these strategic learning mechanisms and enabled us to specify the path-breaking areas that these mechanisms essentially target in business units with a high level of SICap. These deliberate strategic learning mechanisms are hence taken as the independent variables in our study. Now it remains us to hypothesize the specific effects these independent variables will have on SICap. Therefore, we will combine theoretical insights from the sensemaking and ACAP literature with the findings of QUAL2.

When we asked interviewees (especially during the in-depth interviews) to tell us more about the process of creating SIinitiatives, a full mediating cycle seemed general practice. A strategic innovator notes: *“you cannot just do something without deep knowledge of your market. This implies listening to your market, your customers and, above all, much discussion about the trends you see in the market and in your industry. Then, your organization has to be adapted to this”*. Furthermore, the systematic stimulation of this cycle was emphasized. A supplier to the truck & trailer industry remarks: *“you should build the systematic capacity to see, discuss, and set up turnkey projects, since the clue is to keep on repeating this cycle”*. A hardware supplier in the printing industry notes that *“it is a question of structuralizing the market information flows. From what is heard in the market by our sales people and what users tell our engineers, to eventually turning and tuning our organization to it”* A printer says: *“a market signal is often a stimulus to deeply think about the market, and then to reorganize our business and our confrontation with the market, say, our market approach. One should consciously trigger this entire process”*. A TMS supplier notes: *“you should watch and study and discuss and reflect on your market before offering something new to customers. And this process should be structured, as much as possible”*. The QUAL2 data hence suggested the overall existence of full mediating effects.

Relying on both ACAP and sensemaking theory, these *full mediation effects* (see the black arrows in Figure 4.1) may be further justified.

This basic full mediating relationship is foremost grounded in Zahra & George’s (2002) argument that for the creation of ACAP as a coherent dynamic capability, all dimensions play complementary roles since they build upon each other. Hence, when fostering SICap, recognition, assimilation, and transformation all need stimulating, since these dimensions build upon each other to jointly produce a dynamic capability (Zahra & George, 2002). Similarly, Lane & Lubatkin (1998) consider the different ACAP dimensions as [sequential] *steps* in the learning *process*.

In the development of dynamic capabilities, therefore, recognition and assimilation have not been *directly* associated with outcome variables (Lane et al., 2001).

These arguments can be enriched by insights from the sensemaking literature as well. There, similar ideas have been conceived. More specifically, it is argued that noticing environmental information will only lead to effective renewal if this noticing leads to a renewed understanding (Becker, 2001). External scanning thus facilitates strategic action through its effects on strategic interpretation (Thomas et al., 1993).

First, the causal link between recognition and assimilation is based on the argument that the amount and type of information searched for and used will affect interpretation (Dutton & Duncan, 1987). Thomas et al. (1993) empirically demonstrated that attention to a broad range of information positively influences strategic interpretation (i.e. the attribution of meaning to strategic issues). Interpretation means translating information, developing models for understanding it, attributing meaning to it, and sharing perceptions (Daft & Weick, 1984). Information gathering is thus considered as an antecedent to interpretation. Furthermore, Barr et al.'s (1992) study suggested that noticing new environmental information increases the likelihood and speed by which firms can change their mental models. New environmental information indeed provides stimuli and substance for internal reflection and discussion on possible strategic and operational implications (Zollo & Winter, 2002). "The ways in which openness to new information and knowledge is achieved [...] establishes processes whereby that knowledge is handled within an organization and which will impinge on the use made of it" (Child, 1997: 69). Hence, deliberate strategic learning mechanisms for recognition capacity will increase assimilation capacity.

Assimilation in turn leads to transformation. As rational thought is assumed to be closely linked to chosen actions (Thomas et al., 1993), mental maps direct action (Barr et al., 1992). Likewise, Walsh (1995), referring to Read (1987), suggests that knowledge structures may play an enabling role in shaping behavior. Hult (2005) empirically confirmed that market information processing increases the organization's responsiveness. Interpretation is hence the process which determines the actions chosen (Daft & Weick, 1984). However, information can only effectively acted upon if first a common understanding of this information is developed (Hult et al., 2005). Effective organizational action, defined as any significant change in ongoing organizational practices hence depends on managers' understanding of their environment (Thomas et al., 1993).

Moreover, Tranfield & Smith (1998) found that cognitive change (changing mindsets) was the driver of behavioral change. A renewed understanding hence guides the adoption of new behaviors (Barr et al., 1992). New routines replacing old ones rely on processes of forgetting (de Holan & Phillips, 2003). Successful transformation thus relies on effective assimilation processes. Moreover, Maltz & Kohli (1996) found that formal communication channels (often used to stimulate assimilation) encourage people to act on the information shared. Hence, deliberate strategic learning mechanisms triggering assimilation capacity will hence positively affect transformation capacity.

Finally, transformation will lead to SIcap. Barr et al.'s (1992) study of the US railroad industry showed that major changes in mental models were reflected in more proactive strategies. Therefore, we can propose that an organization's assimilation capacity is positively associated with SIcap. However since cognitions are manifested in actions, cognitions only affect outcomes in an indirect way, i.e. through taking actions (Rajagopalan & Spreitzer, 1996). This was already discussed at length in chapter 2 (section 2.3). Hence, deliberate strategic learning mechanisms triggering transformation capacity will positively affect SIcap.

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Taking into account this sequential character of the ACAP and sensemaking process, the full effects of fostering recognition capacity are only realized on the condition assimilation and transformation capacity are triggered as well. In turn, the full effects of a stimulation of assimilation capacity will only be materialized if transformation capacity is also triggered. This implies that the effects of deliberate strategic learning mechanisms for recognition will be optimized on the condition deliberate strategic learning mechanisms for assimilation and transformation are in place as well. Similarly, deliberate strategic learning mechanisms for assimilation will most positively affect SIcap on the condition deliberate strategic learning mechanisms for transformation are in place.

As a consequence, deliberate strategic learning mechanisms for recognition are fully mediated by deliberate strategic learning mechanisms for assimilation and transformation, and deliberate strategic learning mechanisms for assimilation are fully mediated by deliberate strategic learning mechanisms for transformation (see the black arrows in Figure 4.1).

However, this is only part of the story. In fact, some additional effects should be taken into account.

First, even though the *sequential* execution of all stages from scanning to action undergirds both the ACAP and the strategic sensemaking construct, some shortcuts can be discerned. The influence of politicking on this process (e.g., Hall, 1984) may give rise to nonlinear, direct and indirect influences of all the antecedent dimensions, more than is predicted by the traditional linear models (Thomas et al., 1993). Although the influence of politicking could not be discerned in the data (only one printing hardware producer and one food ingredients producer brought up this issue), still, data did point to deviances from the sequential full cycle. Shortcuts are often associated with (deliberate or undeliberate) timing issues. Information and ideas should be brought up at the right moment, and change should be initiated when times are ripe. For example, a manager of an adhesives supplier in the TMS industry mentions that much attention is paid to the application of strategic learning mechanisms for recognition and assimilation. However, he stresses the importance of timing aspects in the launch of a SIinitiative. He tells that often, based on recognition and assimilation, an initiative is developed and stored until the company receives a market signal that ‘times are ripe to launch’. Transformation is hence retarded. As a consequence, at the moment the SIinitiative is considered to be launched there is a direct link from recognition over transformation to SIcap. Even though, some other companies emphasized the importance of ‘pushing the market’ (hence neglecting timing issues), the issue of timing, reducing the importance of assimilation at the moment of the market launch, was raised by many interviewees.

Furthermore, previous research findings have shown that both information search and interpretation also directly affect action and performance (Thomas et al., 1993), i.e. deviating from the linear recognition-assimilation-transformation model. This direct effect could be attributed to the cyclicity of the sensemaking process, in the sense that assimilation or transformation are not turned useless, but in that past experience may enable organizations to sometimes circumvent the *systematic* assimilation and transformation stages. Based on new information, previous experience may further guide interpretations and decisions, so that reinterpretation and altered action may not be required every time new information is used. The QUAL2-data seemed to confirm this

assertion. The process stories companies told us suggest that the full cycle capacity pays off more than once. Often, different SIinitiatives are launched, based on the market insights generated in the course of previous SIinitiatives. We could detect a shortcut, especially concerning transformation.

Even though the path loosening effects of deliberate strategic learning mechanisms may inhibit *complete* reliance on experience, our discussion on path dependencies in chapter 2 would still suggest the occurrence of direct effects, going from deliberate strategic learning mechanisms for recognition to transformation or even SIcap and direct effects going from deliberate strategic learning mechanisms for assimilation to SIcap (see the grey arrows in Figure 4.1). For example, to better tailor its offerings to emerging market needs, a truck & trailer supplier adapted its organization to achieve a closer fit between the internal organizational structure and new or changing markets segments. Interviewees stressed that this renewed structure facilitated the organization to recently launch several specific SIinitiatives. In a sense, some new SIinitiatives seem to lift on the transformation capacity that was required (and built) for previous SIinitiatives. Likewise, a manager of an energy company mentioned the creation of a separate ‘retail services’ business unit, with the aim of providing full service concepts to the customer. The unit is smaller, closer to the end market and has the autonomy to launch radically new service concepts better fit to the end market. The interviewee told us that this autonomy has considerably eased the development and market introduction of recent SIinitiatives, without having to turn upside down the entire organization with every new initiative. A similar story was told by a printer and a printing hardware producer. Their stories all point to a shortcut from recognition (and assimilation) to SIcap.

Apart from the non-sequentiality of the process itself, an additional effect may occur. Our research question led us to focus on deliberate strategic learning mechanisms. This implies we restrict our attention to what essentially are ‘flow’ variables. ‘Stock’ variables (meaning recognition, assimilation and transformation *capacity* as they are) are not taken into account. Our discussion in chapter 2 (section 2.5) on the idiosyncratic nature of capabilities, and the existence of path dependencies, leads us to propose that the effect deliberate strategic learning mechanisms will exert depends also on these stock variables. In the concrete, the effect deliberate strategic learning mechanisms produce on a firm’s SIcap will also be determined by the firm’s level of development (in terms of path-breaking focus areas) of recognition, assimilation and transformation *capacity*. The full-mediating effects may therefore be reduced and direct effects may occur (see the grey arrows in Figure 4.1). For example, when assimilation and transformation capacity are highly developed, chances are high that deliberate strategic learning mechanisms for recognition directly affect SIcap, without much intermediateness of deliberate strategic learning mechanisms for assimilation and transformation.

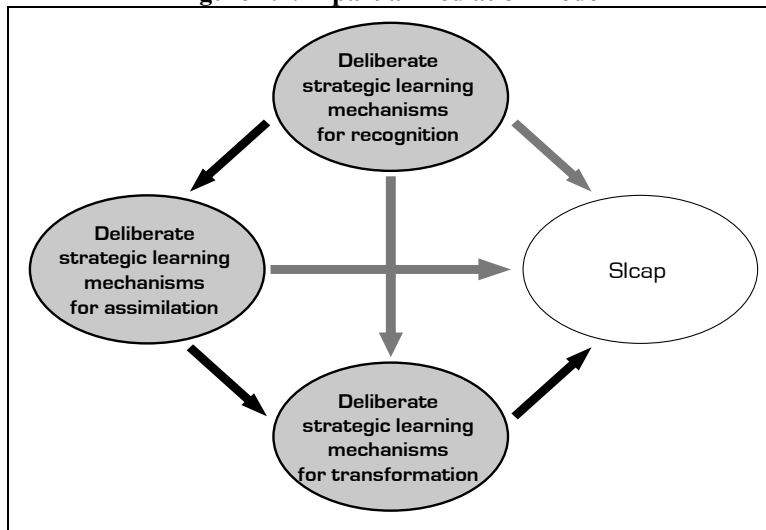
The QUAL2-findings did indeed suggest that over time the importance of deliberate strategic learning mechanisms may diminish as recognition, assimilation and transformation capacity have grown. A manager of a TMS systems supplier remarks: “*we gradually learnt how to use a more marketing- and commercially-based approach. But we are a technological company; in the beginning, this was a harsh process and much formal stimulation was needed. Now this view has become ingrained in the people working here and it has become part of our daily business*”. Interviewees hence pointed to the importance of additional *informal* (i.e. not deliberately stimulated) recognition,

assimilation and transformation capacity. Some strategic innovators state that stimulating recognition capacity should not be entirely formalized. A printing hardware supplier and an energy service provider both remark that it is often during unforeseen, occasional, informal conversations with customers where one learns the most of their business, their problems and their needs. A manager of a truck & trailer supplier indicates the importance of informal assimilation capacity: “*Sure, formal and structured channels to discuss markets and to develop new ideas and concepts are very important, but ... there’s also something as the ‘coffee machine channel’. I must say that our informal discussions are much extended, especially when considering that this is an international company!*”

Stock effects of informal capacity may thus cause the earlier mentioned deviance from the sequential path as well. In an attempt to speed up the cycle, deliberate mechanisms may be by-passed. For example, assimilation is often stimulated by formal (cross-functional) meetings. Yet, meetings are only held at certain time intervals, running the risk the idea will be forgotten in the mean time due to daily pressure, or its initiation will be needlessly retarded (Koput, 1997). Furthermore, the preplanned nature of assimilation meetings may give potential opponents the time to develop politically advantageous positions (Maltz & Kohli, 1996).

In conclusion, insights based on the conceptual study and the analysis of the QUAL2 data led us to hypothesize a *partial mediation* model (see Figure 4.1).

Figure 4.1: A partial mediation model

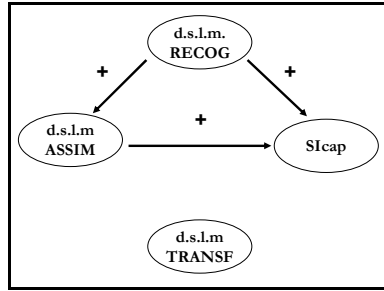


This model shows we hypothesize that deliberate strategic learning mechanisms for recognition will positively affect SIcap. This influence is partially mediated by the effects of deliberate strategic learning mechanisms for assimilation and for transformation.

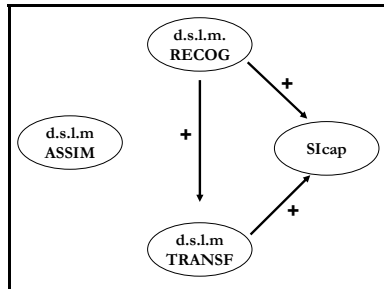
Deliberate strategic learning mechanisms for assimilation will, for their part, positively affect SIcap. This influence is in turn partially mediated by the effects of deliberate strategic learning mechanisms for transformation. Finally, deliberate strategic learning mechanisms for transformation will positively and directly affect SIcap.

More specifically, the test of this entire model comes essentially down to testing the following three hypotheses²⁶.

H1: *Deliberate strategic learning mechanisms for recognition will positively affect SIcap. This influence is partially mediated by the effects of deliberate strategic learning mechanisms for assimilation.*



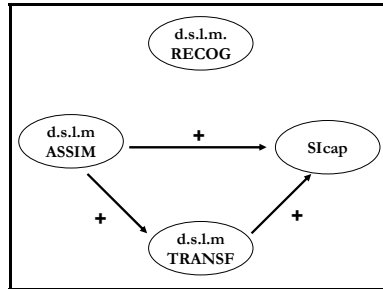
H2: *Deliberate strategic learning mechanisms for recognition will positively affect SIcap. This influence is partially mediated by the effects of deliberate strategic learning mechanisms for transformation.*



²⁶ We use the term ‘hypotheses’ instead of ‘propositions’ since we follow Whetten (1989: 491) that “the primary difference between propositions and hypotheses is that propositions involve concepts, whereas hypotheses require measures”. So, while both propositions and hypotheses articulate relationships, propositions are more abstract and also relate to more abstract constructs. In contrast, hypotheses build on specific, operationalized variables derived from these constructs, and involve more concrete and operational statements (Bacharach, 1989). The qualitative phase enabled us to further refine and operationalize the constructs we use (see the next section). The relationships we hypothesize here are defined in terms of these refined and operationalized concepts and will be tested in the quantitative phase. We judge the term ‘hypothesis’ hence more appropriate here.

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H3: *Deliberate strategic learning mechanisms for assimilation will positively affect SIcap. This influence is partially mediated by the effects of deliberate strategic learning mechanisms for transformation.*



4.3.2.2 Research questions regarding the moderators

External validity is related both to generalizing to particular target persons, settings, and times, and to generalizing *across* types of persons, settings and times. The latter answers to the question how far one can generalize (Cook & Campbell, 1979). “Tests of the extent to which one can generalize across various kinds of persons, settings, and times are, in essence, tests of statistical interactions. [...] Where effects of different magnitude exist, we must then specify where the effect does and does not hold and, hopefully, begin to explore why these differences exist” (Cook & Campbell, 1979: 72). Hence, in addition to the main hypotheses we developed, additional research questions concerning potential moderating effects were formulated.

The QUAL2-findings did not enable us to formulate specific hypotheses concerning moderator effects on the (mediated) relationships between strategic learning mechanisms and SIcap.

First, research on potential moderators on the ACAP-cycle is rather limited, not to say non-existent. Besides Zahra & George’s (2002) conceptual propositions and Jansen et al.’s (2006) attempt to study the antecedent effects of ‘coordination, systems and socialization capabilities’ (Van den Bosch et al., 1999) on the four ACAP dimensions (Zahra & George, 2002), the literature lacks (both empirical and conceptual) insights regarding whether and how moderators affect the ACAP cycle in itself. The development of hypotheses about moderating effects renders even more difficult in a study like ours, which focuses not on the general ACAP dimensions in themselves, but on the deliberate strategic learning mechanisms fostering specific path-breaking focus areas in them.

Secondly, the qualitative phase was primarily focused on the selection of strategic innovators (QUAL1), the operationalization and refinement of the constructs, and the development of a basic research model (i.e. hypotheses regarding the effects of deliberate strategic learning mechanisms on SIcap). Given the lack of a robust theoretical framework to fall back on, the data proved not sufficiently detailed to provide well-founded insights into the mechanisms that several moderators prime on the basic relationships.

Finally, the development of hypotheses regarding moderating effects is further complicated by the 'flow' character of the independent variables. For example, many interviewees indicate that the involvement of various functional areas in discussions and reflections on the market should be stimulated (see section 4.3.1.1). In companies where cross-functional information dissemination (one of the moderators) is highly developed, the effect deliberate strategic learning mechanisms for assimilation will have on SICap can hence be expected to be larger than in companies with less-developed capacities for cross-functional information dissemination. However, the opposite effect could be argued as well. In line with Zahra & George's (2002) propositions concerning the effects of social integration mechanisms, we could hypothesize that cross-functional information dissemination would increase the efficiency of assimilation *capacity*. Companies where market information is well disseminated across all functional areas would hence have a lower need for *deliberate* strategic mechanisms that stimulate individuals to share reflections about the market. In these companies, the establishment of deliberate strategic learning mechanisms for assimilation could hence turn out redundant as well. For all moderators, we were confronted with similar contradictory arguments. In addition, the influence moderators could exert on the (partial) mediation effects would have to be taken into account as well. In other words, the development of specific hypotheses was even more complicated as hypotheses regarding 'moderated mediation' effects (e.g. James & Brett, 1984) had to be formulated.

In conclusion, a profound study of the literature and of the QUAL2-findings turned out fruitless, and we were forced to restrain ourselves from the formulation of directional hypotheses regarding moderating effects.

Hence, we confined ourselves to the formulation of research questions, instead of the development of concrete hypotheses. This strategy has been used in prominent journals. For example, Duxbury & Higgins (Journal of Applied Psychology, 1991) justify the specification of research questions instead of hypotheses when existing empirical evidence is lacking. The formulation of research questions implies that our study on the moderating effects of several organizational and supply chain characteristics is essentially exploratory²⁷.

Research questions were formulated for all the key influential constructs that were derived from the QUAL2 analysis in section 4.3.1.2.

RQ1: *What are the effects of an innovative culture on the hypothesized partial-mediation model?*

RQ2: *What are the effects of a risk-taking culture on the hypothesized partial-mediation model?*

RQ3: *What are the effects of the cross-functional dissemination of market information on the hypothesized partial-mediation model?*

²⁷ Since we combined an exploratory investigation (i.e. research questions instead of hypotheses) with a quantitative data collection (survey) and statistical analysis (PLS) in the QUAN-phase (see chapter 5), this is actually a mixed type III of 'mixed *model* research' (Tashakkori & Teddlie, 1998).

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RQ4: *What are the effects of information provision by customers on the hypothesized partial-mediation model?*

RQ5: *What are the effects of information provision by suppliers on the hypothesized partial-mediation model?*

RQ6: *What are the effects of a formalized organization structure on the hypothesized partial-mediation model?*

RQ7: *What are the effects of a centralized organization structure on the hypothesized partial-mediation model?*

RQ8: *What are the effects of the innovation stimulus from customers on the hypothesized partial-mediation model?*

RQ9: *What are the effects of the innovation stimulus from suppliers on the hypothesized partial-mediation model?*

RQ10: *What are the effects of the general chain climate on the hypothesized partial-mediation model?*

4.3.3 Development of quantitative measurement instruments

In the early stages of questionnaire design and development, both an extensive literature study and a qualitative research prove useful.

First, it is important that operationalizations depend on the results of a conceptual analysis in which essential features of the construct are revealed. “A precise explication of constructs is vital for high construct validity since it permits tailoring the manipulations and measures to whichever definitions emerge from the explication” (Cook & Campbell, 1979: 65). Hence, each construct was first theoretically conceptualized based on the literature (see chapter 2).

Second, as already mentioned, these conceptual definitions served as guidelines during the QUAL study. More specifically, the QUAL findings enabled us to further specify, refine, supplement and validate these definitions. The value of in-depth interviews, discussions with experts, and focus groups with respondents and experts have been stressed in this respect (Bagozzi, 1994a: 39). The development of all indexes and scales was consequently based on a conceptual study of relevant literature and on the results of our qualitative research. Wherever possible, validated operationalizations of constructs developed by other researchers were adopted (Creswell et al., 2003).

For every category of variables, both the contents of the construct and the measurement mode was first specified before a sample of reflective indicators or a census of formative indicators were formulated to measure the construct. The purpose of following this logic is to explicitly relate theoretical notions to the empirical model, and in this sense to better be able to make (content) valid research conclusions (Bagozzi, 1994a; Rossiter, 2002). The

formulation of the operational construct definitions is based on the conventions developed by Rossiter (2002).

4.3.3.1 Operationalization of the independent variables

4.3.3.1.1 Operational construct definition

The QUAL findings (see section 4.3.1.1), enriched by the conceptual study in chapter 2, led to the following operational construct definitions of the independent variables:

‘RECOG’: *Deliberate strategic learning mechanisms for recognition (‘recog’) are deliberate mechanisms, as perceived by people in charge of the organization/BU’s marketing strategy (raters), that foster the path-breaking focus areas in an organization’s recognition capacity. The object of recog is the Dutch industrial organization/BU. Recog is a second-order formed attribute, consisting of 8 components, of which two are eliciting attributes: mechanisms for the stimulation of 1) the collection of general environmental information (macro-economic and societal, ‘envinfo’), and 2) the development of deep customer insight (‘insight’). The remaining six components are formed attributes: the stimulation of 1) insights into future customer needs, 2) market research on other industries, 3) the detection of fundamental changes in the industry, 4) the collection of information about the needs of end customers, 5) the consultation of innovative customers for new ideas, and 6) the study of non-customers.*

‘ASSIM’: *Deliberate strategic learning mechanisms for assimilation (‘assim’) are deliberate mechanisms, as perceived by people in charge of the organization/BU’s marketing strategy (raters), that foster the path-breaking focus areas in an organization’s assimilation capacity. The object of assim is the Dutch industrial organization/BU. Assim is a second-order formed attribute, consisting of 5 components. All five components are in turn formed attributes as well: mechanisms for the stimulation of 1) the critical reflection on customers, 2) the critical reflection on markets, 3) the critical reflection on the marketing approach, 4) the exchange of critical reflections on customers and markets, and 5) the memory of critical reflections on customers and markets.*

‘TRANSF’: *Deliberate strategic learning mechanisms for transformation (‘transf’) are deliberate mechanisms, as perceived by people in charge of the organization/BU’s marketing strategy (raters), that foster the path-breaking focus areas in an organization’s transformation capacity. The object of transf is the Dutch industrial organization/BU. Transf is a second-order formed attribute, consisting of 6 components. All six components are in turn formed attributes as well: mechanisms for the stimulation of 1) the adjustment of the organizational structure to better meet the needs of a new (planned) offering, 2) the replacement of skills/competencies to better meet the needs of a new (planned) offering, 3) the adjustment of procedures to better meet the needs of a new (planned) offering, 4) the change of the way of working to better meet the needs of a new (planned) offering, 5) the prevention of organizational chaos when a new offering is being launched, and 6) the support of new initiatives, even at the detriment of existing products/services.*

These operational definitions reveal the multidimensional character (Law & Wong, 1999; Law et al., 1998; Chin & Gopal, 1995) of the independent variables, found in the QUAL

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analysis. More specifically, the qualitative findings pointed to the appropriateness of a ‘molar approach’. This means that the independent constructs are conceptualized as superordinate constructs; no interdependencies among their (own) components are studied. The independent construct only connects its dimensions to other constructs in the model (Chin & Gopal, 1995). The independent constructs are in fact second-order *formed* attributes, in themselves consisting of several first-order attributes, or dimensions or facets (Rossiter, 2002). This implies that the direction of causality is from the dimensions to the construct, or to put it in another way, that the arrows go from the dimensions to the construct.

4.3.3.1.2 Indicator specification

Knowing that all independent variables are molar, multidimensional, constructs concrete indicators can be specified. First of all, the contents of the constructs (with all its dimensions) should be reflected in the items. Since the constructs are molar and include several different facets, unidimensionality is precluded. This implies that reflective measures of distinct dimensions may not be forced into a unidimensional model (Bollen & Lennox, 1991). Basically this situation leaves us with two alternative indicator specification modes, between which we can choose the most appropriate one.

The first alternative consists of building a second-order model in which each dimension is separately measured by its own set of reflective indicators (Bollen & Lennox, 1991). The second option consists of capturing each dimension by one well chosen formative indicator. We decided to follow the latter approach because of the following reasons. First, this option has often been referred to in the literature (e.g., Cohen et al., 1990; Chin & Gopal, 1995): “[...] multidimensional constructs are often conceptualized as composites of their dimensions, such that the paths run from the dimensions to the construct. In such instances, the dimensions of the construct are analogous to formative indicators” (Williams et al., 2003: 909). Secondly, opting for the first alternative (measuring each dimension by its own set of reflective indicators) would have extended the –already long– questionnaire even more. We think the disadvantages of a long survey (e.g. low response rate) would have outweighed its potential advantage in terms of an increase in measurement qualities. The more since Rossiter (2002) stressed the value of one well chosen formative indicator to capture a formed attribute. Finally, the exploratory character of the study made us prioritize on revealing the importance of certain dimensions, more than on specifying the indicators’ measurement properties (by measuring each significant formative indicator by a domain-sampling strategy).

Hence, all independent variables are operationalized in a formative specification mode; the formed attribute measures are not unidimensional and their indicators form an index. The independent constructs are thus determined by an explanatory mix of manifest variables.

To check the appropriateness of the formative measurement mode, the guidelines developed by Fornell & Bookstein (1982), Chin (1998a), Diamantopoulos & Winklhofer (2001) and Jarvis et al. (2003) were followed (see chapter 3). In short, the QUAL2 findings revealed the specific path-breaking focus areas the independent variables target. Consequently, the indicators are conceptualized as defining characteristics of the construct. This implies that changes in the indicators would cause changes in the construct; dropping one indicator would change the conceptual domain of the construct. Indicators share a common theme (the specific ACAP dimension), still they are not interchangeable. The

different deliberate learning mechanisms of a construct are by definition not positively correlated; a change in one of the indicators is not necessarily associated with a change in all the other indicators. Alternatively, an increase of the construct value does not per definition lead to an increased value of each and every deliberate learning mechanism measuring this construct. In contrast, a change in one deliberate learning mechanism changes the overall construct value. For example, the QUAL2 findings indicated that the stimulation of the study of non-customers does not necessarily imply that insights into future customer needs are stimulated as well, in each and every case. If the construct recog increases, this does not necessarily imply that all of the eight domains are stimulated to a higher degree. However, if one of the eight focus areas is stimulated more, recog will have a higher value. A similar logic can be applied to all indicators and to every independent variable.

In the concrete, recog, assim and transf consist of respectively 8, 5, and 6 dimensions or components that are captured by one good item per component; all the indicators hence cover all the construct's components (Rossiter, 2002). As a consequence, the number of indicators used to capture these constructs should equal the number of construct components; the indicators are all defining items for the attribute. This explains why a formative specification mode requires being fully inclusive; too few indicators would mean ignoring certain construct dimensions and would consequently alter the construct's contents (Diamantopoulos & Winklhofer, 2001). This is why an extensive literature and QUAL research were needed to refine dimensions before operationalizing them.

In the case of recog the situation becomes still more complicated. This construct was in fact operationalized by *combining* the aforementioned two options for molar constructs. Both the dimensions 'mechanisms for the stimulation of the collection of general environmental information' (*envinfo*), and 2) 'mechanisms for the stimulation of the development of deep customer insight' (*insight*) were measured by means of several reflective indicators: recog4, 5 & 6 for envinfo, and recog3, 7, 8 & 9 for insight (see Appendix II). For envinfo we decided to do so because this enabled us to use an existing scale (Matsuno et al., 2002: measure for market intelligence generation). For insight, reflective indicators were used since they illustrated the specific contents of the dimension in a clearer way. Moreover, although the insight-indicators had all separately been mentioned in the QUAL research, they were conceptually much related to each other. For this reason, we decided to combine them into one single 'insight'-dimension.

Yet, the reflective operationalization of both the dimensions envinfo and insight turned the recog construct into a so-called 'reflective first-order, formative second-order model' (Jarvis et al., 2003). Yet, we wanted to keep the measurement model parsimonious by keeping consistency with the operationalization of the other components (i.e. one formative indicator per component). Moreover, we were especially interested in the paths from the dimensions onto the constructs, more than in the paths from the reflective indicators onto the dimensions. In the case a second-order model is not preferred two possibilities are left.

The first possibility was to operationalize all recog indicators in a formative mode, including all the envinfo and insight indicators (e.g., Fornell et al., 1990 for an illustration). Still, this approach lacks methodological correctness since "lumping together items across dimensions in an index could misleadingly yield a weighted average and obscure the differential contributions of the dimensions" (Bagozzi & Heatherton, 1994: 36; see also

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Carver, 1989 for a more detailed critique). Hence, we opted for the second possibility, which consists of aggregating the reflective indicators of these eliciting components (Bagozzi & Baumgartner, 1994; Cohen et al., 1990; Baumgartner & Homburg, 1996). The use of composites is quite popular in SEM; for example, Baumgartner & Homburg (1996) report that in 38 percent of SEM applications published in prominent marketing journals (1977-1994) items were combined into composites prior to entering them into a structural equations model.

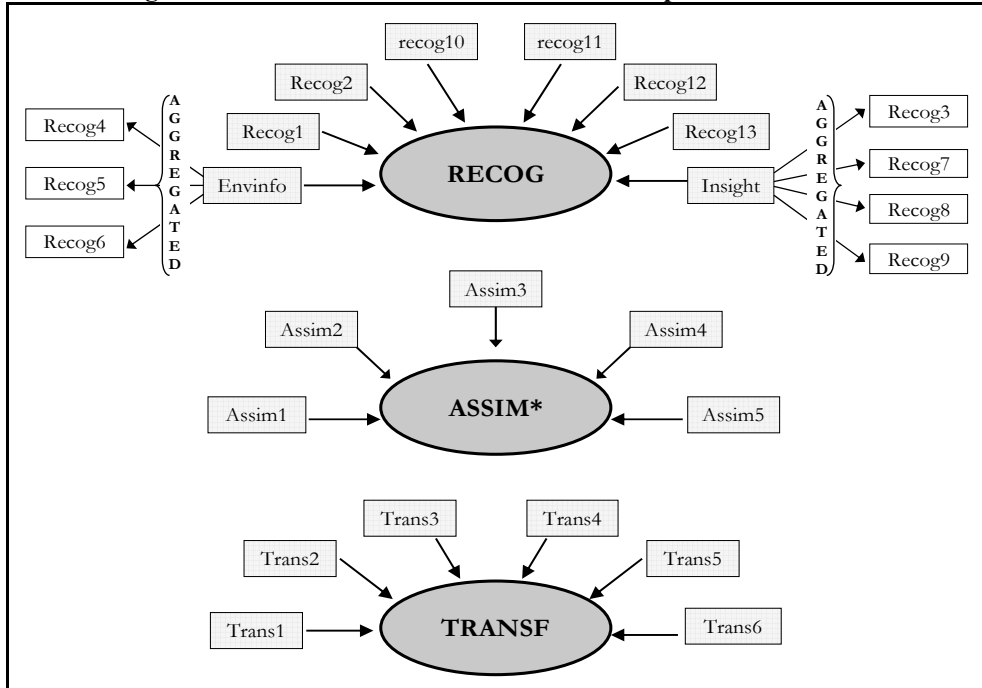
Despite the popularity of aggregation, it has rarely been documented and substantiated in methodological publications. The approach became finally more delineated through Bagozzi & Heatherton's (1994) framework on 'partial aggregation models'. In a partial aggregation model separate dimensions of a construct are treated as indicators of a single latent variable, with each dimension being an aggregation of items (Bagozzi & Heatherton, 1994)²⁸. In this way, model complexity is minimized (Baumgartner & Homburg, 1996). More specifically, we opted for a so-called 'discrete components partial aggregation model' (Bagozzi & Heatherton, 1994: 40). An illustration of this approach is given in Ravichandran & Rai (2000). This approach should be followed when the dimensions do not share significant amounts of common variance. The appropriateness of this approach is justified by the fact that our constructs were conceptualized as being emergent (second-order formed attributes).

In the concrete, we averaged the reflective item scores for the *envinfo* and *insight* dimensions. Then, these averages were used as formative indicators. Consequently, all independent variables were entirely operationalized by means of formative indicators (see Figure 4.2).

In chapter 5, we will demonstrate that there are no empirical contingencies on the use of a formative mode since sample size was acceptable and multicollinearity among the formative indicators was absent (Chin, 1998a; Fornell & Bookstein, 1982). The full indicator descriptions (question wording) can be found in Appendix II. As can be seen there, negatively or reversed-worded items have been included to control for acquiescence, leniency bias, and spurious response conditions (Harrison & McLaughlin, 1996).

²⁸ A good illustration of this approach can be found in Hull et al. (1991).

Figure 4.2: the measurement model for the independent variables



*: The final measure for assim consisted in fact of 6 formative indicators. The formative indicator ‘assim6’ was added based on the pre-testing results (see chapter 3, section 3.6.2.2.1).

4.3.3.2 Operationalization of the dependent variable

4.3.3.2.1 Operational construct definition

In chapter 1, we defined SI in the following way: “*SI entails the creation of new and substantially superior customer value by a new and fundamentally different way of playing the game in an existing industry. It implies the deviance from traditional industry assumptions and conventions and, as such, has the potential of altering the rules of the game in an industry. SI can be achieved by redefining the business model, the roles and (power) relationships in the industry included*”. Resting on conceptual and empirical arguments (chapter 1), we however treat *SIcapacity* as the dependent variable (DV) of our study. We defined *SIcap* as “*an organization’s capacity to systematically create SI initiatives*”.

The following operational construct definition of *SIcap* was adopted:

‘SIcap’: *Strategic innovation capacity as perceived by people in charge of the BU’s (firm’s) marketing strategy (raters) is the BU’s (firm’s) capacity, relative to its main competitors’ capacity, to systematically create SI-initiatives that entail: 1) the creation of new and substantially superior customer value, by 2) a redefinition of the business model (incl. market approach), and by 3) the altering of roles & relationships (incl. partnerships and power relations) among industry players. SIcap is an eliciting attribute, its object is the Dutch industrial organization/BU.*

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In chapter 3, we justified the study of SI initiatives and the BU level of analysis in multi-unit organizations. Furthermore, as the aforementioned operational definition shows, we measured a BU's (firm's) level of SICap in relation to competitors. We decided to follow Baden-Fuller's (1995) advice to not relate SICap to some absolute standard, but to consider it in relation to the SICap of main competitors. This implies that an external reference point was used instead of measuring a differential score over time between a pre- and post-SI organizational situation (for a critical assessment of the latter method, see Bergh & Fairbank, 2002). In this way, emphasis is put on the deviance of SI from industry rules, more than on the internal deviance from past strategy contents. This external focus reflects the external aspect of the SI concept (in contrast to e.g. the concept of strategic renewal, which is more inwardly focused, see chapter 1). Concerning the operationalization of the crucial aspect of 'new and substantially superior customer value', we experienced that the lack of conceptual consensus about the nature of customer value is also reflected in the lack of unanimity about its measurement (Payne & Holt, 2001). Some authors even oppose against any low-level operational measurement of the construct, given its higher level nature (Woodall, 2003). For this reason, we decided to define customer value in broad terms at the beginning of the survey, but not to operationalize it in a separate measure. Finally, the operational definition of SICap relative to the SICap of main competitors moreover reflects the nature of this variable as being continuous, rather than dichotomous. The question is not whether SICap is present or absent, but it is a matter of degree. This is in consistence with Jaworski et al.'s (2000) conceptualization of market-driving behavior; where the degree of market-driving behavior depends on the number of market changes and on the magnitude of these changes.

4.3.3.2 Indicator specification

SICap can be conceptualized as an underlying factor giving rise to several observable manifestations; it can be considered as an organizational trait or disposition and not as a set of discrete activities (Rossiter, 2002; Jarvis et al., 2003). All the indicators were hence to be considered as a set of specific manifestations or 'proximal consequences' of the underlying latent variable (Rossiter, 2002: 316-317). To measure the trait adequately, 7 items were included.

SICap was operationalized by means of a reflective specification mode. This implies that for SICap to be present, all different manifestations of the construct had to be observable; a change in the underlying construct implied a similar change in all of its manifest indicators. The construct was hence operationalized according to a domain-sampling strategy of interchangeable indicators; all indicators had to be positively correlated to each other (Jarvis et al., 2003; Chin, 1998a). The study's aim was to explain the observed variances in the manifest variables of the dependent variable (Fornell & Bookstein, 1982). The final measure consisted of 7 reflective indicators. The final indicators can be found in Appendix II. All items were formulated according to a comparative perspective ('in relation to our main competitors') since the construct definition specified to do so. An additional advantage was that comparative questions have been found to lead to a higher measurement quality (Andrews, 1984).

4.3.3.3 Operationalization of the moderators

As previously mentioned, the selection of moderators was based on a study of relevant literature and on the results of QUAL2.

In contrast to the independent variables in our research, many of the moderators we included have already been operationalized in the literature. In this case, it has been recommended to use existing scales as much as possible in order to compare and accumulate findings (e.g., Churchill, 1979; Creswell et al., 2003). Whenever possible, (a Dutch translation of) existing (validated) scales were hence used to operationalize the moderators. Still, some scales had to be altered or combined in order to enhance content validity of the moderators in the context of SI. The scales for *information provision by suppliers*, *innovation stimulus from suppliers* and *general chain climate* were entirely newly developed. They were however based on the QUAL2 study and were operationalized by analogy with existing scales. As regards the measure for general chain climate, we explicitly chose to use a perceptive measure, instead of using existing, objective measures of industry dynamism or hostility. We did so in order to avoid so-called ‘aggregation’ problems. All variables were measured on a business unit level. Since environmental effects are not likely to have an impact on organizations in a homogenous way, this variable was not operationalized on an industry but on a business unit level. Furthermore, research has indicated the influence of perceived environmental factors (see chapter 1).

All moderators were measured in a reflective mode since a) all moderators could be considered as traits or dispositions of the organization/BU giving rise to observable manifestations, and b) existing scales for these constructs have been specified in this mode. All operational construct definitions could hence be considered as eliciting attributes. They were rated by people in charge of marketing strategy and their object was the Dutch industrial organization/BU.

Table 4.2 shows for each moderator the operational construct definition and the existing scales we relied on for the final Web survey (see chapter 3). Once again, full indicator descriptions can be found in Appendix II.

4.3.3.4 Operationalization of the control variables

The QUAL2 findings revealed potential homogenization effects of three additional variables on business unit’s (firm’s) SICap. More specifically, we controlled for the potential impact of the business unit’s (firm’s) size, its supply chain position and its type.

The organization’s position in the supply chain had to be indicated on a 10-point scale ranging from 1: raw material to 10: end customer. Levels 1-4 represented upstream companies, levels 5-7 were considered as midstream companies and levels 8-9 stood for downstream companies.

To measure the business unit’s (firm’s) type, the main activities of the organization were asked for (product firm or service firm). Industrial product activities were further subdivided into 8 corresponding BIK classes; industrial service activities were classified into 6 BIK categories.

Business unit (firm) size was defined as the number of full time employees. This number was distinguished into four categories: <100, 100-199, 200-499, and >500, resulting from

respondents' remarks during the pretest (see chapter 3, section 3.6.2.2.1). The operationalizations of the control variables can be found in Appendix II as well.

Table 4.2: Moderators: constructs definitions and scales used

Moderator	Construct definition	No. of items (see appendix II)	Scale based on:
Innovativeness (innovat)	Openness to new ideas as an aspect of a firm's culture (Hurlley & Hult, 1998)	5 (cult1-5)	- Matsumo et al., 2002 (cult1-2) - Calantone et al., 2002 (drawn from Hurt et al., 1977; Hollenstein, 1996; Hurt & Teigen, 1977) (cult3-5)
Risk taking attitude (risktak)	Willingness to undertake risky ventures (Miller, 1983: 771)	4 (cult 6-9)	- Matsumo et al., 2002 (cult6-8) - Calantone et al., 2002 (cult9)
Centralization (central)	The locus of authority and decision making in the organization (Zaltman, Duncan & Holbek, 1973: 142)	4 (struct4-7)	Jaworski & Kohli, 1993 (struct4-7)
Formalization (formal)	The emphasis placed within the organization on following specific rules and procedures in performing one's job (Zaltman, Duncan & Holbek, 1973: 138)	3 (struct1-3)	Jaworski & Kohli, 1993 (struct1-3)
Cross-functional information dissemination (crossf)	The sharing of market information internally across different functional areas of the firm (based on Martin & Grbac, 2003; Matsumo et al., 2002)	9 (crossf1-9)	- Matsumo et al., 2002: intelligence dissemination (crossf1-6) - Martin & Grbac, 2003: cross-functional sharing of information (crossf7-9)
Information provision by customers (infocus)	The acquisition of meaningful information about the marketplace through customers (based on Walter et al., 2002)	3 (nwinfo1-3)	Walter et al., 2001: scout function (nwinfo1-3)
Information provision by suppliers (infosup)	Market and other information that can be obtained from the working environment through a particular supplier (Möller & Törönen, 2003: 112)	3 (nwinfo4-6)	Newly developed, conceptually based on Möller & Törönen, 2003; scale in analogy with Walter et al., 2001 (nwinfo4-6)
Innovation stimulus from customers (innocus)	The possibility of joint innovation with a particular customer (based on Walter et al., 2002)	7 (nwinfo1-5, 11, 14)	- Walter et al., 2001: innovation function (nwinfo1-4) - Newly developed, based on QUAL2 (nwinfo5, 11, 14)
Innovation stimulus from suppliers (innosup)	The possibility of joint innovation with a particular supplier (based on Walter et al., 2002)	4 (nwinfo6-9)	Newly developed, conceptually based on Möller & Törönen, 2003; scale in analogy with Walter et al., 2001 (nwinfo6-9)
General chain climate (chainclim)	The absence of hostility or unaccustomedness among industry parties.	4 (nwinfo10,12, 13, 15)	Newly developed, based on QUAL2 (nwinfo10,12,13,15)

Findings of the qualitative phases

In conclusion, the QUAL study enabled us to select and refine relevant constructs, to develop hypotheses and additional research questions and to develop measurement specifications for the constructs to be further studied. As predicated by the QUAL→QUAN design that we applied, the hypothesized partial mediation model was further tested in a quantitative study. The purpose of the additional quantitative phase was to increase the statistical conclusion, construct and external validity of the (preliminary) qualitative results.

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CHAPTER 5

FINDINGS OF THE QUANTITATIVE PHASE

The QUAN phase essentially served to test and validate the preliminary insights derived from the QUAL-analysis. Building on the constructs, model and measurement instruments selected and developed during the QUAL-phase, we created a survey instrument and administered it to a sample of target respondents. The survey data were used to test the hypothesized partially-mediated model by means of Partial Least Squares. A technical explanation of this statistical method can be found in chapter 3. This chapter also provides details about the survey development process, the survey administration, the respondents and the characteristics of the final data set.

Over the next sections we are confining ourselves to the analytical results of the QUAN analysis. First, we will briefly describe how data were cleaned before entering them into the analysis. The second section tackles results regarding the measurement model. This essentially comes down to tests on the reliability and validity of the measures. The analysis and results of the structural model are elaborated on in the final section of this chapter.

5.1 DATA SCREENING AND CLEANING

We examined the accuracy of the data. First, we checked for possible mistakes during the data entering process by means of frequencies. Then, missing value and outlier patterns were examined. Finally, we tested for the existence of common method bias.

5.1.1 Accuracy of input

Although the data entered onto the website were directly stacked into an excel file, we still studied univariate descriptives ('Frequencies' module in SPSS 11.0) to check the accuracy of the input. We looked for out of range values (minimum and maximum values) and examined whether means (or medians for the ordinal variables) and standard deviations were plausible (Tabachnick & Fidell, 2001a). All values were plausible; no problems were detected.

5.1.2 Missing values analysis

Results may be biased if missing values do not follow a random pattern. For this reason, in the analysis of missing data, much attention should be paid to the pattern of the missing data. We followed Tabachnick & Fidell's (2001a) and Hair et al.'s (1998) guidelines to analyze the missing data.

A first raw examination of the data set indicated that the number of missings was related to the sequence of questions in the survey; the later questions appeared in the survey, the more missing values they seemed to have. Inspection of the missing and data patterns (missing value analysis in SPSS 12.0) confirmed this triangular pattern. Of the 339 respondents who had initiated the survey, only 221 had completed the survey up to the last

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recog-item, 188 up to the last SICap-item, and only 155 had completed the entire survey (up to and including the last nwinno-item).

We already had expected this pattern given the number of technical breakdowns we noted, and given the low response rates of marketing managers found in the literature (see the methodological chapter). Although the website had been tested extensively, technical breakdowns could apparently not be avoided. We contacted several respondents with a high-missings profile and our suspicions proved to be correct. Many persons indicated that the system broke down while they were trying to complete the survey. For example, after the first two identifications screens, almost 82 respondents quit the survey. Although we provided respondents with new authorization codes to make another attempt, respondents indicated that when the site did not work properly at this second attempt they eventually gave up. In addition, respondents mentioned that their job workload and time pressure did not leave time to complete the survey.

No exact guidelines exist on the level of missing values for exclusion; decisions should be built upon theoretical and empirical arguments (Tabachnick & Fidell, 2001a). Since research data are scarce and valuable, we needed to choose between making full use of all available data, and prioritizing the consistency in the subsequent analyses, which meant substantial loss of subjects.

Restricting data to respondents who had entirely completed the survey, the so-called 'complete case approach' (Hair et al., 1998: 51), would result in an inappropriate sample size of only 155 respondents. As the survey was built according to the following sequence: 1) independent variables, 2) dependent variable, 3) moderators (see chapter 3), we decided to compromise by including all respondents who had adequately completed the survey items at least up to the moderators. In this way, we could make full use of the data on the main variables of interest (the independent and dependent variables), while maintaining consistency in the basic analyses.

We however first verified whether item missingness was not related to the moment of survey completion. Results showed no relationship. Indeed, despite the numerous attempts made during the survey process to reduce the number of technical breakdowns, respondents kept on reporting technical problems. Furthermore, the fact that some respondents quit the Web survey before finishing it because of time constraints remained an important issue in the entire process as well. Hence, it was not surprising that the study of missing patterns revealed no relationship between item missingness and time of completion (Van der Stede et al., 2005). We further compared the early and late respondents by means of a chi-square test (a dummy variable to indicate missingness on an item was related to a dummy variable indicating early or late response) (Tabachnick & Fidell, 2001a). Once more, results proved insignificant. Hence, we decided it was safe to remove the 151 cases reporting too many missings on the independent and dependent variables from the dataset. This however implied that of the 339 respondents to the survey, only 188 respondents could be kept for analysis.

This reduced sample was once more subjected to a missing value analysis. Missing patterns in this set of 188 cases did not reveal systematic missing values on the items of the independent variables (IV) and the dependent variable (DV). In addition, t-tests were performed to see whether missingness was related to any other variables, (with $\alpha = 0.05$ and test done only for variables with at least 5 percent missings). Results showed no

significance for the IV- and DV-items, so missings can be assumed to be randomly distributed in the remaining data matrix of the main theoretical constructs.

After carefully weighing up the pros and cons of imputation, we decided to not impute the remaining missings. Our final decision was built upon the following arguments. Firstly, the number of remaining missing values on the independent and dependent variables was small and random. Secondly, popular imputation methods, such as mean substitution and regression, reduce the variance of a variable. Thirdly, the partial least squares program PLS graph 3.0 (Chin) that was used for the main analysis can easily handle missing values, and applies imputation on the conditions the researcher specifies; for example, only when a small number of values is missing (Chatelin et al., 2002). Fourthly, the only block of missing values interesting enough to impute would be the systematic missings on the moderators. Yet, when missings appeared, they mostly appeared for all the items of a construct (respondents seemingly quit the survey when a new web page appeared), so scores on remaining items could not be used to impute the missing items; imputation of an entire construct should hence only be based upon values of other constructs. In our opinion this would obscure the data too much; variance of constructs would be reduced such that constructs would fit together better than they should. Finally, although a smaller sample size implies a reduction in statistical power and generalizability towards the population, the sample size (N=188) was still large enough to perform the main statistical analyses.

5.1.3 Outliers

Since outliers may distort solutions, their presence was examined.

The presence of univariate outliers (extreme scores on one variable) was examined by studying the standardized z-scores of the data. Z-scores smaller than -3.3 or larger than 3.3 were regarded as outliers. The number of univariate outliers was expected to be small since Likert-scores had been used for measurement. Only for the centralization construct one univariate outlier was found (case 69 on struct3). The case was removed from the analysis.

Multivariate outliers (peculiar combination of scores departing markedly from others) were identified by calculating the Mahalanobis distance²⁹ for each variable. To identify multivariate outliers a regression analysis was conducted with all indicators (of the IVs, DV and moderators) serving as independent variables and the response number as the dependent variable (Tabachnick & Fidell, 2001b). Mahalanobis distances pointed to the existence of six multivariate outliers. After careful examination, we found that all these outliers showed inconsistent answering patterns to the items of several constructs (so per construct). Inconsistency across/among different constructs was however limited. Specifically, cases 6, 86, 98, 119, and 169 showed inconsistent scores on the items of the independent variables. Respondents 86 and 98 completed the items of the dependent

²⁹ The Mahalanobis distance is the distance from the gravity center, or the centroid of the sample determined by the means of the variables. The Mahalanobis distance is Chi-square distributed with $df = \text{number of variables}$. Each Mahalanobis distance is compared to a critical chi-square value ($\alpha = 0.001$). Cases with a Mahalanobis distance exceeding this critical value represent multivariate outliers and are discarded (see e.g., Tabachnick & Fidell, 2001a).

variable in an inconsistent way as well. In addition, for cases 86, 98, 119 and 169 inconsistent patterns were found in several moderators (e.g. respondent 86 answered inconsistently on innovativeness and risktaking). All these outliers were removed from subsequent analyses.

5.1.4 Common method bias assessment

Since self-reports were used for data collection, it is especially important to control for potential common method variance (Podsakoff & Organ, 1986).

To this end, we applied Harman's one-factor test. All measured variables were entered into a factor analysis (principal axis factoring) and results of the unrotated factor solution were examined (Podsakoff & Organ, 1986). Results indicated that no single factor emerged; 20 factors were extracted of which 13 factors (= the same number as the number of hypothesized constructs entered) had eigenvalues >1. Moreover, no general (first) factor accounted for the majority of variance: the first factor accounted for only 20,4% of the 62,8% of variance extracted by the entire factor solution. Both results point to the absence of common method bias (e.g., Schriesheim, 1979).

In addition, we trimmed scales and evaluated discriminant validity (see section 5.2.1.2). A satisfactory level of discriminant validity can be considered as an additional proof of the absence of common method bias (Podsakoff & Organ, 1986).

5.2 ANALYSIS AND RESULTS OF THE MEASUREMENT MODEL

If measures are less reliable and theory only tentative, Hair et al. (1998) propose to follow a two-stage model evaluation, in order to maximize the interpretability of both the measurement and structural model. Particularly in a PLS analysis, this two-stage approach has often been applied and advised (e.g., Hulland, 1999)³⁰. Hence, we will first assess the psychometric qualities of the measures, before analyzing the structural model.

Basically this comes down to assessing whether measures are sufficiently valid, meaning that they measure what they are intended to measure (Bagozzi, 1994a), before testing for a significant relationship in the structural model (Fornell & Larcker, 1981). Valid measures are measures that demonstrate a satisfactory level of reliability, content validity, and convergent and discriminant validity (Bagozzi, 1994a).

The observed score on a measure always equals the true score plus systematic error plus random error. Systematic error then consists of a) method variance (e.g., respondents each interpret the answer categories in a different way) and b) response sets (e.g., respondents answer in a socially desirable way). Random error occurs because of chance errors, e.g. careless responding due to fatigue or mood.

Reliability then depends on how much of the variation in scores is attributable to random or chance errors. In other words, if a measure is perfectly reliable, there are no *random*

³⁰ A true two-stage model evaluation in the strict sense is however not possible in PLS. Whether formative or reflective, loadings and weights can change dependent on the nomological context in which the measures are used (Chin, 1998a). This implies that measurement properties partly depend on the structural model.

sources of error. Consequently, a measure is reliable to the extent that independent but comparable attempts to measure the same trait or construct of a given object agree (Bagozzi, 1994a; Churchill, 1979).

In contrast, a measure is valid on the condition that “the indicators accurately measure what they are supposed to measure” (Hair et al., 1998: 612). This implies that the differences in observed scores only reflect the *true* differences on the characteristic being measured and nothing else; or, the observed score equals the true score (Churchill, 1979).

These definitions of reliability and validity imply that if a measure is valid, it is reliable, but that the converse is not necessarily true; when random sources of error do not exist (perfect reliability), the observed score could still equal the true score plus systematic sources of error (no perfect validity). Measures can be consistent for the wrong reasons, such as method biases or halo effects (Andrews, 1984; Bagozzi, 1994a). Thus it is often said that reliability is a necessary but not a sufficient condition for validity; Bagozzi (1994a) even considers reliability as one of the aspects of validity.

This implies that for the examination of a measure’s validity, next to testing its reliability, content (and face) validity and construct validity should be checked as well. Whereas content validity and face validity have already been examined and verified during the extensive pre-testing procedure, construct validity will now be assessed as well.

Construct validity relates to what the instrument is in fact measuring; does the operationalization of a construct, trait or concept really measure this construct, trait or concept? In this way its meaning is quite similar to the general definition of validity (Bagozzi, 1994a). Construct validity consists of convergent validity (the extent to which a measure covaries with other measures designed to measure the same construct) and discriminant validity (the extent to which measures of a construct differ from measures measuring another construct). Both need to be assessed since a high level of convergent validity alone can be caused by method variance or other extraneous factors (Bagozzi, 1994a).

The best way to check for convergent and discriminant validity is through Campbell & Fiske’s (1959) multitrait-multimethod matrix. Yet, this matrix implies that the same constructs have been measured by different methods. Due to time and resource constraints we were not able to do so. This is why we only tried to assess convergent and discriminant validity between the different indicators of the final survey. Moreover, we deliberately grounded the survey indicators in previous qualitative research in order to enhance construct validity.

As mentioned in the methodological chapter, traditional validity criteria do not apply to formative indicators. Therefore, the analysis had to be conducted separately for the reflective constructs and the formative constructs. We will first study the reflective constructs: the dependent variable and the moderators.

5.2.1 The reflectively specified constructs

Even though psychometric qualities of the measures are often directly assessed in PLS, we chose to perform a separate, preparatory exploratory factor analysis (EFA).

EFA groups manifest variables that are intercorrelated under a common factor (Heck, 1998). Although an EFA can not be considered as a confirmatory technique testing for

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factor unidimensionality (Heck, 1998), it is still very useful in revealing, or even confirming, the underlying data structure the researcher expects (Iacobucci, 1994). It plays hence a useful role in the development and validation of a scale (Conway & Huffcutt, 2003)³¹.

We explicitly chose to perform a common factor analysis (principal axis factoring) instead of the very popular principal component analysis (PCA). As the DV and the moderators were defined as being latent (see chapter 4), we tried to explain covariance among the measured variables by extracting common factors corrected for unique variance of the observed variables (Conway & Huffcutt, 2003; Iacobucci, 1994). PCA, which creates linear combinations that contain as much as possible common *and* unique variance of the original data, would only have been appropriate if our purpose had been one of data reduction.

An even more important argument for the use of a common factor model is that in subsequent analyses PLS will be used. Since PLS rests on PCAs (maximizing all variance; assuming the nonexistence of uniqueness terms), the factor extraction method used in these preparatory EFAs would probably produce more conservative results than those obtained in the subsequent PLS analysis³².

5.2.1.1 Exploratory factor analyses

We followed a stepwise approach. First an EFA was conducted for each conceptual domain separately. Constructs belonging to the same domain can be assumed to be conceptually and empirically most related. Performing first an EFA among the most related constructs helped to keep the analysis structured (by purifying measures in advance), and facilitated the interpretation of the factors. More precisely, first six EFAs were conducted: 1) on the cultural constructs: innovativeness (innovat) and risk taking (risktak), 2) on cross-functional dissemination of market information (crossf), 3) on chain information potential: information provision by customers (infocus) and information provision by suppliers (infosup), 4) on organizational structure: formalization (form) and centralization (central), 5) on chain innovation potential: innovation stimulus from customers (innocus), innovation stimulus from suppliers (innosup) and general chain climate (chainclim), and 6) on the dependent variable: SICap. The corresponding items per construct in these conceptual domains are indicated in Appendix II.

Based on these results, we proceeded by performing a complete EFA with all moderators and the dependent variable entered en bloc. All EFAs were run in SPSS 12.0 ('data reduction-factor' module).

³¹ In fact, in order to gain full evidence of construct unidimensionality, confirmatory factor analysis (CFA) should be performed. Yet, we would like to refer here to the same arguments as the ones that we developed in chapter 3 regarding the inappropriateness of covariance-based SEM in this research. In our view, it is exactly due to these arguments that CFA has, to our knowledge, never been used in the PLS tradition.

³² The smaller the uniqueness, the larger the communality, the more PCA and FA will show similar results.

5.2.1.1.1 Separate exploratory factor analyses

Before starting the EFAs, all assumptions underlying factor analysis were profoundly checked (Tabachnick & Fidell, 2001c; Hair et al., 1998). In appendix IV, more details are provided. After having verified these assumptions, for each EFA analyses with/without all/only largest outliers were compared. No structural differences were found in the factor patterns. Results are only reported for the analyses with all outliers removed.

Inspection of the factor intercorrelations demonstrated the appropriateness of the oblique rotation method³³, except for the constructs belonging to the domain of chain innovation stimulus (see Table 5.1). Results of the scree test and the Kaizer criterion indicated that the hypothesized number of factors could be retained. The proportion of variance extracted (of each factor and of all factors as a group) was examined and proved satisfactory in all factor solutions. Finally, loadings and communalities were studied. Clear cut-off values are lacking in the literature (Wijnen et al., 2002), but, in general, it is said that higher communality estimates and high loadings concentrated on one factor (not spread across all factors) suggest stronger measures of the factors (Heck, 1998: 191).

Regarding the loadings, we followed Comrey & Lee's (1992) rules of thumb (in Tabachnick & Fidell, 2001c: 625): loadings > 0.71 (50% overlapping variance) are 'excellent', loadings > 0.63 (40% overlapping variance) are 'very good', loadings > 0.55 (30% overlapping variance) are 'good', loadings > 0.45 (20% overlapping variance) are 'fair', loadings > 0.32 (10% overlapping variance) are 'poor', and loadings < 0.32 are not interpreted. Based on these guidelines we took 0.45 ('fair') as the loading cut-off. Also, in terms of statistical significance, considering our sample size (150 to 200) only loadings exceeding 0.40 to 0.45 could be considered as statistically significant, with $\alpha = 0.05$ and power $(1-\beta) = 0.80$ (Wijnen et al., 2002).

In oblique rotations, it is more common to interpret and report the pattern matrix than the structure matrix (Tabachnick & Fidell, 2001c). Hence, in the case of oblique rotation the pattern matrices, in one-factor EFAs the factor matrix, and for the domain of chain innovation potential the rotated factor matrix were analyzed.

Table 5.1 summarizes the final loadings and communalities of all items; loadings smaller than 0.32 (Tabachnick & Fidell, 2001c) are not reported (except when necessary for interpretation, e.g. struct3). No indicator loaded on more than one factor.

³³ We preferred to use an oblique rotation (direct oblimin) since, as is often the case in organizational research (Heck, 1998), we can assume most moderators to be somewhat related to each other (Conway & Huffcutt, 2003; Iacobucci, 1994). Orthogonal rotation would impose an orthogonal, meaning independent, structure upon the factors. If, in reality, factors proved to be correlated, results would have been biased. We examined the factor correlations matrix in the (oblique rotation) EFA output; correlations exceeding 0.32 were considered as indicative of the appropriateness of an oblique rotation (Iacobucci, 1994; Tabachnick & Fidell, 2001c). If factors did not correlate highly, we opted for the more parsimonious orthogonal rotation (Heck, 1998; Tabachnick & Fidell, 2001c).

Table 5.1: Results of the separate explorative factor analyses

CULT	Loading on innovat	Loading on risktak	Communality	Result	Factor correlations	
Cult1	0.532		0.294	Item of innovat	0.520	
Cult2	0.371		0.187	Removed: low communality		
Cult3	0.740		0.602	Item of innovat		
Cult4	0.926		0.805	Item of innovat		
Cult5	0.638		0.404	Item of innovat		
Cult6		0.447	0.224	Item of risktak		
Cult7		0.764	0.650	Item of risktak		
Cult8		0.796	0.568	Item of risktak		
Cult9	0.313		0.408	Removed: low loading & high cross-loading		
CROSSF	Loading on crossf		Communality	Result	Factor correlations	
Cross1	0.667		0.444	Item of crossf	n/a	
Cross2	0.601		0.361	Item of crossf		
Cross3	0.667		0.472	Item of crossf		
Cross4	0.785		0.616	Item of crossf		
Cross5	0.633		0.400	Item of crossf		
Cross6	0.767		0.589	Item of crossf		
Cross7	0.583		0.340	Item of crossf		
Cross8	0.697		0.486	Item of crossf		
Cross9	0.539		0.290	Item of crossf		
NWINFO	Loading on infocus	Loading on infosup	Communality	Result	Factor correlations	
Nwinfo1	0.912		0.777	Item of infocus	0.323	
Nwinfo2	0.848		0.729	Item of infocus		
Nwinfo3	0.634		0.465	Item of infocus		
Nwinfo4		0.779	0.646	Item of infosup		
Nwinfo5		0.903	0.794	Item of infosup		
Nwinfo6		0.915	0.828	Item of infosup		
STRUCT	Loading on formal	Loading on central	Communality	Result	Factor correlations	
Struct1	0.848		0.681	Removed: method bias	0.658	
Struct2	0.496		0.444	Removed: method bias		
Struct3	7.535E-02	0.375	0.183	Removed: method bias (loads on wrong construct)		
Struct4		0.695	0.482	Item of central		
Struct5		0.772	0.586	Item of central		
Struct6		0.840	0.706	Item of central		
Struct7		0.944	0.891	Item of central		
NWINNOV	Loading on innocus	Loading on innosup	Loading on chain clim	Communality	Result	Factor correlations
Nwinno1	0.782			0.612	Item of innocus	Innosup-innocus: 0.341 Innosup-chainclim: 2.497E-02 Innocus-chainclim: 0.107
Nwinno2	0.805			0.652	Item of innocus	
Nwinno3	0.736			0.549	Item of innocus	
Nwinno4	0.621			0.390	Item of innocus	
Nwinno5	0.633			0.436	Item of innocus	
Nwinno11	0.176		0.231	0.105	Removed: low loading, low comm., high crossload.	
Nwinno14	1.035E-02		0.278	9.982E-02	Removed: low loading, low comm., high crossload.	
Nwinno6		0.840		0.720	Item of innosup	
Nwinno7		0.880		0.789	Item of innosup	
Nwinno8		0.741		0.605	Item of innosup	
Nwinno9		0.764		0.593	Item of innosup	
Nwinno10			0.322	0.201	Removed: low loading & low comm.	
Nwinno12			0.658	0.447	Item of chainclim	
Nwinno13			0.615	0.389	Item of chainclim	
Nwinno15			0.566	0.330	Item of chainclim	
SICAP	Loading on Sicap		Communality	Result	Factor correlations	
Explo1	0.734		0.538	Item of Sicap	n/a	
Explo2	0.617		0.380	Item of Sicap		
Explo3	0.754		0.568	Item of Sicap		
Explo4	0.690		0.476	Item of Sicap		
Explo5	0.763		0.583	Item of Sicap		
Explo6	0.659		0.435	Item of Sicap		
Explo7	0.600		0.360	Item of Sicap		

For the constructs of the conceptual domain ‘culture’, cult2 and cult9 were removed. Although the loading for cult6 scored marginally below the formal 0.45 cut-off value we decided to –provisionally– keep this item and await the results of the measurement model in PLS graph, since its loading is a borderline value. Furthermore, removing this item would leave us with only two indicators for risktak.

In the crossf construct, the communality value pointed to a potential problem with item crossf9. Nonetheless this item was provisionally kept because of its ‘good’ loading.

For chain information potential all items showed good results and were hence remained. Concerning the structure constructs, struct3 was hypothesized as an item of formal. Yet,

this item loaded on the central construct. After studying the potential cause of this, we found that the other formal-items struct1 and struct2 were both reversely coded, whereas struct3 was not (like the items of central). Although central and formal were conceptually different (and this was correctly reflected in different questions in the questionnaire), the only reason the terms clustered together in this way seemed to be due to the formulation of the items in the questionnaire (negatively or positively formulated). Due to its unreliability, we decided to remove the entire construct of formal. Removing the construct 'formalization' could be justified because of two additional reasons. First, the interviewees of the QUAL2-phase had stressed the importance of (de)centralization to a much greater extent than they had done for the issue of formalization. Secondly, Tsai (2002) operationalized organizational structure by only measuring the centralization-dimension. He draws on Goshal et al's (1994) argument that "centralization alone represents a somewhat partial but parsimonious operationalization of the structure domain". We hence operationalized the structural domain by restricting ourselves to the 'centralization' measure. This did however imply we had to drop the study of RQ6 (see chapter 4).

For the constructs in the domain of chain innovation potential, all items of innosup were kept. For innocus the items nwinno11 and nwinno14 were removed because they loaded higher on the chainclim construct than they did on the innocus construct, though conceptually this could not be explained. In chainclim one item (nwinno10) was removed because of a low loading and communality.

The EFA results of SIcap did not show any problems.

All communalities of the items we retained largely exceeded 0.35, meaning that at least 35% of the measures' variance was explained by the factors (Iacobucci, 1994; Tabachnick & Fidell, 2001c). Yet cult1, cult6 and crossf9 gained lower scores (0.294; 0.224; 0.290). Since their loadings were reasonable, we provisionally kept them for further analysis.

On the items retained after the separate EFAs a joint EFA was performed in which all the items of the reflective constructs were entered en bloc.

5.2.1.1.2 Joint exploratory factor analysis

Once again, the assumptions underlying the use of EFA were first checked, in an analogous way to the separate EFAs (Tabachnick & Fidell, 2001c; Hair et al., 1998) (see Appendix IV).

Results are given for the EFA with all outliers removed, although the analysis without removal did not indicate structural differences.

The oblique rotation results showed relatively low inter-factor correlations. The highest correlation (innocus-SIcap) was 0.325. Although this value formally exceeds the 0.32 limit for orthogonal rotation it is still a borderline value. Moreover, all other correlations were much lower. Hence, the more parsimonious orthogonal rotation was chosen for further examination.

We hypothesized ten factors to be extracted (items of 10 reflective constructs). The scree test confirmed this number. Although the Kaizer criterion only indicated 8 factors with eigenvalues surpassing 1, we retained the hypothesized ten factor-solution. Firstly, the correctness of the Kaizer criterion has much been debated (Iacobucci, 1994). Furthermore, the cumulative proportion of variance of the ten-factor solution –only– amounted to 60%, which is reasonable (Heck, 1998) but not excellent. Reducing the number of factors to

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eight would further reduce this amount to 54%. Finally, the eight-factor solution was not interpretable.

Inspection of the rotated factor matrix showed the following results (see Table 5.2). Loadings smaller than 0.32 (=less than 10% common variance, Tabachnick & Fidell, 2001c) are not reported. No indicator loaded on more than one factor.

Table 5.2: Results of the joint exploratory factors analysis

	Innovat	Rishtak	Crossf	Infocus	Infosup	Central	Innocus	Innosup	Chainclim	Slcap	Communality
Cult1	0.466										0.318
Cult3	0.697										0.630
Cult4	0.839										0.806
Cult5	0.593										0.469
Cult6		0.447									0.307
Cult7		0.681									0.674
Cult8		0.664									0.543
Crossf1			0.666								0.508
Crossf2			0.636								0.506
Crossf3			0.735								0.583
Crossf4			0.769								0.650
Crossf5			0.589								0.450
Crossf6			0.745								0.655
Crossf7			0.522								0.358
Crossf8			0.619								0.559
Crossf9			0.468								0.317
Nwinfo1				0.832							0.806
Nwinfo2				0.758							0.695
Nwinfo3				0.538							0.530
Nwinfo4					0.708						0.639
Nwinfo5					0.839						0.828
Nwinfo6					0.837						0.839
Struct4						0.685					0.534
Struct5						0.716					0.653
Struct6						0.731					0.637
Struct7						0.682					0.871
Nwinno1							0.736				0.657
Nwinno2							0.751				0.664
Nwinno3							0.748				0.633
Nwinno4							0.635				0.492
Nwinno5							0.581				0.522
Nwinno6								0.802			0.723
Nwinno7								0.839			0.767
Nwinno8								0.777			0.674
Nwinno9								0.774			0.669
Nwinno12									0.530		0.376
Nwinno13									0.638		0.599
Nwinno15									0.491		0.403
Explo1										0.759	0.687
Explo2										0.649	0.622
Explo3										0.677	0.606
Explo4										0.554	0.511
Explo5										0.645	0.606
Explo6										0.536	0.495
Explo7										0.445	0.402

By analogy with the separate EFAs, and following guidelines concerning loading size (Comrey & Lee, 1992 in Tabachnick & Fidell, 2001c) and statistical significance (Wijnen et al., 2002), 0.45 was considered as the loading cut-off. Evaluation of loadings was based on Comrey & Lee's (1992) rules of thumb.

For the construct of innovat, cult1 is a fair, cult5 is a good, cult3 is a very good and cult4 is an excellent measure. The communality of cult1 was relatively low though still sufficiently

important. Since 32% of its variance was explained by the factor solution, the item could be considered as relevant in the factor definitions (Wijnen et al., 2002).

Concerning risktak, we decided to retain all the measures, although cult6 could be considered as a borderline value. The other items, cult7 and cult8, showed very good loadings and communalities.

Overall, the crossf items could be considered as good to excellent measures of the construct, though the loadings and communalities of crossf7 (0.522; resp. 0.358) and of crossf9 (0.468; resp. 0.317) were considerably lower than those of the other items.

The items of infocus and infosup scored well and could consequently be retained for further analysis.

The central items showed very good results as well; the smallest loading and communality being these of struct4 (0.685; 0.534 resp.).

The measures of chainclim gained fair to good loadings, though not excellent (the loading of nwinno15 being 0.491). In this scale, nwinno12 had the lowest communality of 0.376. Given that in this case a newly developed scale was dealt with, results were more than acceptable.

Finally, all measures of SICap showed good results, all the more since this was a newly developed scale. Only explo7 could be considered as a borderline value (loading=0.445; communality=0.402). This item was retained because it was the only negatively formulated item of this construct; which could explain its lower score. Method bias was however not present, since the EFA solution clearly pointed to a one-factor solution.

In conclusion, the joint EFA revealed the same results pattern than did the separate EFAs. Overall, all items showed very good results; only cult1, cult6, nwinno12, nwinno15, crossf9 and explo7 could be considered as borderline values.

Psychometric qualities of these –preliminarily– purified measures will now be dealt with in more depth, using PLS-analysis.

5.2.1.2 Measurement model in PLS

We used the analyses provided in PLS-Graph 3.0 (Chin, 2001) to assess the reliability and validity of the moderators' and the dependent variable's measurement model (bootstrapping with 500 resamples, construct-level sign change: see, Chatelin et al., 2002). The psychometric properties of interest we will explicitly treat are reliability, average variance extracted and convergent and discriminant validity (Fornell & Larcker, 1981). First, individual item reliability, composite reliability and average variance extracted are assessed. Then, measures are examined on their degree of discriminant validity.

5.2.1.2.1 Reliability and convergent validity

As already mentioned, reliability can formally be defined as the proportion of variance of the true score relative to the total variance (which is the sum of true and error variance) (Bagozzi, 1994a; Ullman, 2001). The multiple squared correlation (MSC) of a measured variable is interpreted as the variable's reliability, and as the proportion of variance in the measured variable that is accounted for by the latent variable (the communality).

In order to ensure individual item reliability, statistical significance of each estimated loading should first be achieved. Furthermore, a general rule of thumb is to accept indicators with significant, standardized loadings exceeding 0.707, implying that at least

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50% (communality, or $MSC=0.707^2$) of the variance in the observed indicator can be attributed to the construct (Ullman, 2001). Other authors relax this constraint to even 0.5 (Chin, 1998a; Hulland, 1999; Falk & Miller, 1992).

As expected, when examining the PLS results, a similar data pattern appeared as the one previously revealed by the EFAs. PLS results showed that all loadings were significant at $p<0.001$. In addition, all standardized loadings exceeded 0.707, except for one item of innovativeness (cult1: 0.673), one item of risk taking (cult6: 0.680), one item of chain climate (nwinn15: 0.696), several items of cross-functional information dissemination (crossf1: 0.685, crossf2: 0.687, crossf5: 0.645, crossf7: 0.629, crossf9: 0.594) and two items of SCap (explo2: 0.670, explo7: 0.672). Yet, these items should not be removed without further examination. Firstly, the rule of thumb of 0.707 can be relaxed in the early stages of scale development; loadings of 0.6 or even 0.5 may still be acceptable if there exist additional indicators in the block for comparison basis (see for example, Hulland, 1999; Barclay et al., 1995, Chin, 1998a). Consequently, as all loadings still exceeded 0.6 they could be considered as acceptable. Secondly, before removing items it is important to study the potential causes of the low loadings (Hulland, 1999). Low loadings may be the result of poorly worded items, the improper transfer of an item from one context to another, or, an inappropriate item.

After carefully reviewing the items, we could see that none of the innovativeness, risk taking, chain climate or SCap-items demonstrated one of these problems. We decided to keep all the items of these constructs because 1) their loadings fell only marginally below the formal cut-off value of 0.7 (max. 0.03 too low), 2) cult1 scored an acceptable loading and communality in the more conservative EFA, removing cult3 would imply changing an existing scale, and imposing a cut-off of 0.707 on the items nwinn15, explo2 en explo7 would be too strict since all of them were newly developed items, and, 3) we judged that content validity would deteriorate after deletion of the 'worse' scoring items cult1, cult6, nwinn15, explo2 and explo7.

Yet, conclusions differed for the items of cross-functional information dissemination. We considered crossf9 (showing the lowest loading of all items) as an inappropriate item since further inspection indicated that it tackled more the issue of cross-functional co-operation than information dissemination. In this sense, *not* excluding crossf9 would lead to low content (and construct) validity.

In multiple-item measures, next to the importance of individual item reliability, measured constructs should also demonstrate sufficient internal consistency (or, often called convergent validity, Hulland, 1999; Fornell & Larcker, 1981). Hence, before removing crossf9, we studied the Cronbach's alpha, composite reliability and average variance extracted of all scales.

The internal consistency of a measure is the degree of agreement between two or more measures of the same concept gathered at the same point in time (Bagozzi, 1994a); e.g., the level of correlations among the different indicators of a multi-item measure. In a domain sampling model (reflective indicators) all items, if they belong to the domain of the concept, are assumed to have an equal amount of common core. Consequently, responses to those items should be highly intercorrelated (Churchill, 1979). The traditional measure for the internal consistency of a set of items is coefficient alpha. The generally agreed upon lower limit for alpha is 0.7 (Nunnally, 1978) or 0.6 for a newly developed

scale (Hair et al., 1998), or $0.60 \leq \alpha < 0.8$ for a reasonably good and ≥ 0.8 for a good scale (de Heus et al., 1995; Wijnen et al., 2002). Next to Cronbach's alpha, Werts et al.'s (1974) measure of composite reliability (CR) can be applied. While Cronbach's alpha assumes all items to equally contribute to the construct (loadings are set to unity) (Barclay et al., 1995), Werts et al.'s (1974) measure does not assume all items to be equally weighted (Chin, 1998a). A scale's CR should exceed 0.7 (Wijnen et al., 2002).

The measurement model showed that the criteria of alpha and CR were met.

Finally, in order to study better the shared variance in the measurement model, Fornell & Larcker (1981) developed the measure of average variance extracted (AVE). AVE measures the amount of variance captured by the construct, in relation to the amount of variance due to measurement error. If this measure shows values < 0.5 this means that the variance due to measurement error exceeds the variance captured by the construct, which makes the validity of the individual indicators as well as the validity of the full construct questionable. Hence values > 0.5 should be aimed at (Fornell & Larcker, 1981: 46). Fornell & Larcker (1981) indicate that their measure is more conservative than Werts et al.'s (1974) measure of composite reliability.

Inspection of the AVE values indicated that all scales demonstrated satisfactory levels (>0.5), except for cross-functional information dissemination where an AVE value of only 0.490 appeared. The inadequacy of crossf9 was once more demonstrated and crossf9 was consequently removed.

The model was rerun without the item crossf9. Item loadings were all significant ($p < 0.001$). Concerning the level of item loadings the same pattern appeared in the cross-functional information dissemination construct. Although this construct now achieved a satisfactory level of AVE (0.514), crossf1, crossf2, crossf5 and crossf7 still showed loadings marginally below the 0.7 cut-off value. We decided to remove the lowest loading item crossf7 as we thought it added little value to the contents of the scale. Furthermore, for reasons of consistency, we decided to simultaneously remove the item crossf8; as we borrowed all three items crossf7, crossf8 and crossf9 from the same existing scale (Martin & Grbac, 2003). The removal of crossf7 would otherwise have resulted in only keeping crossf8 from this scale (remember that crossf9 had already been removed). Moreover, after further examination of the items borrowed from Martin & Grbac (2003), we found that these items all added little valuable contents to the scale.

Hence, we reran the analysis without the items crossf7, crossf8 and crossf9 (see Table 5.3). Results finally proved satisfactory. Of the cross-functional dissemination construct, only crossf5 did not formally reach the 0.707 value, but the loading fairly approached this value (0.689). For this reason, we decided to leave the existing scale intact and to keep the item included.

Table 5.3 shows an overview of the final item loadings, CR, AVE and Cronbach's alpha. All figures in Table 5.3 display a satisfactory level of item loadings, composite reliability, Cronbach's alpha and average variance extracted. For all constructs acceptable levels of CR were obtained; all values largely surpassed the 0.7 value. The AVE of each construct reached the minimal value of 0.5 as well. Concerning coefficient alpha, for all the measures that were based upon existing scales, values met the recommended 0.7 level. For the construct of supply chain climate, a value of only 0.64 was reached, which is acceptable for a newly developed scale. In addition, item-to-total correlations and the alpha-if-item-deleted values (not reported) did not indicate further elimination of items.

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Table 5.3: Reliability and convergent validity of the reflective measurement model

	Mean	SD	Loading	C.R.	AVE	α
Innovat				0.869	0.626	0.80
Cult1	3.58	0.78	0.673			
Cult3	3.73	0.90	0.841			
Cult4	3.74	0.85	0.885			
Cult5	3.62	0.89	0.750			
Rishtak				0.834	0.629	0.70
Cult6	3.10	0.96	0.680			
Cult7	2.97	0.93	0.850			
Cult8	2.57	0.91	0.840			
Crossf				0.886	0.564	0.87
Crossf1	3.40	1.03	0.710			
Crossf2	3.41	1.03	0.725			
Crossf3	3.40	1.10	0.801			
Crossf4	3.17	1.05	0.815			
Crossf5	3.26	0.90	0.689			
Crossf6	3.24	0.97	0.760			
Infocus				0.902	0.754	0.83
Nwinfo1	4.29	0.69	0.882			
Nwinfo2	4.12	0.72	0.890			
Nwinfo3	3.83	0.82	0.832			
Infosup				0.926	0.807	0.88
Nwinfo4	3.57	0.98	0.870			
Nwinfo5	3.32	1.05	0.909			
Nwinfo6	3.21	1.09	0.914			
Central				0.909	0.715	0.86
Struct4	2.52	0.98	0.796			
Struct5	2.18	0.80	0.840			
Struct6	2.08	1.02	0.825			
Struct7	1.97	0.82	0.917			
Innocus				0.884	0.605	0.85
Nwinno1	3.36	1.05	0.786			
Nwinno2	3.63	0.95	0.845			
Nwinno3	3.45	1.03	0.781			
Nwinno4	3.56	1.12	0.724			
Nwinno5	3.30	1.02	0.748			
Innosup				0.917	0.733	0.89
Nwinno6	2.93	0.97	0.853			
Nwinno7	2.96	1.06	0.889			
Nwinno8	3.18	1.05	0.838			
Nwinno9	2.85	1.02	0.845			
Chainclim				0.793	0.562	0.64
Nwinn12	4.16	0.86	0.772			
Nwinn13	3.91	0.93	0.778			
Nwinn15	3.35	0.98	0.696			
Sicap				0.893	0.544	0.86
Explo1	3.12	1.03	0.740			
Explo2	2.96	0.98	0.670			
Explo3	3.31	0.94	0.771			
Explo4	3.12	0.90	0.801			
Explo5	3.16	0.90	0.791			
Explo6	3.21	0.85	0.707			
Explo7	3.49	0.83	0.672			

5.2.1.2.2 Discriminant validity

Finally, the discriminant validity of the measurement model was assessed. In other words, we examined whether measures of a construct sufficiently differed from measures of other constructs. Discriminant validity can be assessed by comparing the AVE to the squared correlations among the constructs (alternatively the square root of the AVE can be compared to the inter-construct correlations) (Fornell & Larcker, 1981).

To this end, the standardized construct scores provided by the PLS analysis were imputed into SPSS 12.0 to conduct a correlational analysis. The results of the two-tailed Pearson correlations are displayed in Table 5.4. Diagonal elements represent the square root of AVE (of the reflective constructs). Table 5.4 shows that all diagonal elements (square root of AVE) exceed the lower-left triangle of inter-construct correlations, meaning that all reflective constructs shared more variance with their own indicators than they shared with all other latent constructs in the model, the formatively specified independent constructs included (Chin, 1998a; Barclay et al., 1995; Hulland, 1999).

Table 5.4: Correlations among the construct scores

	Innovat	Risaktak	Crossf	Infocus	Infosup	Central	Innocus	Innosup	Chaincli	Recog ^F	Assim ^F	Transf ^F	Sloap
Innovat	0.791												
Risaktak	0.406**	0.793											
Crossf	0.231**	0.206**	0.751										
Infocus	0.233**	0.275**	0.287**	0.868									
Infosup	0.150	0.077	0.280**	0.350**	0.898								
Central	-0.335**	-0.298**	-0.220**	-0.190*	0.013	0.846							
Innocus	0.288**	0.179*	0.226**	0.311**	0.315**	-0.121	0.778						
Innosup	0.075	0.118	0.225**	0.129	0.369**	-0.012	0.294**	0.856					
Chaincli	0.263**	0.215**	0.228**	0.287**	0.099	-0.374**	0.048	0.010	0.750				
Recog ^F	0.352**	0.243**	0.619**	0.388**	0.280**	-0.218**	0.354**	0.232**	0.262**	-			
Assim ^F	0.416**	0.291**	0.550**	0.325*	0.289**	-0.264**	0.273**	0.256**	0.247**	0.683**	-		
Transf ^F	0.473**	0.331**	0.414**	0.258**	0.165*	-0.326**	0.306**	0.115	0.210**	0.624**	0.625**	-	
SI	0.463**	0.428**	0.350**	0.357**	0.240**	-0.285**	0.447**	0.249**	0.264**	0.505**	0.535**	0.513**	0.738

Diagonal elements represent square roots of AVEs

^F: Formatively specified construct

* Significant at 0.05 [2-tailed]; ** significant at 0.01 [2-tailed]

Another test for adequate discriminant validity is to compute cross-loadings. For this analysis, once again the standardized (reflective) indicator scores and construct scores of the PLS output were imputed into SPSS 12.0 and a Pearson correlational analysis was run. The results are shown in Table 5.5.

Table 5.5 Loadings and cross-loadings of the measurement model

	INNOVAT	RISKI	CROSSF	INFOCUS	INFOSUP	CENTRAL	INNOCUS	INNOSEP	CHAINCLIM	RECOG	ASSIM	TRANSF	SICAP
cult1	0.673**	0.270**	0.105	0.159*	0.187*	-0.213**	0.164*	-0.036	0.157*	0.105	0.069	0.092	0.228**
cult3	0.841**	0.373**	0.197*	0.196**	0.022	-0.366**	0.229**	0.092	0.153	0.275**	0.357**	0.430**	0.402**
cult4	0.885**	0.352**	0.154	0.180*	0.133	-0.212**	0.244**	0.062	0.287**	0.269**	0.337**	0.398**	0.411**
cult5	0.750**	0.283**	0.238**	0.205**	0.150	-0.268**	0.265**	0.102	0.226**	0.355**	0.394**	0.419**	0.377**
cult6	0.266**	0.680**	0.065	0.209**	0.048	-0.130	0.114	0.152	0.224**	0.016	0.069	0.050	0.241**
cult7	0.415**	0.850**	0.277**	0.230**	0.044	-0.323**	0.194*	0.148	0.141	0.309**	0.352**	0.419**	0.425**
cult8	0.280**	0.840**	0.128	0.217**	0.089	-0.237**	0.113	-0.010	0.158*	0.221**	0.242**	0.280**	0.343**
crossf1	0.234**	0.215**	0.710**	0.114	0.219*	-0.096	0.123	0.207*	0.144	0.433**	0.374**	0.305**	0.224**
crossf2	0.064	0.036	0.725**	0.215**	0.301**	-0.100	0.132	0.246**	0.207*	0.480**	0.384**	0.226**	0.231**
crossf3	0.100	0.105	0.801**	0.250**	0.152	-0.139	0.176*	0.093	0.176*	0.440**	0.368**	0.318**	0.228**
crossf4	0.144	0.177*	0.815**	0.257**	0.217*	-0.178*	0.145	0.205*	0.179*	0.530**	0.505**	0.344**	0.317**
crossf5	0.204*	0.168*	0.689**	0.266**	0.276**	-0.170*	0.314**	0.234**	0.109	0.522**	0.433**	0.378**	0.344**
crossf6	0.354**	0.264**	0.760**	0.213**	0.165	-0.319**	0.183*	0.072	0.229**	0.462**	0.480**	0.339**	0.296**
nwinf01	0.221**	0.259**	0.240**	0.882**	0.198*	-0.249**	0.214**	0.041	0.355**	0.324**	0.254**	0.243**	0.274**
nwinf02	0.166*	0.243*	0.316**	0.890**	0.320**	-0.145	0.239**	0.124	0.258**	0.358**	0.327**	0.217**	0.327**
nwinf03	0.223**	0.214**	0.193*	0.832**	0.400**	-0.098	0.365**	0.174*	0.126	0.326**	0.264**	0.212**	0.329**
nwinf04	0.172*	0.052	0.266**	0.357**	0.870**	-0.051	0.244**	0.289**	0.114	0.206**	0.228**	0.192*	0.187*
nwinf05	0.065	0.051	0.310**	0.272**	0.909**	0.051	0.243**	0.329**	0.103	0.273**	0.283**	0.126	0.225**
nwinf06	0.171*	0.104	0.186*	0.318**	0.914**	0.035	0.366**	0.379**	0.051	0.276**	0.273**	0.131	0.237**
struc4	-0.227**	-0.241**	-0.182*	-0.165*	-0.062	0.796**	-0.123	0.014	-0.199*	-0.138	-0.195*	-0.231**	-0.281**
struc5	-0.276**	-0.333**	-0.238**	-0.136	0.075	0.840**	-0.055	0.011	-0.356**	-0.206**	-0.233**	-0.272**	-0.235**
struc6	-0.365**	-0.159*	-0.121	-0.107	-0.012	0.825**	-0.088	-0.040	-0.320**	-0.160*	-0.209**	-0.270**	-0.220**
struc7	-0.268**	-0.272**	-0.206**	-0.228**	0.038	0.917**	-0.141	-0.024	-0.390**	-0.227**	-0.255**	-0.326**	-0.233**

* Significant at 0.05 (2-tailed); ** significant at 0.01 (2-tailed)

Table 5.5 (continued)

	INNOVAT	RISK	CROSSF	INFOCUS	INFOSUP	CENTRAL	INNOCUS	INNOSEP	CHAINCLIM	RECOG	ASSIM	TRANSF	SICAP
nwinno1	0.199*	0.048	0.148	0.218**	0.382**	-0.044	0.786**	0.301**	0.020	0.175*	0.161	0.128	0.315**
nwinno2	0.154	0.160*	0.101	0.293**	0.274**	-0.075	0.845**	0.227**	0.032	0.335**	0.211**	0.252**	0.380**
nwinno3	0.234**	0.130	0.239**	0.187*	0.082	-0.128	0.781**	0.214**	0.028	0.255**	0.243**	0.233**	0.334**
nwinno4	0.288**	0.120	0.283**	0.219**	0.172*	-0.111	0.724**	0.160	0.073	0.347**	0.222**	0.380**	0.320**
nwinno5	0.292**	0.260**	0.157	0.323**	0.343**	-0.126	0.748**	0.251**	0.042	0.304**	0.258**	0.251**	0.423**
nwinno6	0.058	0.062	0.253**	0.119	0.323**	0.012	0.229**	0.853**	0.023	0.196*	0.222**	0.126	0.272**
nwinno7	0.072	0.122	0.203*	0.156	0.344**	-0.050	0.260**	0.889**	-0.007	0.236**	0.250**	0.089	0.264**
nwinno8	0.065	0.131	0.112	0.127	0.300**	-0.060	0.324**	0.838**	0.007	0.170*	0.188*	0.072	0.161
nwinno9	0.068	0.101	0.224**	0.046	0.337**	0.061	0.214**	0.845**	0.015	0.217**	0.239**	0.120	0.175*
nwin12	0.188*	0.075	0.100	0.085	-0.010	-0.322**	-0.031	-0.108	0.772**	0.120	0.110	0.122	0.132
nwin13	0.145	0.160*	0.280**	0.375**	0.281**	-0.235**	0.046	0.088	0.778**	0.328**	0.247**	0.162*	0.236**
nwin15	0.293**	0.286**	0.138	0.194*	-0.064	-0.314**	0.104	0.048	0.696**	0.146	0.215**	0.215*	0.246**
explo1	0.267**	0.287**	0.180*	0.270**	0.264**	-0.059	0.278**	0.202*	0.204*	0.312**	0.321**	0.175*	0.740**
explo2	0.263**	0.325**	0.207*	0.168*	0.222**	-0.088	0.223**	0.210*	0.292**	0.350**	0.352**	0.259**	0.670**
explo3	0.268**	0.300**	0.299**	0.301**	0.138	-0.273**	0.388**	0.139	0.128	0.364**	0.375**	0.354**	0.771**
explo4	0.417**	0.310**	0.295**	0.294**	0.109	-0.279**	0.372**	0.136	0.220**	0.510**	0.495**	0.555**	0.801**
explo5	0.407**	0.325**	0.206*	0.251**	0.170*	-0.231**	0.421**	0.271**	0.159*	0.349**	0.431**	0.392**	0.791**
explo6	0.385**	0.309**	0.241**	0.298**	0.185*	-0.340**	0.307**	0.165*	0.207**	0.333**	0.320**	0.390**	0.707**
explo7	0.344**	0.373**	0.356**	0.264**	0.201*	-0.133	0.292**	0.171*	0.187*	0.337**	0.410**	0.399**	0.672**

* Significant at 0.05 (2-tailed); ** significant at 0.01 (2-tailed)

Chapter 5

As can be seen in Table 5.5, each reflective indicator loaded higher on the construct it intended to measure than on other constructs. Furthermore, each block of reflective indicators loaded higher on its respective latent construct than did the indicators of all other latent constructs. Formative indicators have not been reported since their interpretation should not be based on the indicators' loadings (Chin, 1998a).

In conclusion, results suggest that all final –reflective– measures proved to have a satisfactory level of reliability and validity.

5.2.2 The formatively specified constructs

5.2.2.1 Measurement quality of the formative indicators

All the independent variables have been operationalized in a formative mode (see chapter 4).

The evaluation of the measurement properties of the formatively specified constructs will however be incorporated into the assessment of the structural model, and will hence be dealt with in section 5.3.3.1. As such, the two-stage model evaluation (Anderson & Gerbing, 1988) will be abandoned for the formatively specified constructs.

We were bound to do so since the measurement qualities of formative indicators largely depend upon the specified structural relationships. In other words, they can not be disconnected from the structural model. Moreover, in our study, the formative indicators represent specific path-breaking focus areas stimulated by deliberate strategic learning mechanisms. Our discussion in chapter 2 clarifies why the study of these path-breaking focus areas is of specific theoretical interest in the context of SI. As such, the assessment of the formative measurement model should be regarded as an integral part of the research results, more than as a mere validation of measurement quality.

5.2.2.2 Test of the hypothesized semi-aggregate model for recognition

However, before measurement properties of the formative indicators could be studied in a later section, the correctness of the semi-aggregate model used for recog had to be verified. More specifically, in chapter 4 we justified our choice for the ‘discrete components partial aggregation model’ (Bagozzi & Heatherton, 1994) to operationalize the dimensions ‘envinfo’ and ‘insight’ of the recog construct.

Yet, before items could be aggregated into a single composite, their unidimensionality (per component) had to be demonstrated (Baumgartner & Homburg, 1996). We hence modeled the relation between each component and its measures with a separate confirmatory factor analysis (CFA) model (Bagozzi & Heatherton, 1994: 40). A CFA provides a statistical test of how closely the data fit the hypothesized structure, in other words, how well the individual items fit with the hypothesized factor (Heck, 1998).

Before conducting a CFA, a preparatory EFA (principal axis factoring) was run with the items of both dimensions. As hypothesized, the two-factor solution appeared with acceptable loadings.

Then, assumptions underlying a CFA (Tabachnick & Fidell, 2001c) were assessed: sample size, missing values³⁴, outliers (case 50 was a multivariate outlier on insight), normality and linearity. All assumptions were met, except for the latter two, which showed less satisfactory results. The solutions could hence be deflated.

By means of the software Amos 5.0 a CFA was performed for each dimension separately. Model fit was assessed³⁵.

First, concerning the envinfo dimension, the evaluation of the overall model fit seemed impossible at first sight. As the degrees of freedom (*df*) were zero (three indicators), the chi-square test would always indicate a perfect fit. Consequently, in order to test the fit of this just-identified model, all factor loadings were constrained to one, which resulted in two additional *df* (Bagozzi & Heatherton, 1994). The chi square was given with two *df* and amounted to 3.90. Since $p = 0.142 (>0.05)$ the model suggested that the three items all loaded on a single factor and equally reflected this factor. The alternative fit indices indicated a good fit as well: $\chi^2/df=1.952$, GFI=0.986, AGFI=0.958, CFI=0.985 and RMSEA=0.071. We freed the two factor loadings to further study convergent validity and reliability. All items showed significant standardized loadings, largely exceeding 0.5. Standardized residuals were all $< |2.58|$. CR was 0.75; AVE was with 0.50 an accepted borderline value.

As regards the insight dimension, an even better model fit was achieved: $\chi^2 = 3.026$, $p=0.220$, $\chi^2/df=1.513$, GFI=0.992, AGFI=0.961, CFI=0.995 and RMSEA=0.053.

In addition, all standardized loadings were significant and larger than 0.5, all standardized residuals were $< |2.58|$, CR was 0.79 and AVE scored a just-accepted 0.50.

The CFA results demonstrated that the partial aggregation model could be applied in the subsequent analyses. We hence aggregated the items (means) of both recog-dimensions into one formative indicator for each dimension.

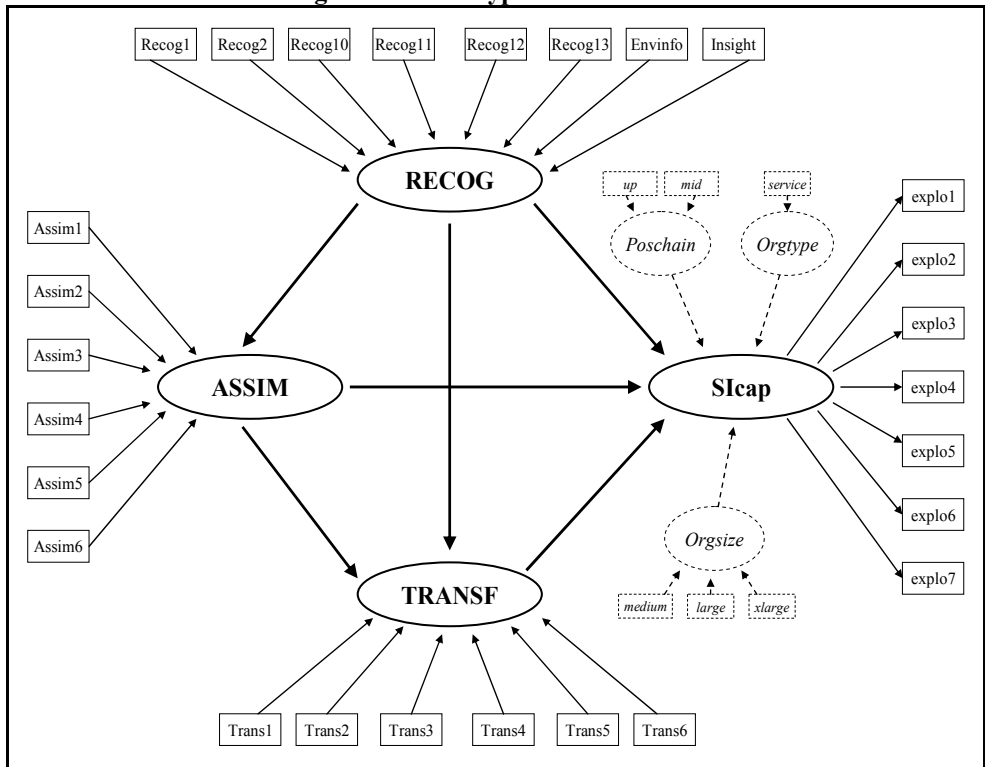
³⁴ As AMOS-software for CFAs can not handle missing values, missing values had to be imputed. They accounted for less than 5% of the dataset and showed a random distribution (see also section 5.1.2). We imputed the missings by series means and reran the EFA; exactly the same data structure was found and loadings were only a few tenths of percentages lower (this is evident as imputation by series means reduces variance) than in the non-imputed EFA. We concluded that it was safe to run the CFA with missings imputed.

³⁵ The overall model fit (test on unidimensionality) in a CFA can be evaluated by studying the chi-square value, which should be insignificant relative to the degrees of freedom in the model ($p>0.05$). An insignificant result (a failure to reject the model) suggests that each of the indicators measures a single underlying factor (Bagozzi & Heatherton, 1994). As the chi square statistic assumes multivariate normality and is affected by sample size it should be combined with alternative fit indices (Ullman, 2001). For example, GFI, AGFI and CFI are measures of the relative amount of variance and covariance accounted for by the model, and should consequently approximate 1.00. RMR and RMSEA indicate the average unexplained variances and covariances so should be as close as possible to 0 (Heck, 1998).

5.3 ANALYSIS AND RESULTS OF THE STRUCTURAL MODEL

Figure 5.1 shows the hypothesized structural model. The model also includes the indicators of the basic constructs as measured in the final web survey. The corresponding survey questions can be found in Appendix II.

Figure 5.1: The hypothesized model



Before testing and discussing the hypothesized model, the influence of control variables on Sicap was studied.

5.3.1 Analysis of the control variables

As previously three control variables were included in the model: 1) the organization’s position in the supply chain (‘poschain’): upstream (levels 1-4 on a 10-point scale), midstream (levels 5-7) or downstream company (levels 8-9), 2) the organization or business unit size (‘orgsize’) defined as the number of full time employees: a small-sized organization was defined as one having less than 100 FTEs, a medium-sized 100-199, a large one 200-499, and a very large one as having more than 500 FTEs, and finally, 3) the main activities of the organization (‘orgtype’): product firm or service firm.

All control variables, being categorical, were recoded into dummies (k-1 categories) (see e.g., Chatterjee et al., 2002)³⁶. Each control variable was specified in a formative way; each dummy-category served as a formative indicator (Falk & Miller, 1992).

To test the impact of the control variables in the model, we used a method to test whether a block of two or more variables significantly increases the R² above the R² predicted by a set of variables already in the equation (Tabachnick & Fidell, 2001b; Chin et al., 2003; Kenny, 2004; Bass et al., 2003). More specifically we tested three nested models by means of an F-test: the full model (with the hypothesized independent variables and the control variables), the theoretical model (the hypothesized model), and the control model (without the hypothesized independent variables; i.e. only with control variables) (see e.g., Bontis et al., 2002; Teo et al., 2003). The three models were run in PLS-Graph 3.0 (bootstrapping with 500 resamples, construct-level sign change, path weighting, metric=1, see Tenenhaus et al., 2005; Lohmöller, 1984).

Table 5.6 shows that on the one hand the theoretical model is to be preferred over the full model; the control variables do not significantly add explained variance to the dependent variable ($F_{3, 175} = 2.34, p > 0.05$). On the other hand, the full model is to be preferred over the control model; the hypothesized independent variables do apparently significantly increase the R² of SI over and above the impact of the control variables ($F_{3, 175} = 28.88, p < 0.00$). Moreover, none of the control paths were found to be significant (all $p_{2\text{-tailed}} > 0.1$): poschain ($\beta = 0.111, t = 1.38$), orgsize ($\beta = 0.108, t = 1.26$) and orgtype ($\beta = 0.098, t = 1.55$).

Table 5.6: F-tests on the influence of the control variables

	Full model	Theoretical model	Control model	F (3, 175)	Sign. of F
R ² of SIcap	0,378	0,353	-	2,34	n.s. [p > 0,05]
R ² of SIcap	0,378	-	0,070	28,88	p < 0,001

The analyses (nested models and significance of paths) indicated that the inclusion of the control variables would not add value to the model. Following the principle of parsimony, which requires the use of a model with equal predictability than the full model but with fewer variables and paths, we decided to run all subsequent analyses on the hypothesized model, i.e. without the inclusion of the control variables.

Since the structural model was hypothesized as a partial-mediation model, the correctness of the hypotheses regarding partially mediated relationships is first formally verified in the next section, before the structural results are studied in a more detailed way.

³⁶ For the control variable of supply chain position the reference category was ‘downstream position’, for organization size the reference category was ‘small-sized’, and for the organization activities the reference category of ‘product firm’ was chosen.

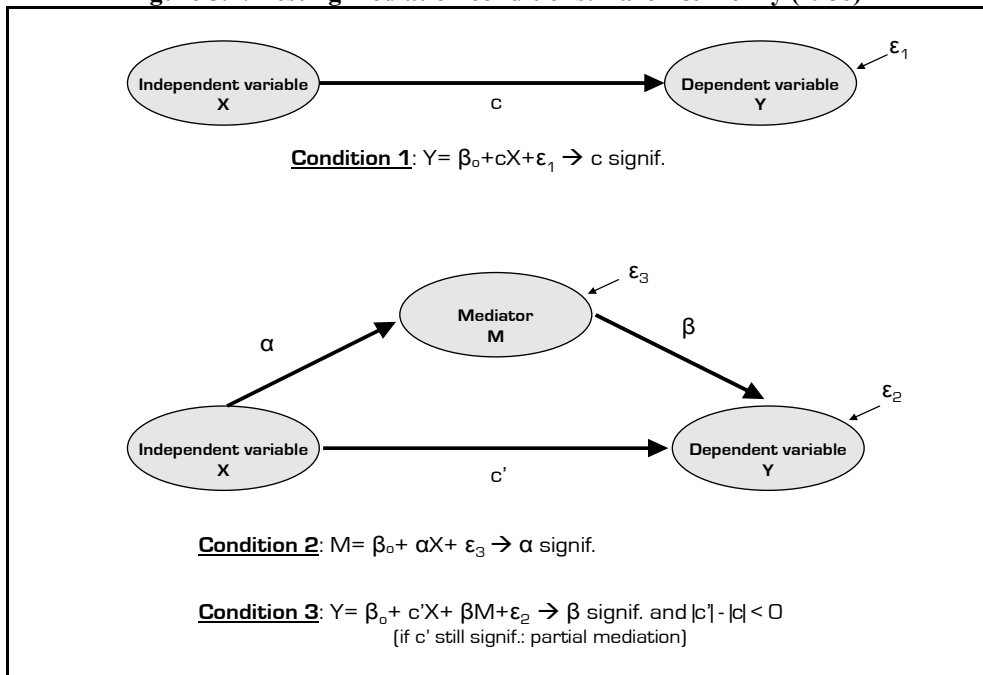
5.3.2 Tests on the correctness of the hypothesized partial mediation model

So far, some ambiguity exists as to how mediation should be tested; in MacKinnon et al. (2002) no less than fourteen different mediation tests have been described and evaluated. The confusion is even greater in the context of SEM. For example, some authors do not structurally test for mediation, but directly infer the existence of a mediator from their structural model, by comparing the total effect with the direct effect of an IV (see e.g., Bass et al., 2003).

We, however, followed McDonald’s (2001) and MacKinnon et al.’s (2002) advise to test mediation in a more profound way. This ‘profound’ mediation check comes down to: a) Baron & Kenny’s (1986) test on *conditions* for mediation, and b) McKinnon et al.’s (1995) test on the *statistical significance* of the indirect effects. For the latter, both tests for the separate mediation relationships and the full model were performed.

First, Baron & Kenny’s (1986) mediation test comes essentially down to running a set of OLS regressions (which have been graphically represented in the path diagrams in Figure 5.2).

Figure 5.2: Testing mediation conditions: Baron & Kenny (1986)



Adapted from MacKinnon et al. (2002); Baron & Kenny (1986).

These regressions serve to test three conditions:

- 1) Regress the DV on the IV and show that the IV significantly influences the DV (c is significant),
- 2) Regress the potential mediator on the IV and show that the IV significantly influences the potential mediator (α is significant),

- 3) Regress the DV on the IV and on the potential mediator and show that the mediator significantly influences the DV (β is significant). Furthermore, if the regression coefficient of the IV (c') approaches 0 (becomes insignificant) this is proof of full mediation. If the regression coefficient is smaller than in regression 1), though still significant, there is partial mediation ($|c|-|c'| > 0$, but c' is significant).

Table 5.7 (left-hand part) shows the results of this analysis.

Table 5.7: results of the different mediation tests

CONDITIONS OF MEDIATION TESTS (Baron & Kenny, 1986)				PRODUCT OF COEFFICIENTS MEDIATION TESTS (Sobel, 1982; MacKinnon et al., 1995)	
Condition	IVs	DV	Stand. β	Indirect effect Separate model	Indirect effect Hypothesized full model
H1: Recog \rightarrow Assim \rightarrow Slcap?					
Condition 1 (c)	Recog	Slcap	0.536***	0.234***	0.183***
Condition 2 (α)	Recog	Assim	0.699***		
Condition 3 (c') (β)	Recog Assim	Slcap	0.286** 0.344***		
H2: Recog \rightarrow Transf \rightarrow Slcap?					
Condition 1 (c)	Recog	Slcap	0.536***	0.209***	0.087*
Condition 2 (α)	Recog	Transf	0.642***		
Condition 3 (c') (β)	Recog Transf	Slcap	0.293* 0.326***		
H3: Assim \rightarrow Transf \rightarrow Slcap?					
Condition 1 (c)	Assim	Slcap	0.559***	0.173***	0.088*
Condition 2 (α)	Assim	Transf	0.626***		
Condition 3 (c') (β)	Assim Transf	Slcap	0.376*** 0.276***		
Indicated are two-tailed significance levels: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$					

For each of the three hypothesized mediated relationships, Table 5.7 shows the standardized β coefficients. Although all hypotheses were formulated as being directional in nature, we indicated 2-tailed significance levels because these tests are more conservative (lower chance of Type I-errors).

The results shown in the left-hand side of table 5.7 indicate that all three partial mediation hypotheses could be accepted. In other words, for each of the hypotheses, Baron & Kenny's three conditions were met: c is significant ($p < 0.001$), α is significant ($p < 0.001$), β is significant ($p < 0.001$) and $|c|-|c'| > 0$. Since c' is still significant there is proof of partial mediation for all three hypotheses.

The mediation test developed by Baron & Kenny (1986) has been based rather on conceptual than on statistical grounds; it can actually be considered as a test on mediation conditions (MacKinnon et al., 2002). Although this approach compares the coefficient of the IV on the DV between the simple model (c in condition 1, see Figure 5.2) and the

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mediation model (c' in condition 3, see Figure 5.2), it provides no formal test on the *statistical significance* of the indirect effect.

Therefore, we also performed MacKinnon et al.'s (1995) test. MacKinnon et al. (1995) have demonstrated the equivalence of testing $c-c'$ to testing $\alpha\beta$ (see Figure 5.2). This is the so-called 'product of coefficients' mediation approach, where the estimated indirect effect $\alpha\beta$ is divided by its standard error and compares this to a standard normal distribution (MacKinnon et al., 2002). In general, the product coefficients approach is regarded as being more appropriate in the context of path modeling (MacKinnon et al., 2002). We added the results of this approach to the right-hand side of Table 5.7.

The *right-hand* side of Table 5.7 shows that actually two sets of product of coefficients analyses were run: one for the separate models and one for the full model. The reason for this is that in the context of a SEM (or a path modeling) framework no clear guidelines exist as to whether mediation hypotheses should be tested individually, or as part of the whole multiple regression framework. In other words, when testing mediated relationships, should additional predictor variables of the mediator and the dependent variable be included (i.e. controlled for) in the tests or not?

Controlling for all other variables' influence (the so-called 'full model') should be preferred if the researcher believes that the true effect of the IV on the mediator and on the DV is this which exists after removing any potential effect of any other independent variables (Heath, 2001: 94). We could justify this 'full model approach' in our study since we wanted to test the entire hypothesized model, including all three mediated relationships simultaneously. This would logically imply controlling for the influence of all other variables in the model. However, including all other potential predictors of the mediator means that all other assumed, and yet to be tested, mediation effects should be considered as true. In other words, this would imply that only the 'surplus' mediation effects could be studied, controlling for all other mediation effects. For example, when testing the mediation effect of *transf* for *recog* on *SIcap*, only the mediation effect beyond and above the mediation effect of *transf* for *assim* on *SIcap* could be studied (for *assim* is assumed to be an additional predictor of the mediator *transf*, it should be included in the regression equation). Furthermore, including other predictors may lead to ambiguous results, due to collinearity problems among predictor variables. For example, if another predictor variable accounts for almost all of the shared variance between the independent variable and the mediator, this may disguise a true mediating effect. Since only mediation of the independent variable's *unique* component (the shared variance with the mediator, that is not shared with another predictor) is tested, the variable's remaining shared variance is ignored. However, it could be exactly the latter part which is mediated (Heath, 2001).

Accordingly, we decided to estimate the indirect effects for both separate models (only containing the mediation hypothesis under study; so only containing three constructs) and for the full, hypothesized model (with all constructs and hypothesized mediation relations included). The latter controls for effects of other IVs (and hence for other mediating relationships) and, consequently, tests only the 'surplus' mediation effect. Results are shown in the *right-hand* side of Table 5.7.

To calculate the statistical significance of the indirect effects, the approximate formula developed by Sobel (1982)³⁷ was applied.

Both the full model and the separate model product of coefficients results demonstrated significant mediation effects of *assim* for *recog* (H1), and of *transf* for both *recog* (H2) and *assim* (H3). However, when comparing both methods, it can be seen that the mediation role of *transf* for *recog* significantly diminishes when being controlled for other relationships, such as the mediation effects of *assim* for *recog*. Although *transf* is in and of itself an important mediator for *recog*, its role is apparently reduced by *assim*. The same applies to the mediation effect of *transf* for *assim*. When controlling for all other direct and mediation effects the mediating role of *transf* for *assim* becomes rather small, yet still significant. These attenuated effects could however be due to collinearity effects (Heath, 2001).

In general, *assim* seems to have a more important mediating role than does *transf*. These results will be studied more profoundly in the discussion of the final structural model (see, section 5.3.3.2).

Even though the above mentioned mediation tests indicated the existence of three *partial* mediation effects, and even though the direct effects remain rather large, in view of parsimony, we finally tested whether, on statistical grounds, a fully-mediated model could possibly not be preferred over a partially-mediated one. We did so since the structural model we hypothesized is a full model. As all possible unidirectional relationships have been specified in this model, the model has maximum predictability. The scientific principle of parsimony however dictates ‘simplicity of the model until proved otherwise’ (Lehmann, 2001). This means that models with fewer relationships specified, but with an equal level of predictability, should be preferred (Falk & Miller, 1992). Therefore, we tested whether the direct paths from *recog* and *assim* to *SIcap* explained significant additional variation in order to be retained in the final model (Lehmann, 2001).

To this end, we performed a nested models F-test to compare the R²s of the full and partial mediation model (e.g., Subramani, 2004). In the full mediation model direct paths running from *recog* and *assim* to *SIcap* were removed. The test result ($F_{2,178} = 10,179$; $p < 0.01$) clearly demonstrated the superiority of the partial mediation model.

Having demonstrated the correctness of the hypothesized partial mediation model, we will finally discuss the results of the hypothesized model in a more detailed way.

5.3.3 Analysis of the partial mediation model

Figure 5.3 shows the PLS-results of the partially mediated model.

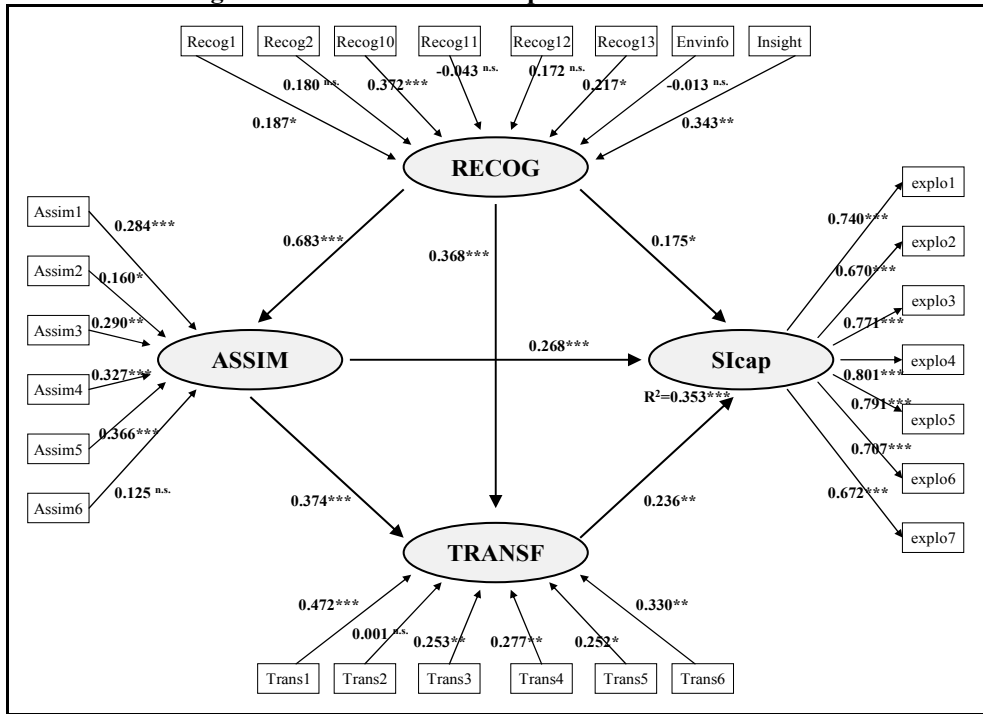
First, the importance of the formative indicators of the independent latent variables is discussed. Then, the findings concerning the structural relationships will be treated.

³⁷

$$z = \frac{\alpha\beta}{\sqrt{\alpha^2\sigma_\beta^2 + \beta^2\sigma_\alpha^2}}$$

with the path coefficients between the IV and M (α), and between the M and DV (β) respectively, and their standard errors (see MacKinnon et al., 2002: 85).

Figure 5.3: PLS results of the partial mediation model



One-tailed significance: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.3.3.1 Analysis of the formative indicators

As already indicated in section 5.2.2.1, in the case of formative indicators, the application of traditional reliability and validity criteria is meaningless (e.g., Bagozzi, 1994b, Hulland, 1999). The analysis of loadings is misleading since the intra-block correlations are not taken into account in the estimation procedure (Falk & Miller, 1992). Instead, since formative indicators have a regression-like relationship with the latent constructs, interpretation should be based on the indicators' weights (Chin, 1998a).

The indicators' weights can be considered as standardized (multiple) regression weights, estimated in such a way that the latent variable is predicted in the best way, without regard to the residual variance of the predictor indicators. The weight thus indicates the relative importance of the indicator in the formation of the component (Chin, 1998a). As such, each indicator contributes variance to the 'latent' variable, but there need not be common variance among the manifest variables themselves.

Hence, as explained in chapter 3, in the case of formative measures, the indicators' paths to their corresponding construct are not determined by the covariance of these indicators among each other (by definition they may not have any covariance), but by their covariance with indicators of other latent constructs in the model. This implies that the indicators' weights will vary according to different measures and different structural relations included in the model (Williams et al., 2003). Therefore, it is important to remark

that the estimated weights we report are determined by estimating the hypothesized structural model. Weights hence indicate the relative importance of the indicators, given the partially mediated model. We would like to stress that all results should be interpreted in this way.

Since the weights are determined by multiple regressions, indicator inter-correlations may affect their stability. Therefore, first indicator multicollinearity was examined for each independent construct separately (Diamantopoulos & Winklhofer, 2001). Bivariate inter-item correlations never exceeded 0.7 (Wijnen et al., 2002). In addition, collinearity diagnostics were run in SPSS 11.0. For each formative indicator, the analysis showed condition indices far below 30 (Tabachnick & Fidell, 2001b) and tolerance levels each largely surpassing the –very conservative– 0.4 threshold (Allison, 1999). We took this as proof of the absence of indicator-multicollinearity.

As no minimum threshold values for indicator weights have been established, the significance of the weights can be used to determine the relative importance of the indicators in the formation of the construct (Chin, 1998a). The significance of the weights was obtained using a bootstrapping technique with 500 resamples (construct level sign change). In Table 5.8 results are shown. Indicators noted in bold are those that are significant at $p < 0.05$ (one-tailed since relationships are unidirectional and since a two-tailed significance level would be too conservative with these newly developed measures).

Table 5.8: Characteristics of the formative measurement model (IVs)

	Mean	SD	Loading	Weight	t-value	p 2-tailed	p 1-tailed
RECOG							
Recog1	3.022	1.022	0.587	0.187	1.854	< 0.1	< 0.05
Recog2	2.972	1.235	0.705	0.180	1.615	n.s.	< 0.1
Recog10	3.695	0.993	0.662	0.372	4.219	< 0.001	< 0.001
Recog11	2.567	1.193	0.404	-0.043	0.477	n.s.	n.s.
Recog12	3.220	1.104	0.678	0.172	1.620	n.s.	n.s.
Recog13	2.552	0.994	0.709	0.217	1.946	< 0.1	< 0.05
Envinfo	2.925	0.834	0.464	-0.013	0.133	n.s.	n.s.
Insight	2.990	0.974	0.849	0.343	2.823	< 0.01	< 0.01
ASSIM							
Assim1	3.132	1.016	0.501	0.284	3.298	< 0.001	< 0.001
Assim2	3.307	0.989	0.607	0.160	1.752	< 0.1	< 0.05
Assim3	2.540	0.967	0.726	0.290	2.527	< 0.05	< 0.01
Assim4	3.412	0.835	0.589	0.327	3.952	< 0.001	< 0.001
Assim5	2.716	0.985	0.807	0.366	3.477	< 0.001	< 0.001
Assim6	2.877	1.202	0.545	0.125	1.362	n.s.	< 0.1
TRANSF							
Trans1	2.983	1.142	0.774	0.472	4.126	< 0.001	< 0.001
Trans2	2.832	1.099	0.541	0.001	0.011	n.s.	n.s.
Trans3	3.486	0.990	0.498	0.253	2.611	< 0.01	< 0.01
Trans4	2.850	0.947	0.398	0.277	2.907	< 0.01	< 0.01
Trans5	3.304	1.034	0.642	0.252	2.213	< 0.05	< 0.05
Trans6	2.860	0.967	0.761	0.330	2.670	< 0.01	< 0.01

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As regards the recog construct, recog2, recog11, recog12 and envinfo seem to be of no importance (the corresponding survey questions can be found in Appendix II). Recog11 and envinfo even show (insignificant) negative values. Apparently, deliberate strategic learning mechanisms fostering the detection of fundamental changes in the industry (recog2), the broadening of market research towards other industries (recog11), the collection of information about the needs of end customers (recog12) and the gathering of general macro-economic and societal information (envinfo) do not pay off in the context of SI.

Results suggest that only recog1, recog10, recog13 and insight have a significant impact with weights of 0.187, 0.372, 0.217 and 0.343, respectively. This means that stimulating the consultation of innovative customers for new ideas (recog10) is the most important recog practice, followed by mechanisms to develop deep insight into customers (insight). Also, mechanisms stimulating to find out why non-customers are no customers (recog13), and to focus market research more on future customer needs (recog1), have a –though smaller– impact on Sicap.

Concerning deliberate strategic learning mechanisms for assimilation, in particular, mechanisms that stimulate the systematical questioning of all aspects of the marketing approach (assim5) and keeping alive past critical reflections about customers/markets (assim4) seem to have the most impact. Likewise, mechanisms that foster organizations to question the very way the marketplace is being perceived (assim3), to share critical reflections on customers/markets (assim1), and to critically reflect on the shared assumptions that have been made about customers (assim2) seem to be effective in fostering Sicap. The analysis further suggests that deliberately fostering the filing of critical customer/market reflections, e.g., in a computer system, (assim6) is not useful.

Finally, a closer inspection of the trans-items reveals that all but one indicator (trans2) are significant. Mechanisms stimulating the adjustment of the organizational structure to new initiatives (trans1) outperform the impact of all other mechanisms. Mechanisms fostering a change in the way tasks are being carried out (trans6) are shown to be very effective as well. The analysis further suggests the usefulness of mechanisms to deliberately support new initiatives, even to the detriment of existing products/services (trans4), mechanisms to prevent chaos when a new initiative is being launched (trans3) and mechanisms fostering a change in established procedures to cater the needs of a new initiative (trans5). Yet, mechanisms facilitating organizations to replace one set of skills with a different set of skills in order to better adopt a new initiative (trans2) do apparently not affect Sicap.

Although not all indicators proved to be relevant (insignificant weights) we still decided to keep them all in subsequent (structural) analyses. The reason for this is twofold. Firstly, since PLS is based on standard OLS regressions, the inclusion of non-significant indicators does not bias the estimates of significant indicators. Standard error estimates could only be increased if the irrelevant items were highly correlated with the other items. The collinearity analysis demonstrated that this was however not the case. Since estimates will not be affected, any re-analysis after dropping the insignificant items is not required (Mathieson et al., 2001). Secondly, the operationalization of the independent constructs originates from a well-considered process, where existing literature and qualitative research results have guided indicator selection. As each indicator measures a specific

path-breaking focus area of the construct, removing indicators would alter the contents of the constructs (Diamantopoulos & Winklhofer, 2001; Williams et al., 2003). Since we deal with newly developed indices we decided not to prioritize on the refinement of the measurement model at this point in theory development (e.g., Ravichandran & Rai, 2000). Having discussed the measurement properties and the importance of the formative indicators, we turn now to the results of the structural model.

5.3.3.2 Analysis of the structural relationships

The results of a structural PLS analysis are traditionally explained in terms of R^2 and path coefficients (Chin, 1998a). R^2 is then the squared multiple correlation coefficient, it measures the effect size, or the ratio of explained to total variance. It shows the proportion of variance in a dependent variable explained by all independent variables jointly (Allison, 1999; Andrews, 1984). Path coefficients can in turn be interpreted as standardized beta coefficients (Falk & Miller, 1992) and are a measure of the strength of a relationship between a dependent variable and an independent variable, while holding constant the effects of all other independent variables (Allison, 1999).

Not only the statistical significance but also the size of the R^2 statistic and beta coefficients should be reported. Statistical significance tests do not provide information on the size of an effect; it is not because Type I errors are lower that the effect will be larger (Sawyer & Peter, 1983)³⁸; a very small effect can be statistically significant in a large sample, whereas a sizable effect can become statistically insignificant in a small sample. For this reason, it is important to also study the size of the path estimates (Chin, 2000b).

In Table 5.9 the main results of the structural analysis are shown.

Overall, deliberate learning mechanisms seem to be good predictors of S_{icap}; no less than 35% of variance in S_{icap} is explained by the three categories of deliberate learning mechanisms. Also, transf ($R^2=0.46$), respectively assim ($R^2=0.47$), seem to be well predicted by recog and assim, respectively assim. The R^2 values were all tested for significance by an F-test (Falk & Miller, 1992; Cohen et al., 2003). All values proved to be highly significant ($p<0.001$).

³⁸ A common misinterpretation is to consider the p-value as the probability that the results occurred because of sampling error or chance fluctuations. In real, a p-value of 0.05 simply means that, if the null hypothesis is true, there is a 5% chance of getting a mean difference this large or larger and the odds are 19 in 20 of getting a smaller mean difference. However, statistical significance testing does not determine whether the null hypothesis is really true or the probability that it is true (Sawyer & Peter (1983).

Table 5.9: Results of the structural model

	1	2	3	4	5	6	7	8
	Correlation	Direct path (stand. β)	Indirect path (stand. β)	Total effect	Effect size: ²	Effect size: F-test	Variance explained in DV	Relative contribution to R ² of DV
Recog → Slicap	0.505	0.175 *	$(0.683 \times 0.268) + (0.368 \times 0.236) + (0.683 \times 0.374 \times 0.236) = 0.330$	0.505	0.01	$F_{1,178} = 1.66^{ns}$	0.088	25%
Assim → Slicap	0.535	0.268***	$0.374 \times 0.236 = 0.088$	0.356	0.06	$F_{1,178} = 10.50^{***}$	0.143	41%
Transf → Slicap	0.513	0.236**	-	0.236	0.03	$F_{1,178} = 5.23^*$	0.121	34%
Recog + Assim → Slicap	-	-	-	-	0.11	$F_{2,178} = 9.52^{***}$	-	-
R ² Assim: 0.467***								
R ² Transf: 0.463***								
R ² Slicap: 0.353***								
<i>One-tailed significance: *p < 0.05, **p < 0.01, ***p < 0.001</i>								

In addition (see Figure 5.3), recog highly affects assim ($\beta=0.683^{***}$); organizations applying deliberate learning strategic mechanisms for recog, seem to do this as well for assim. The same argument applies to the relationship between recog and transf ($\beta=0.368^{***}$) and the one between assim and transf ($\beta=0.374^{***}$).

As regards the partial mediation effects that we hypothesized, results were studied more profoundly (see the different columns in Table 5.9).

Concerning the effects of deliberate strategic learning mechanisms on the ultimate DV (Slicap), all three categories of mechanisms seem to show considerable path estimates to Slicap (see Table 5.9, column 2). The path coefficient between assim and Slicap amounts to 0.268***, this of transf on Slicap to 0.236**. The direct effect of recog on Slicap is the lowest (0.175*). Multiplying the path estimate with the correlation gives an estimate of the variance the IV explains in the DV (Falk & Miller, 1992) (see Table 5.9, columns 7 and 8)³⁹. Taking into account the estimates of the direct paths, it is not surprising to find that the direct contribution of recog to Slicap is lowest (0.088, or 25% of the variance explained in Slicap), followed by transf (0.121, or 34%). Assim explains the largest part of Slicap (0.143, or 41%).

³⁹ Comparison of the correlations and path coefficients shows furthermore that there is consistency in sign between both; so-called ‘suppressor effects’ seemed to be absent (Cohen et al., 2003; Falk & Miller, 1992).

The picture however changes when taking into account the total effects (direct + all indirect, i.e. mediated effects) of the independent variables (see Table 5.9, column 4). It is here where mediating roles of *assim* and *transf* become manifest. *Recog* shows the highest total effect on *SIcap* (0.505), being channeled by both *assim* and *transf*. *Assim* also shows a substantial effect of 0.356, because of its considerable direct effect and its partial mediation by *transf*. The lowest total effect is caused by *transf* (0.236).

The mediation effects become even clearer when studying the effect sizes. The effect size can be calculated in order to know whether a specific IV has a substantive impact on a DV, above and beyond the effects of other IVs (Chin, 1998a; Cohen et al., 2003). This effect size can furthermore be tested for significance (Mathieson et al., 2001). We found that all effect sizes (see Table 5.9, column 5 and 6) were 'small' (relying on Cohen et al.'s (2003) conventions for a small, medium and large effect size in behavioral science). The low value of the individual effect sizes indicates that it is apparently the combined action of the independent constructs that causes the high variance explained of *SIcap*. The contribution of *recog* in the total variation of *SIcap*, above and beyond the effects of *assim* and *transf*, is very small and not significant ($0.01^{n.s.}$). Since we know that the total effect of *recog* is high (column 4), this implies that deliberate learning mechanisms for *recog* only fully pay off because of the mediating effects of both *assim* and *transf*. Contrary to what was expected, the effect size of *assim* was largest (0.06^{***}). *Transf* serves as a mediator for *assim*, but the direct effects *assim* has on *SIcap* are still considerable (see column 2). The effect size of *transf* is smaller (0.03^*) than this of *assim*, yet larger than the effect size of *recog*.

In conclusion, when the three categories of deliberate strategic learning mechanisms are studied in isolation, *assim* seem to be the most crucial element in the stimulation of *SIcap* (largest effect size). Deliberate strategic learning mechanisms for transformation are important too. In contrast, deliberate strategic learning mechanisms for recognition show the smallest contribution to *SIcap* in and of their own. To put it another way, of all deliberate learning mechanisms not having *assim* in place is the worst, whereas not having *recog* does the least harm.

Yet, the study of total effects shows that deliberate strategic learning mechanisms for recognition have on the contrary the largest total effect on *SIcap*: *recog* hence becomes the most important factor in stimulating *SIcap*, on the condition that both *assim* and *transf* are in place to channel its effects. The above mentioned mediation analysis (section 5.3.2) sheds further light on this result.

Let us therefore digress on the difference in effect size between *assim* and *transf*.

A first reason of the smaller effect size of *transf* can be found in its mediating role for *assim*. The mediation analysis (see Table 5.7) suggested that *transf* is a mediator for *assim* (0.173^{***} in the separate model; 0.088^* in the full model). Yet, the direct path from *assim* to *SIcap* remains substantial (0.268^{***}). This implies that *transf* can be considered as a mediator for *assim*, but that its mediating role is truly partial in nature; we noted an even larger direct path estimate between *assim* and *SIcap* than this between *transf* and *SIcap* (see Table 5.9).

Secondly, a comparison of the mediating function that *assim* and *transf* exert for *recog* indicates that the mediating role of *assim* is larger than this of *transf*. More specifically, the analysis of the separate models in Table 5.7 indicates 0.234^{***} for *assim* versus 0.209^{***} for *transf*. In the full model this difference becomes even more notable: 0.183^{***} versus

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0.087*. Although results should be interpreted with caution due to potential (and expected) collinearity effects in the full model analysis (Heath, 2001), results may suggest that *assim* ‘takes over’ the mediating role of *transf* for *recog*. Hence, the mediating effect *assim* has for *recog* is more crucial than is that which *transf* has. This implies that the absence of *assim* practices will reduce the relation between *recog* and *SIcap* far more than in the case *transf* is lacking.

In conclusion, the large total effect of *recog*, in combination with its small effect size is remarkable. The mediation analysis (see Table 5.7, Baron & Kenny’s mediation test) suggested that *recog* was considerably mediated by both *assim* and *transf*. This explains the limited effect size of *recog* over and beyond the effects of *assim* and *transf*. Despite the small direct relation between *recog* and *SIcap*, the large mediated effects through *assim* and *transf* amount to a large total effect of *recog* (see Table 5.9). The effects of *recog* need to be ‘channeled’ by *assim* and *transf*.

Furthermore, *assim* mediates the effects of *recog* to a larger extent and has consequently a more important function in channeling the effect of *recog* on *SIcap*, than does *transf*. In addition, *assim*’s relation to *SIcap* is in turn mediated by *transf*, though only to a certain extent. *Assim* also has a considerable direct relation with *SIcap*. It is the combination of these effects which explains the smaller effect size of *transf*, compared to this of *assim*. *Transf* does still have a considerable impact, yet, the ‘*potential ACAP*’-block of *recog* and *assim* amounts to a larger effect size than the ‘*realized ACAP*’-component *transf* (see Table 5.9, third and fourth row).

Next to mediating effects, we studied several moderating effects on the specified structural relationships. We will treat the results in the following section.

5.3.4 Analysis of the moderating effects

We studied the impact of several organizational and supply chain moderators on the strength (incl. moderated mediation) of the structural relationships.

In order to examine moderating effects on structural relationships in a multiple regression or PLS framework, two methods can be applied.

The first option is the traditional mean/median-split approach, which consists of splitting the entire sample on the moderator variable in an above- and below-median group (see e.g., Bagozzi & Yi, 1994). The model is then run in PLS for each group separately and path coefficients between both groups are compared by means of unpaired t-tests (Chin, 2000a,b). Despite the method’s relative simplicity, its major pitfall lies within its lack of statistical precision (loss of both power and the multi-item character of the moderator) (Carte & Russel, 2003)⁴⁰.

For this reason, the median-split approach has been substituted for hierarchical moderated regression (Williams, 2003), in which the independent and moderator variables are entered

⁴⁰ Irwin & McClelland (2003), for example, found serious reductions in the squared correlation, and in the significance of the interaction term (Irwin & McClelland, 2001), after dichotomization of a continuous predictor variable.

first, followed by their product. The increase in variance explained by the product term provides evidence for moderation (Cohen et al., 2003; Jaccard et al., 1990).

However, the application of the latter method in our study turned out to be not as straightforward as initially thought. More specifically, in a latent variable framework, the interaction term is created by cross-multiplying all indicators of all independent variables, including the moderator (Chin et al., 2003). Yet, this method only applies to reflectively specified constructs (Chin et al., 2003). The only possibility to model interaction effects with formatively specified independent variables is the so-called ‘latent variable score approach’ (Schumacker, 2002). This method consists of two steps: first, construct scores for the independent and moderator variables are computed by means of PLS, then a single interaction term is created by multiplying these construct scores. This interaction term is then entered into the PLS analysis (Chin, 2000a; Chin et al., 2003). Still, the latter method has not yet been validated within a PLS framework and has, to our knowledge, never been applied (personal e-mail correspondence with Chin, 2004).

In conclusion, up till now the –suboptimal– median-split method has been the only validated possibility to examine moderating effects with formative indicators (personal e-mail correspondence with Chin, 2004). This explains the method’s lasting popularity in PLS applications in marketing and management research (e.g., Avolio et al., 1999; Venkatesh & Morris, 2000; Duxburry & Higgins, 1991; Howell & Avolio, 1993; Lee & Tsang, 2001; Kleijnen et al., 2004). Furthermore, an additional advantage of the method lies in its potential to compare *entire* models across different moderator levels. In other words, a median-split analysis permits to compare mediating effects among the moderator subgroups and can, as such, reveal moderated mediation effects (James & Brett, 1984). This is especially interesting in the context of our study, for existing literature and qualitative research results did not enable us to specify hypothesized effects in detail (see chapter 4).

In order to apply the median-split method, first, for each (reflectively measured) moderator a summated scale was created. Averages were computed for each scale. Then, for each scale the median was computed and the sample was split into an above- and below-median group (cases with exact median values were excluded from the analysis).

Table 5.10 shows the ranges, medians, means and standard deviations of these average moderator scales.

Table 5.10: Descriptives of the moderator scales

	min	max	median	mean	s.d.
INNOVAT	1.50	5.00	3.75	3.67	0.68
RISKTAK	1.00	5.00	3.00	2.87	0.74
CROSSF	1.17	5.00	3.50	3.31	0.78
INFOCUS	2.00	5.00	4.00	4.08	0.65
INFOSUP	1.00	5.00	3.33	3.39	0.95
CENTRAL	1.00	4.00	2.00	2.19	0.76
INNOCUS	1.00	5.00	3.60	3.45	0.81
INNOSUP	1.00	5.00	3.00	2.99	0.89
CHAINCLIM	1.67	5.00	4.00	3.82	0.71

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Apparently, medians/means are all relatively high, except for the central, the risktak and the innosup constructs. These high scores might stem from hypothesis-guessing or evaluation apprehension by the survey respondents (Cook & Campbell, 1979). However, in the moderator analysis, these effects could be ignored since only values relative to the median point were taken into account.

Before analyses could be run, two problem areas of the median-split method had to be tackled first: the issue of statistical power and the equivalence of weights in the subgroups. Concerning power, we adopted the two more complex rules of thumb (one for R^2 s, and one for beta coefficients) that Green (1991) developed, based on the power-analytical work by Cohen (1988). These formulas yielded a minimum sample size of 31 to 60 for an $\alpha = 0.05$, power = 0.80, and medium-large effect sizes: see Appendix V). Since the average sample size of the subgroups was 67 (the smallest subgroup, low-infocus, consisting of 49 cases, the largest subgroup, low-risktak consisting of 86 cases) all subgroup sample sizes could be considered as adequate. The median-split analysis could hence be assumed to have a sufficient power level in the subgroups.

Besides the issue of power reduction, a second drawback of the median-split method concerns its assumption that underlying weights in the formation of the construct scores are approximately equivalent across subsamples (Bagozzi, 1994b; Chin 2000b). Yet, since construct scores are estimated in PLS using different weighted combinations in each subsample, differences in path coefficients can be caused by differences in latent construct composition. This is why in view of construct validity, equality of construct composition (equality of indicator weights) should be tested before separate subgroup PLS models can be compared. Carte & Russell (2003) accordingly advise to first perform Box's M tests per block of indicators. Box's M tests the assumption of homogeneity of covariance matrices ($=H_0$). Only if test results are insignificant, item covariance matrices can be assumed to be similar among the subsamples and a median-split analysis can be interpreted (Carte & Russell, 2003). Box's M tests were performed on the indicators of each construct in the hypothesized model and for every moderator-subgroup. Results indicated that inter-item covariance matrices of no single construct differed significantly ($p < 0.05$) between low- and high-groups, which suggests equal construct composition in the subsamples⁴¹.

⁴¹ In each PLS model indicators are weighted optimally in order to predict dependent variables (observed or latent variables, dependent on the measurement mode). Consequently, in the case of formative indicators, intra-block covariances are never taken into account in the estimation process (Chin, 1998a); in contrast, indicators are weighted to optimally predict the correlation between construct scores. Therefore, in the case of a formative mode equality of weights does not entirely parallel equality of loadings (the latter being tested by Box's M). In other words, testing homogeneity of covariances among items in a block does not prove equality of construct composition. Nonetheless, the methodological literature has, to our knowledge, never treated this issue (personal e-mail correspondence with Chin, 2005). We think probably a Chow test could shed light on equal construct composition across the different moderator groups. Still, as far as we know, this test has never been applied in this context. In addition, such tests have not yet been incorporated in the PLS software (personal e-mail correspondence with Chin, 2005).

After having ensured a sufficient power level and equal construct compositions, separate models for each subgroup were run in PLS-Graph3.0. For each model, 200 bootstrap resamplings (construct level sign change) were created. Standard error estimates were treated in a parametric sense via unpaired t-tests (with degrees of freedom = sample size low-group plus sample size high-group minus 2) to know the difference in path estimates between groups (Chin, 2000a; 2000b).

In Table 5.11 results of the moderator analysis are shown⁴². Columns indicate standardized beta weights for the structural relations, the last column shows the R^2 of SICap. Per moderator, results of the low-group and high-group models are shown, followed by the t-test difference results.

Before analyzing the moderator results, first additional unpaired t-tests were performed on PLS construct scores between the low- and high-group of every moderator. The t-tests indicated significant differences on some construct scores, for some moderators. Results of the median-split moderator analysis (see Table 5.11) should thus sometimes be interpreted as partly stemming from differences in the patterns of relationships among the constructs, and as partly stemming from different construct scores (Duxbury & Higgins, 1991). When significant differences were found on the construct scores, we explicitly report them.

Results in Table 5.11 will now be discussed in more depth. Mediation effects in the subgroup-models (moderated mediation) were studied applying the 'products of coefficients' approach (MacKinnon et al., 1995).

⁴² Although three significance levels have been indicated in the table, it is especially the 0.05 level that should be considered as the real cut-off value, since power has been examined for this confidence level only.

Table 5.11: Results of the moderator analysis

	Recog → Assim	Recog → Transf	Recog → Slicap	Assim → Transf	Assim → Slicap	Transf → Slicap	R ² Slicap
Unmoderated model (n=182)	0.683***	0.368***	0.175*	0.374***	0.268***	0.236**	0.353***
Moderated models							
Innovat Low (n=67); stand. β High (n=71); stand. β Difference: t (136)	0.707*** 0.784*** -12.98***	0.533*** 0.360** 9.23***	0.084 n.s. 0.423*** -17.73***	0.179 n.s. 0.401*** -12.01***	0.089 n.s. 0.128 n.s. -2.20*	0.436*** 0.202** 16.15***	0.307*** 0.471***
Rishtak Low (n=86); stand. β High (n=70); stand. β Difference: t (154)	0.744*** 0.742*** 0.43 n.s.	0.490*** 0.217* 19.62***	0.335** 0.068 n.s. 15.24***	0.289*** 0.458*** -12.15***	0.213** 0.352*** -9.82***	0.205* 0.223* -1.24 n.s.	0.460*** 0.328***
Infocus Low (n=49); stand. β High (n=60); stand. β Difference: t (107)	0.673*** 0.736*** -8.27***	0.135 n.s. 0.340* -8.93***	0.119 n.s. 0.208 n.s. -4.31**	0.656*** 0.485*** 8.05***	0.058 n.s. 0.470*** -22.15***	0.579*** -0.097 n.s. 32.96***	0.491*** 0.322***
Infosup Low (n=63); stand. β High (n=77); stand. β Difference: t (138)	0.753*** 0.718*** 6.68***	0.234* 0.392*** -9.38***	0.214* 0.246** -2.05*	0.577*** 0.433*** 9.49***	0.184 n.s. 0.334*** -8.76***	0.231* 0.225** 0.40 n.s.	0.488*** 0.525***
Central Low (n=50); stand. β High (n=80); stand. β Difference: t (128)	0.759*** 0.613*** 19.04***	0.432*** 0.398*** 2.11*	0.089 n.s. 0.284** -10.06***	0.476*** 0.317*** 10.34***	0.353** 0.260** 5.48***	0.185 n.s. 0.112 n.s. 3.56***	0.346*** 0.321***
Innocus Low (n=70); stand. β High (n=67); stand. β Difference: t (135)	0.741*** 0.714*** 4.45***	0.427*** 0.271** 9.49***	-0.037 n.s. 0.393*** -24.26***	0.346*** 0.537*** -12.16***	0.395*** 0.253*** 8.72***	0.391*** -0.031 n.s. 19.97***	0.473*** 0.334***
Innosup Low (n=61); stand. β High (n=63); stand. β Difference: t (122)	0.711*** 0.662*** 7.46***	0.525*** 0.294** 15.54***	0.249* 0.430** -10.32***	0.387*** 0.440** -3.63***	0.404*** 0.238** 9.62***	0.107 n.s. 0.101 n.s. 0.26 n.s.	0.488*** 0.470***
Chainclim Low (n=73); stand. β High (n=51); stand. β Difference: t (122)	0.648*** 0.740*** -13.56***	0.450*** 0.170 n.s. 14.18***	0.283** 0.214* 3.87***	0.324*** 0.565*** -13.22***	0.069 n.s. 0.420*** -22.14***	0.355*** 0.088 n.s. 16.61***	0.399*** 0.436***
Crossf Low (n=75); stand. β High (n=69); stand. β Difference: t (142)	0.518*** 0.641*** -7.75***	0.493*** 0.266*** 13.29***	0.120 n.s. 0.322*** -13.09***	0.165 n.s. 0.482*** -20.04***	0.083 n.s. 0.290*** -13.92***	0.395*** 0.160 n.s. 13.68***	0.270*** 0.452***

*Two-tailed significance: ***p < 0.001, **p < 0.01, *p < 0.05*

5.3.4.1 Innovativeness (RQ1)

In the case of high innovativeness, the direct effect of recog on Sicap is largely intensified and becomes very important. In addition, the direct effect of assim on Sicap increases, though remains insignificant. Finally, the effect of transf (in particular the mediating role for recog) is weakened but remains largely significant.

A comparison of both groups sheds further light on moderated mediation effects. In the low-group assimilation has neither a direct, neither a mediation role (recog on assim is significant, but assim on Sicap is insignificant). Transf serves as a full mediator, though only for recog (assim on transf is insignificant). In contrast, in the high group the mediating role of assim for recog is enhanced, but still remains negligible. Transf fully mediates the effects of assim and partially mediates the effects of recog through assim.

In conclusion, an innovative culture increases the level of Sicap and fosters the use of deliberate ACAP learning mechanisms (higher construct values). Moreover, deliberate learning mechanisms resulted in a higher variance explained of Sicap. In other words, deliberate learning mechanisms to foster Sicap seem to be more effective in organizations characterized by a highly innovative culture. A closer inspection of the results demonstrates that particularly recog seems key in this. Innovativeness largely intensifies the direct effect of recog on Sicap. In addition, transf becomes less effective, but still plays an important role as a full mediator for assim and a partial mediator for recog. The implementation of transf hence seems still useful in fostering Sicap, being the catalyst of, in particular, assim. In contrast, a non-innovative culture lowers Sicap and, moreover, curbs the use of deliberate ACAP learning mechanisms (lower construct values) and their effectiveness. A lack of informal RACAP capacity makes transf practices a necessary condition to leverage the effects of formal recog practices. Still, our findings suggest that a lack of innovativeness turns the implementation of assim useless; assim has no effect whatsoever. In order to gain any effect of assim an innovative culture is apparently required.

5.3.4.2 Risk taking(RQ2)

As risk taking did not influence the height of the recog- and assim- construct scores, it is in fact the pattern of relationships between recog, assim and Sicap which is changed by the level of risk taking. Firstly, risk taking strengthens the mediating role of assim; the direct effect of recog on Sicap lowers to insignificance but the effect of assim on Sicap is largely sharpened. Secondly, even though the high-group scored significantly higher on the transf-construct, the effect of transf on Sicap did not significantly differ in comparison to the low-group. In the case of high risk taking, the mediating role of transf for recog decreased whereas its mediating role for assim was enhanced. A remarkable findings is however that although organizations characterized by a high risk taking culture scored significantly higher on the level of Sicap, deliberate learning mechanisms are apparently less effective in fostering Sicap (lower R^2).

In conclusion, comparing both groups reveals that the level of risk taking particularly strengthens the effect/role of assimilation; in the high-risktaking-group assimilation becomes a full mediator for recog (while only being a partial mediator in the low-risktaking-group). In analogy with the effects of innovativeness, the key difference centers on assim.

5.3.4.3 Cross-functional information dissemination (RQ3)

T-tests on the construct scores demonstrated that the high-crossf-group scored significantly higher on Sicap. Moreover, deliberate learning mechanisms (apparently only those for recog and assim) seem to be more effective in this case (higher R^2 of Sicap).

The positive effects of crossf are particularly observable on the effectiveness of both recog and assim. In the high-crossf-group not only the direct effect of recog on Sicap is dramatically sharpened, the effect of assim on Sicap is largely enhanced as well. Likewise, the mediating role of assim for recog is intensified. It is however important to remark that the high-crossf-group achieved significantly higher scores on both these constructs. In contrast to the positive effects of crossf on the impact of recog and assim, crossf largely reduces the impact of transf on Sicap (to a level of insignificance). This is even more true since the high-crossf-group achieved significantly higher scores on the transf construct.

In conclusion, in the case of low cross-functional information dissemination, a pattern similar to this of low innovativeness can be discerned. More specifically, when crossf is low, transf serves as a full mediator, yet only for recog. Assim has no effect whatsoever. When organizations lack the capacity to disseminate market information across different functions any attempt to increase assim will hence be in vein.

5.3.4.4 Information from customers (RQ4)

A high level of infocus enhances the direct effect of recog on Sicap, though it remains insignificant. In particular, the direct effect of assim is heightened, as is its mediating role for recog. Moreover, the increased effectiveness of assim can not be caused by different assim levels since both groups did not significantly differ on their construct score. In the high infocus group, the effect of transf on Sicap considerably diminishes and even drops to insignificance. This weakening effect is remarkable, all the more since the high-infocus-group scored significantly higher on the transf-construct.

As regards the effectiveness of deliberate learning mechanisms in stimulating Sicap, the same conclusions apply to this moderator as to risk taking: although the high-infocus-group scored significantly better on Sicap, the effectiveness of deliberate learning mechanisms is lower in this group (lower R^2). This might be explained by the insignificance of transf in both cases.

In conclusion, a high level of infocus enhances the (full) mediating role of assim for recog and eliminates the role/effect of transf (becomes insignificant). Although companies with high infocus apply more transf practices, their effect is completely ignorable. In contrast, in the case of low levels of infocus, transf plays a prominent role in (fully) mediating the effects of assimilation, which in turn fully channels the effects of recog. Unfortunately, organizations with low infocus do not seem to pay much attention to this category of learning mechanisms.

5.3.4.5 Information from suppliers (RQ5)

A comparison of the effects of infosup with the effects of the previously studied moderators indicates that the effects of infosup are less drastic. Firstly, even though the level of infosup does not influence the construct level of recog, it augments the direct effect of recog on Sicap. A comparison of both groups shows furthermore that it is in particular the effect of assim on Sicap which is intensified by a high level of infosup

(although *assim* does not mediate *recog* more strongly). This can partly be explained by the higher score the high-*infosup*-group achieved on *assim*. As regards *transf*, both groups gained equal scores and the effect of *transf* on *SIcap* did not differ significantly either (in both groups significant). Furthermore, *infosup* did not affect the level of *SIcap*. Still, deliberate learning mechanisms prove to be more effective in the case of high *infosup* (higher R^2).

Conclusions are hence more or less analogue to the *infocus* construct, though the pattern found here is less pronounced. Organizations getting much information from their suppliers pay more attention to PACAP mechanisms (*recog* and *assim*) and gain, in turn, far more results of them in terms of an increase in *SIcap*. Deliberate ACAP mechanisms seem to be extremely effective ($R^2=0.525$) in this case. Both the effect of *recog* and *assim* are intensified. *Trans* practices prove to remain useful, independent of the level of *infosup*.

5.3.4.6 Centralization(RQ7)

A highly centralized structure especially increases the direct effect of *recog* on *SIcap*. This is even more true since both the high-central and the low-central-group did not significantly differ on their *recog*-scores. Furthermore, though both groups scored similarly on the *assim* construct, the effect of *assim* on *SIcap* is weakened in the high-group (but remains important), as is its mediating effect for *recog*. Finally, centralization decreases the effect of *transf* on *SIcap*, despite the high-central-group's higher score on *transf*. The mediating effects of *transf* for both *recog* and *assim* are reduced in the high-central-group as well.

Highly centralized organizations achieved higher levels on *SIcap*. Still, in decentralized organizations deliberate learning mechanisms are a little bit more effective, the difference in effectiveness in comparison to centralized organizations is nevertheless negligible.

In conclusion, in a highly centralized organization both *recog* and *assim* seem useful mechanisms for stimulating *SIcap*. Especially the large direct effect of *recog* is remarkable (the full mediation of *recog* by *assim* apparent in a decentralized structure disappears). A centralized structure will apparently more easily lift the direct effects of *recog*.

5.3.4.7 Innovation stimulus from customers (RQ8)

The direct effect of *recog* on *SIcap* is considerably enhanced in the case of a high level of *innocus*; it is increased from a low, insignificant value in the low-*innocus*-group to a considerable, significant value in the high-*innocus*-group. This effect might also be explained by the high-*innocus*-group's higher score on the *recog* construct. Both groups scored however equally on the *assim* and *transf* constructs. This even strengthens the observation that high *innocus* attenuates the effect of *assim* on *SIcap* (the effect did nonetheless remain considerable). Furthermore, it reduces the mediating role of *assim* for *recog*. Another important result relates to *transf*; the effect of *transf* on *SIcap* largely drops to a (negative) non-significant value in the high-*innocus*-group.

Furthermore, although the high-*innocus*-group scored significantly higher on the *SIcap* construct than did the low-*innocus*-group, it is the latter case in which deliberate learning mechanisms gained effectiveness. In analogy with the results for the moderators risk taking and *infocus*, the lower R^2 of the high-*innocus*-group is probably due to the drop in the effectiveness of *transf*.

5.3.4.8 Innovation stimulus from suppliers (RQ9)

Given the fact that both groups scored similarly on all constructs, differences revealed by the moderator analysis can be entirely explained in terms of differences in the patterns of structural relationships. The comparison of both groups shows that the direct effect of recog on Sicap strongly increases in the case of high innosup. Yet, in this case the effect of assim on Sicap falls, but still remains important. Also, the mediating role of assim for recog is weakened by innosup. As regards the effect of transf on Sicap, no significant difference could be detected between the high-innosup and the low-innosup group. Innosup hence clearly impacts on the learning mechanisms for the PACAP cycle.

Both groups did not significantly differ on their Sicap scores. The variance explained in Sicap by the different deliberate learning mechanisms neither did.

5.3.4.9 Chain climate (RQ10)

Both groups gained similar scores on all constructs, except for recog on which the high-chainclim-group scored significantly higher. Yet, despite this group's higher score on recog, a lower direct effect of recog on Sicap could be observed (though still significant). Nevertheless, in the high-group the effect of assim on Sicap is increased to a large, significant value (while being insignificant in the low-group). Also the mediating effect of assim for recog is considerably larger in the high-chainclim-group. Concerning the (mediating) effect of transf, the influence of a favorable chainclim is however negative. Whereas transf is an important mediator in the low-chainclim-group, the effect of transf on Sicap dramatically falls to non-significance in the high-chainclim-group.

Even though no difference on Sicap level could be detected between both groups, deliberate learning mechanisms explain more variance in Sicap in the case of a favorable chain climate.

In this chapter, we analyzed the data of quantitative research phase. The results of the measurement model demonstrated that all reflectively specified constructs (the moderators and the dependent variable) are reliable and valid. In addition, mediation tests showed the correctness of a partial mediation model. A further analysis of this model revealed several significant path-breaking focus areas in recognition, assimilation and transformation that firms may stimulate by deliberate strategic learning mechanisms. Furthermore, the structural results indicate important mediating mechanisms that channel the effects of deliberate strategic learning mechanisms for recognition, in particular. Overall, deliberate strategic learning mechanisms for assimilation seem the most crucial factor to foster Sicap. Finally, the results of the moderator analysis indicated the occurrence of important moderated mediation effects.

The straight results we derived from these analyses will now be discussed in chapter 6.

CHAPTER 6

DISCUSSION OF THE FINDINGS

In this section the major findings of the QUAN phase will be further discussed. As indicated in the methodological chapter, the qualitative findings were sometimes used to help interpreting some of the quantitative results. This re-interpretation of the qualitative findings revealed once more the value of mixed method research.

6.1 RELEVANT PATH-BREAKING FOCUS AREAS

Our quantitative findings provided early empirical confirmation of the role deliberate strategic learning mechanisms for recognition, assimilation and transformation may play in fostering SIcap. We will discuss the relevant path-breaking focus areas for the three ACAP dimensions.

6.1.1 Deliberate strategic learning mechanism for recognition

The significance of the items ‘insight’, recog1, 10 and 13 (see Appendix II for the corresponding questions) indicate that strategic innovators establish deliberate strategic learning mechanisms to develop more and deeper insight into their current customers. For example, a food ingredients supplier remarked: “*it [the creation of a SI initiative] is not reacting to a crisis, neither is it pure proactiveness. Instead, it is a sort of logical implication of carefully listening to your customers and mapping their needs to your own competences*”. However, strategic innovators’ efforts to develop more customer insight largely surpassed the activity of—simply— ‘hearing the voice of the customer’ (Day, 1999). More seems required that just asking customers what they currently value (Flint et al., 2002). In fact, the significance of the indicators ‘insight’, recog1, recog10 and recog13 fit the more recent insights of the market orientation literature.

Essentially founded on the cultural definition by Narver & Slater (1990) and the behavioural (market information processing) definition by Kohli & Jaworski (1990), market orientation has evolved towards an extensively studied marketing construct (Hult et al., 2005; Han et al., 1998; Day, 1994; Deshpandé et al., 1993). Recent pleas in the market orientation literature have however attributed more proactive shades of meaning to market orientation, which stand in sharp contrast to the prevailing reactive, or ‘market-driven’ interpretation of market orientation (Jaworski et al., 2000).

More specifically, Slater & Narver (1998), in response to the attacks on their reactive notion of ‘market orientation’, later distinguish between ‘responsive’ and ‘proactive’ market orientation. Whereas a responsive approach is customer led, focusing on the short-term satisfaction of *expressed* customer needs (reactive), a proactive market orientation is longer term in focus and enables an organization to proactively lead and anticipate customers by aiming towards the satisfaction of their *latent* needs. A focus on latent needs prevents price competition, so they argue (Slater & Narver, 1998). Latent needs are by definition impossible for the customer to articulate, and what can not be articulated can

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evidently not be articulated to competitors either (Slater & Narver, 1999). Narver et al. (2004) furthermore demonstrated that proactive approaches will lead to more innovative products and services, and to more new product success. Authors endorsing this viewpoint keep stressing the importance of market sensing but emphasis is put on a *proactive* market interpretation (Lynn et al., 1996; Johnson, 1999)⁴³.

The high value of recog10 (mechanisms that stimulate the consultation of the most innovative customers for innovative ideas) confirms the importance of the ‘lead-user technique’ to uncover and visualize latent and unexpressed market needs (Amit & Schoemaker, 1993) and to discover new customer solutions (Slater & Narver, 1998). Our findings indicate that lead users can be used as “a window to the future” instead of an “anchor in the past” (Slater & Narver, 1998: 1003), in particular for industrial markets (von Hippel, 1988). Lead users face new market needs earlier than do the majority of customers. Therefore, they may generate innovations that substantially differ from existing market offers (Lüthje & Herstatt, 2004). The significance of recog10 indicates that the usefulness of the lead user technique extends well beyond the area of product development (Sharma et al., 2001). Kodama (2002) found that dialogue and interaction with innovative customers (sophisticated, well-educated and experienced customers) may lead to new business models as well. The QUAL2 findings indeed showed that strategic innovators use their customers for new idea generation, or for further development and refinement of their SI initiatives by means of pilots.

The QUAN results (‘insight’) furthermore confirm that the study of the different stages in the buyer experience process (from purchase to disposal) can shed light on how a product/service may provide value to the customer (Kim & Mauborgne, 2000). “whatever the customer does not do, or does not do well, represents a business opportunity, for oneself – or for one’s competitors” (Ramirez, 1999: 59). Indeed, to acquire new or latent customer needs, firms with a proactive market orientation record and observe customers closely in their use of products or services (Slater & Narver, 1998). Davenport et al. (2001) found that firms excelling in customer knowledge management focused explicitly on these

⁴³ Still more recently, the market orientation literature has made a distinction between a ‘market driven’ and ‘market driving’ market orientation (e.g., Carrillat et al., 2004). The former centres on ‘keeping the status quo’: a focus on existing customer preferences (Day, 1999) within an existing market structure (Jaworski et al., 2000). In contrast, driving markets implies *not* accepting the present market structure and/or market behavior (Jaworski et al., 2000). Kumar et al. (2000) posit that market driving implies a substantially new customer value proposition and business system. As market drivers address deep-seated, latent or emerging customer needs (Kumar et al., 2000), a market driving approach logically involves a proactive market orientation (Narver et al., 2004). Since the type of business logic adopted is reflected in the type of market orientation applied (Tuominen et al., 2004), it is especially market-driving organizations that have been argued to be more likely to adopt preemptive strategic maneuvers (Johnson et al., 2003) and to propose radically new offerings valued by customers (Carrillat et al., 2004; Johnson et al., 2003). Companies acting as ‘market drivers’ revolutionize the industry and change the rules of the game (Kumar et al., 2000). Hence, the market driving approach exceeds the –traditional– concept of market orientation, and rather fits our conceptualization of SI (see chapter 1).

'human data'. Attentive listening is needed to decode these observations and customer stories (Day, 2002). This is because research indicates that the formation of new customer preferences takes place through the customer's engagement with specific products or concepts (Hamel & Prahalad, 1994b). The perceived value of a product or service may moreover change over time, through its use (van der Haar et al., 2001). New value positions can then be discovered by linking data about these different buyer experience stages to different utility levers (e.g., convenience, productivity) (Kim & Mauborgne, 2000).

In addition to better customer insight, strategic innovators, with a proactive market orientation, scan the market more broadly (Slater & Narver, 1998). The study of non-customers (recog13) prevents the path dependency implied by a too narrow focus on existing customers (Danneels, 2003). The study of non-customers prevents a 'contraction of the opportunity horizon' (Hamel & Prahalad, 1994b) and may reveal new value propositions. For example, a printer remarked: "*we focus on non-customers, but just to get new ideas of serving our customers differently. Then we target our existing customers with cross- and deep-selling techniques*".

Furthermore, since customers periodically change what they value, suppliers should anticipate customers' desired value change, if only to retain their current customers (Flint et al., 2002). Flint et al. (2002) make a plea for the importance of a customer-oriented culture (Slater & Narver, 1995) and a marketing information system that is customer-value oriented, including information about customers' experiences and desired customer value changes. Proactive marketers that actively influence customers' desired value changes may not only help customers to interpret, they also arm themselves against expected environmental changes (Flint et al., 2002). Stimulating the study of future customer needs (recog1) and the effects changes in the business environment may exert on customer needs (recog3 incorporated in 'insight'), proved indeed significant deliberate strategic learning mechanisms.

Yet, contrary to what was expected, deliberate strategic learning mechanisms that stimulate the development of a better insight into current and future (direct) customer needs and behavior are of more importance than do mechanisms targeting a deeper knowledge of end customers, other industries or of more general, macro-level tendencies.

Some deviant citations of the QUAL2-phase, which did not seem to structure the qualitative findings at first glance, proved however useful when re-inspecting in light of these quantitative findings.

Although some interviewees indicated the value of studying the end customer (recog12), this was often done with the view of better satisfying the needs of the direct customer. For some upstream suppliers the end customer is simply perceived as 'too far away'. The distance to the end market can be so large that a) a study of the end customers becomes inefficient, or b) irrelevant. For example, whereas Procter & Gamble had been targeting their market research efforts on end customers in the 1980s, it shifted its focus on large retailers because of their growing concentration (Davenport et al., 2001). Others mentioned another reason. A truck & trailer supplier: "*the question is: how far can you go, and how far do you want to go without simply taking over the function of your direct customer. One rule: do never interfere with his business, don't poach on his territory*". Much study on the

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end-customer may hence give direct customers the impression of a coming forward-integration move. A food ingredients supplier endorsed this view by noting that the direct customer should never get the impression the supplier wants to jump across, wants to make shortcuts in the chain. Of course, this is highly dependent on the degree of market fragmentation. Both the functional food and the truck & trailer industry are very professional industries, where OEMs keep on rationalizing their supplier base. A supplier taking over the role of one of its customers (e.g., responsible of 40% of his total returns) exposes itself to a very large risk. All the SI initiatives studied (in each of the five industries) were indeed built 'around' the existing business; they were linked to an existing product or service. For example a printer noted: *"we do much things that are 'unusual' or 'strange' for a printer to do, but we always try to involve a graphical product in it"*. Interviewees mentioned two reasons for this. First, traditional business is still needed to spread risks. Secondly, for many it is a credibility issue to create the image towards other industry parties (incl. customers) to remain an insider of the traditional industry.

As regards the study of different industries (recog11), the QUAL2-findings indicated that when other industries were studied, these industries were still closely related to the traditional industry. For example, TMS suppliers study the industry of in-car telematics and truck & trailer parties study the vehicle insurance industry. Perhaps, these industries were not considered as 'different industries', but interpreted as different segments or evolutions of the traditional industry. The underlying cause of the insignificant result for this indicator might also be attributed to the credibility issue mentioned above. In fact, in a business-to-business context the buyer's decision is motivated by his belief that the value proposition offered by a supplier (perceived value) will positively affect its own business (Woodall, 2003). Bowman & Ambrosini (2000) however argue that this belief is in itself rooted in a wider set of beliefs that may in turn be influenced by the industry recipe. A buyer's perception of how his firm competes will thus influence his belief in the value creating potential of an offering. Possibly, suppliers may feel that studying other industries may produce new business ideas and value propositions that deviate too much from the customer's business perception. In this way, the problem of mental inertia moves in fact from the supplier to the customer.

The QUAN findings also pointed to the limited value of general macro-level or societal information ('envinfo' and recog2). General market information is often provided by independent market information suppliers (e.g., newspaper articles, trade magazine reports). Anand & Peterson (2000) found that these general market information suppliers are important media through which producers observe each other and other market participants. The scope of the information provided restrains actors' focus of attention. In this way, participants 'cognize' their competitive fields by all receiving and interpreting this same information. In this sense the study of general macro-level information may reinforce industry recipes, path dependencies and do consequently restrain market participants from the creation of SI initiatives. Following Dimaggio & Powell's (1983) institutional theory, it could hence be argued that this information reflects common industry knowledge and will hence enhance chances of mimetic strategic behavior, instead of promoting a contravention to the industry rules of the game. For example, Dimaggio & Powell (1983) hypothesized that the greater managers' participation in trade and professional associations, the more likely the organization will imitate other organizations

in the industry. In addition, most of this macro-level information is gathered by means of desk research. Moreover, this desk research is often performed by the marketing department. A second reason of the insignificant result may hence be found in the low value interviewees attributed to both desk research and the role of the (corporate) marketing department in the creation of SI initiatives (see chapter 4).

In conclusion, findings only partly confirmed the ideas put forward in the SI literature. On the one hand, findings corroborated the proposition that companies have to develop a deep insight into customer needs and priorities in order to create new and substantially superior customer value (Markides, 1997; Kim & Mauborgne, 1997). On the other, sceptics' warnings against the blinding effects of studying the existing value system (see e.g., Christensen & Bower, 1996; Hamel & Prahalad, 1994; Zhou et al., 2005; Hamel & Getz, 2004) could not be confirmed. In fact, we found evidence of Danneels' (2003) empirical results. Danneels (2003) concludes that a tight and loose coupling with existing customers is no dichotomy (as often presented in the literature) but that both are reconcilable.

6.1.2 Deliberate strategic learning mechanisms for assimilation

In general, QUAN-results regarding the assim-indicators seem to support the insights of extant sensemaking literature (e.g., Louis & Sutton, 1991). Our findings furthermore corroborate the value deliberate strategic learning mechanisms may have in triggering path-breaking cognition. In this respect, further evidence is provided for Barr et al.'s (1992) empirical findings that strategically proactive organizations stay open to *continuous* adjustments to their mental frameworks. The value deliberate efforts may have for sensemaking and changing mental frameworks has indeed already been exemplified in the literature (e.g., Thomas et al., 2001; Zollo & Winter, 2002).

More specifically, the results illustrate how strategic innovators do invest in deliberate strategic learning mechanisms to identify and discuss their implicit mental models of the market (Day, 2002). The significance of *assim2*, *assim3* and *assim5* (see Appendix II for the corresponding questions) shows that a stimulation of critical reflections on the market, customers and the marketing approach are to be considered as relevant path-breaking areas in the creation of SIcap. This finding validates Slater & Narver's (1995) proposition that exposing new information to multiple interpretations and holding constructive discussions on long-held assumptions about customers and markets leads to a redefinition of the business in a frame-breaking way. In this sense, the QUAN results also substantiate arguments developed in the literature on SI regarding the importance of questioning assumptions that the firm has about its customers (Markides, 2004b) and its marketing strategy (e.g., Hamel & Getz, 2004; Slywotsky, 1996).

Already in 1975, Schon advised companies to "be effective at shared inquiry". The significance of the indicators *assim1* and *assim5* sheds further light on the value that *collective* critical reflections and discussions may have for changing cognitive frameworks (Kuwada, 1998). The findings indicate how strategic innovators seem to put high emphasis on deep internal dialogue (Schein, 1993).

Some authors have posited the beneficial effects of codifying reflections and understandings of action-performance implications in written (ICT-)tools. For example,

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Nonaka (1994) and Day (2002) point to its value for knowledge diffusion, while Zollo & Winter (2002) stress the learning effects of the codification process itself. In fact, assim6 tackled the aspect of codifying ‘know-why’ knowledge (Zollo & Winter, 2002).

Yet, the effect of indicator assim6 proved nonsignificant. This result is not surprising since this item had originally not been included in the index, based on the QUAL2 findings (see chapter 4). It was added as a result of the pre-testing procedure (Delphi-round), where certain persons of the steering committee insisted upon the inclusion of this item. Although the qualitative research had not revealed this aspect as being crucial, we did add this to the index since being not inclusive is worse than including irrelevant items in index construction with formative items (Diamantopoulos & Winklhofer, 2001).

The nonsignificance of assim6 indicates that stimulating the path-breaking elements in assimilation capacity requires in particular the stimulation of interpersonal discussion and reflection upon customers/markets, more than it does the structured filing of these reflections. A better storing or filing system may facilitate the use of market knowledge needed for innovation, but it is the sensemaking system in itself that has a direct link to a firm’s innovation capacity (Dougherty et al., 2000).

First of all, codification implies considerable additional costs, such as time, resources and managerial attention. For example, research by Haas & Hansen (2005) showed that knowledge flows in the form of electronic documents may sometimes hurt competitive performance. For highly experienced persons, they argue, the additional search costs that the consultation of these digital documents implies is not compensated for by the potential learning effects of it. This reason was also emphasized in the QUAL2 findings. Although some strategic innovators did make attempts to store critical market insights and market lessons learnt throughout prior SI initiatives, many interviewees were (literally) laughing away the idea of actually *consulting* the intranet for these purposes.

Furthermore, although IT systems may be used to capture useful insights, some authors criticized their user-friendliness. Often, incompatible formats, nonintegrated databases, or software impediments prevent people from actually retrieving the information (Day, 2002). A similar problem of the non-effectiveness of intranet-sites was reported in the context of CRM-programs (Campbell, 2003).

A final reason could be found in literature on high velocity markets. For example, Bogner & Barr (2000) argue that fast changing environmental conditions make reliance on experience and past reflections far less useful. Instead, the use of real-time information is advised (cfr. Eisenhardt, 1989; Bogner & Barr, 2000). This information is not only richer and results in faster feedback (Eisenhardt, 1989a), but through its use the negative (path-dependent) consequences associated with the use of historic information may be circumvented (Bogner & Barr, 2000).

6.1.3 Deliberate strategic learning mechanisms for transformation

The QUAN-results regarding the transf-indicators generally confirmed the relevant focus areas that were identified during the QUAL2-phase. Deliberate strategic learning mechanisms that foster transformation capacity targeted the following areas: adapting the organizational structure (trans1), adapting procedures (trans5), changing the way of working (trans6), preventing organizational chaos (trans3), and supporting new initiatives even to the detriment of existing business (trans4). The final element corresponds to the

kind of defensive behavior strategic innovators deliberately try to circumvent. Firms' unwillingness to cannibalize their prior investments until some entrant changes the rules of the game is regarded as a large bottleneck by incumbent firms (Christensen, 1997). The significance of trans4 backs Chandy & Tellis' (1998) findings that a firm's willingness to cannibalize leads to radical innovation.

The high significance of trans1 validates insights developed in the SI literature. To increase a company's ability to create (or cope with) disruptive innovations, Christensen & Overdorf (2000) have indeed stressed the value of creating new organizational structures in which new procedures can be developed. They furthermore point to the value of new team boundaries that change the ways of working within the organization. A re-inspection of the results of QUAL2 suggests that trans1 is perhaps positioned at a more fundamental level than the other dimensions. In this way, it may be considered as a necessary condition to leverage the effects of deliberate strategic learning mechanisms targeting the other path-breaking areas.

Yet, for deliberate strategic learning mechanisms fostering the replacement of a set of organizational skills/competencies (trans2) the analysis showed a nonsignificant result. The QUAL2 findings and the insights developed in the SI literature can shed more light on the potential grounds of this result.

First, as we explained in chapter 1, one the main differences between contributions on strategic renewal versus those on SI is whether the degree of frame-breaking novelty associated with an innovation is to be considered vis-à-vis the existing competence base, or vis-à-vis the market and the industry rules of the game. Yet, change inside the organization does not necessarily imply innovation in market terms. Alternatively, the fact whether competencies need developing, changing, stretching, reconfiguring or mere exploiting when deviating from, or changing, the rules of the game, has not been clearly tackled in SI discourses. Lilien et al. (2002) found however that breakthrough innovations seem to fit organizational competencies as well as do more incremental innovations. Moreover, initiatives that fit existing competencies have a greater chance of acceptance and funding (Lilien et al., 2002), and will therefore pass more easily the organizational 'screening' barrier. This brings further evidence to the argument that strategic innovators will be more inclined to leverage than to completely transform their existing competence base when creating a SI initiative. Baden-Fuller's (1995) insights on SI may further clarify this issue.

In his framework, Baden-Fuller (1995) explicitly distinguishes between external and internal innovation effects, asserting that "what is frame-breaking to the firm isn't necessarily a challenge to the industry recipe" (: S10). In his 'staircase of innovation' innovations producing large external effects while imposing only small internal effects are positioned at the top.

In this respect, the concept of 'architectural innovation' (Henderson & Clark, 1990) may bring valuable insights to the SI literature. Although born in a research tradition of technological and product innovation, architectural innovation shares the idea of SI that even modest internal changes can have dramatic competitive consequences. Henderson & Clark's (1990) idea is that, instead of improving components within a stable architecture, the way components are integrated (i.e. their architecture) may be changed too, leaving intact the core design concepts (i.e. the component knowledge). These authors themselves have posited the future research idea that their concepts could stretch beyond product

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development and design to the strategic, firm level, in the sense that other tasks performed by an organization could also be described as “a series of interlinked components within a relatively stable framework” (1990: 28). This idea of novel competence configurations has in fact been put into concrete empirical research by Galunic & Rodan (1998) and Galunic & Eisenhardt (2001) in the context of multi-business firms.

The idea to reconfigure and leverage existing resources in view of new value propositions and offerings has been echoed in more recent contributions to the resource-based view as well. For example, Peteraf & Bergen (2003) have asserted that for competitive advantage, it is not rareness of resources in terms of resource *type* that matters, but rareness in resource *functionality*.

Second, a reconfiguration or rebundling of competencies may well extend beyond the organizational border. Hitt et al. (2000) found that firms in developed markets (such as the Dutch firms in our sample) select alliance partners in order to leverage their own competencies. Therefore, partner selection is primarily based on partners' unique competencies and market knowledge or access. The literature on relationship marketing has since long propagated the value of combining competencies and experience inter-organizationally with the view of joint value creation (e.g., Ford et al., 1998; Håkansson et al., 1999; Day, 2000). The insignificance of trans2 hence brings the issue of ‘value co-production’ (Ramírez, 1999), or the creation of synergistic effects through bundling the different value-creating activities of different parties into one ‘value constellation’ (Normann & Ramírez, 1993), to the center stage of SI.

Continuing on this line of argument, some authors have even argued that the possibility of inter-organizational ways of competence leverage puts the weapons in the hands of incumbents. In the context of product innovation, Mitchell & Singh (1993: 175) found for example that “when many supporting assets retain their value despite major core product innovation, leading industry incumbents possess very strong advantages relative to newcomers, no matter how innovative”. Likewise, Markides & Geroski's (2003a,b) results on radical innovation in B2C markets may be portable to the domain of SI. These scholars point to an incumbent's capacity to leverage its existing competencies and experience (e.g. deeper pockets to invest in manufacturing, distribution and logistics, market credibility, after-sales service, strong marketing skills) in order to have an existing, premature innovation of a pioneer expand into a mass market. Their findings show that especially established companies have a competitive advantage over pioneers in this activity. In similar vein, Christensen et al. (1998) have doubted the existence of first-mover advantages in fast-changing industries. Even though we could not find further evidence for Markides & Geroski's (2003a,b) arguments, the QUAL2 findings did confirm that the combination of internal competencies with those of other parties was a prominent aspect in SI initiatives.

Third, strategic innovators furthermore argued during the QUAL2-phase that in the case external competence combinations do not suffice and new competencies have to be integrated within the existing organization, they often hire people from different industries, with different experiences. These newly hired people are then mixed with internal members, for example to form a temporary project team. In this way, competencies are ‘added’ instead of ‘replaced’. The combination of newly attracted skills with existing skills hence leverages existing competencies into a reconfiguration.

Finally, focusing on a study of *SI initiatives*, it is plausible to expect that *SI initiatives* in this premature stadium of *SI*, exist *alongside* the traditional business. Moreover, Ramírez (1999) argues that even if new value-creation initiatives do succeed and do ‘take hold’, they are not likely to automatically replace existing ones.

6.2 PARTIAL MEDIATION EFFECTS

The QUAN results point to the value of deliberate strategic learning mechanisms for the creation of *SIcap*. 35% of variance in *SIcap* is explained by deliberate strategic learning mechanisms for recognition, assimilation and transformation. This is regarded as a large effect in behavioral science (Cohen et al., 2003; Falk & Miller, 1992), considering the potential impact of numerous other organizational and environmental characteristics and conditions. All three categories of learning mechanisms show a considerable association with *SIcap* (path coefficients).

The structural results confirm the three hypotheses (H1, H2 and H3, see chapter 4). First, our results point to important mediating mechanisms through deliberate strategic learning mechanisms for assimilation and transformation. The QUAN analysis hence confirmed the insights generated through the conceptual study of the sensemaking literature (chapter 2) and the analysis of the QUAL2 findings (chapter 4). Our results validate Thomas et al.’s (1993) proposition that noticing external information facilitates strategic action through its effects on strategic interpretation. In other words, deliberately increasing recognition capacity will affect the outcome variable *SIcap* to a larger extent on the condition assimilation and transformation capacity are triggered as well. In turn, fostering assimilation capacity will more intensively affect the outcome variable *SIcap* if transformation capacity is triggered. In this respect, our findings empirically validate Zahra & George’s (2002) argument that for the creation of *ACAP* as a coherent dynamic capability, all dimensions play complementary roles since they build upon each other. The development of recognition, assimilation and transformation capacity respectively, can be considered as differential steps in the learning process (Lane & Lubatkin, 1998).

Second, the confirmation of H1, H2 and H3 (and the mediation analysis in chapter 5, section 5.3.2, Table 5.7 in particular) showed that these mediation effects are only partial in nature.

Building upon the line of reasoning that we developed in chapter 2 and chapter 4 (the idiosyncrasy of capabilities and the existence of path dependencies) the occurrence of partial mediation is probably caused by the firm’s existing ‘stocks’ of assimilation and transformation capacity. During the QUAL2-phase, interviewees mentioned the possibility of learning effects in the development of recognition, assimilation and transformation capacity. Over time, stimulation may trigger a process where recognition, assimilation and transformation capacity become gradually embedded within the ordinary, daily way of operating, in turn diminishing the need for any additional deliberate stimulation. In this respect, past experience may enable organizations to sometimes circumvent the systematic assimilation and transformation *stimulation* stages. Even the linearity of the *ACAP stages in themselves* may become debatable. Van den Bosch et al. (2003) indeed mentioned the need for a dynamic of model for the *ACAP* construct. As Weick (2002) asserted: since

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cognitions are manifested in actions, cognition starts and begins with action. Or, sensemaking both precedes and follows decision making (Maitlis, 2005). The assumed linear sequence of the different ACAP stages, and the deliberate stimulation of these ACAP stages, hence becomes questionable, and multiple nonlinear (i.e. positive and negative) feedback loops should be taken into consideration (see e.g., Daft & Weick, 1984; Day & Schoemaker, 2004b). Similarly, recent observations on the innovation process blur the sequential model (e.g., Amis et al., 2004). Due to delays, reversals and oscillations, innovation may be considered as involving complex feedback structures in which the search and implementation stages are intertwined (Koput, 1997). Feedback effects and shortcuts are hence likely to occur among the different independent variables mutually, and among the independent variables and the dependent variable.

Our findings do not only confirm the occurrence of partial mediation effects, they furthermore indicate an unexpected difference in effect size between deliberate strategic learning mechanisms for assimilation and those for transformation (see chapter 5, section 5.3.3.2). In the concrete, when the three categories of deliberate strategic learning mechanisms are studied in isolation, deliberate strategic learning mechanisms for recognition show the smallest contribution to SIcap in and of their own, pointing to the value of deliberate strategic learning mechanisms for assimilation and transformation to channel their effects. In addition, the effect size of deliberate strategic learning mechanisms for assimilation surpasses the effect size of deliberate strategic learning mechanisms for transformation, hence suggesting the superiority of the former as a stimulator of SIcap. This difference in effect size is a remarkable finding.

At first sight, this finding may suggest the existence of ‘knowledge-enhancing use’ (Menon & Varadarajan, 1992). This means that a time lag exists between the knowledge creation and the actual behavioral change following it. Slater & Narver (1995) argue that in the case of frame-breaking, generative learning (i.e. a redefinition of the way business is done) the change of managerial perspectives (assimilation) may form the foundation for a radical behavioral change (transformation), though this behavioral change will only take place at some point in the future. In analogy to our research, we may posit that deliberate strategic learning mechanisms for assimilation capacity will lead to SIcap through the behavioral effects of a deliberate stimulation of transformation capacity. Yet, transformation capacity may be developed at some point later in time, which would diminish the immediate need for deliberate strategic learning mechanisms for transformation. As illustrated in chapter 4, some of the qualitative findings indeed pointed in this direction. Yet, contrary to the QUAL2-phase, our survey questions did not target the creation process of one specific SIinitiative through time, but measured the general organizational efforts to deliberately foster transformation capacity in general. This means that the timing effects of stimulating transformation capacity for different SIinitiatives should normally average themselves out. This implies that the partial mediation role of deliberate strategic learning mechanisms for transformation is unlikely due to timing effects.

Still, the difference in effect size may be attributed to five other potential reasons.

First, our findings may provide evidence for the argument that, in the context of SIcap, learning at a cognitive level is more fundamental than learning at the action level (Rajagopalan & Spreitzer, 1996). Authors have argued that exploration is mainly triggered

by means of cognitive efforts to develop new intuitions and ideas (Zott, 2003; Zollo & Winter, 2002). More specifically, it is argued that noticing environmental information will only lead to effective renewal if this noticing leads to a *renewed* understanding (Becker, 2001). Hamel & Välikangas (2003) consequently refer to the term ‘cognitive challenge’ and Marinova (2004) found that only when interpretation updates market knowledge, an increased innovation effort could be discerned. These arguments all place assimilation practices to the centre stage of SICap development.

In addition, the path-breaking character of SI matches extreme exploration. We could adopt Zahra & George’s (2002) arguments here that it is foremost ‘potential ACAP’ that enhances a firm’s strategic flexibility and its reconfiguration capacity. Hence, the more extreme and path-breaking the level of innovation, the more cognitive aspects may come to the fore. The extreme innovation construct of SICap, being the dependent variable, may explain the superior value of PACAP compared to deliberate strategic learning mechanisms for transformation (a RACAP component).

A second reason may be found in the character of the independent variables, namely *deliberate* strategic learning *mechanisms*. During the QUAL2-phase, strategic innovators strongly emphasized the value of deliberate strategic learning mechanisms in fostering assimilation capacity (see chapter 4). Maybe, assimilation capacity is more susceptible to a deliberate stimulation than is transformation capacity. Zollo & Winter (2002) have emphasized how deliberate cognitive activity (articulation and codification) can stimulate the creation of dynamic capabilities. Departing from the sensemaking literature, we saw however no reason to not extend their discussion to the value of deliberate learning mechanisms for behavioral change as well, i.e. deliberate learning mechanisms triggering transformation capacity. However, our results may prove us to be in the wrong. Indeed, also the literature concerning the deliberate triggering of sensemaking seems more concerned with steering cognitive aspects than behavioral aspects (e.g., Thomas et al., 2001). Although transformation capacity may in and of itself still have an important mediating role, this role may need less deliberate managerial fostering, or may be less susceptible to it.

Thirdly, the smaller effects of deliberate strategic mechanisms for transformation, relative to those for assimilation may also be due to the way we decided to operationalize the concept of SICap. We funded the operationalization on the original conceptual definition of the exploitation-dimension provided by Zahra & George (2002). Recall that Zahra & George (2002: 190) defined exploitation as the capability to persistently create new outputs such as new ventures, goods or services. As argued in chapter 2, we equated this exploitation-dimension with SICap. Since SICap has been measured as the *number of SIinitiatives* (relative to competitors’ SICap), it does not incorporate any measure of success, such as the commercial roll-out of the initiative on a larger scale, or the additional (financial) value the firm may capture with it. In this respect, an important distinction can be noted with definitions provided by other authors. For instance, Cohen & Levinthal (1990: 128) originally defined exploitation as a firm’s ability to apply new, external information to commercial ends, Lane & Lubatkin (1998: 465) describe exploitation as the organization’s ability to *commercially* apply new knowledge to achieve organizational objectives, and Lane et al. (2001) even operationalized it as business strategy. Compared to these approaches, our SICap-operationalization stands somewhat midway between full

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exploitation (successfully commercialized) and full exploration (ideas, concepts not yet materialized in any way). In this respect the lower mediating effect of deliberate strategic mechanisms for transformation would be entirely logical. Since the SIcap operationalization is not entirely explorative in nature either, deliberate strategic mechanisms for transformation do still have a considerable impact. Yet, maybe, having operationalized SIcap in a different, i.e. fully exploitative, way would have proved a larger mediating role of deliberate strategic mechanisms for transformation.

Fourthly, the relative importance of deliberate strategic learning mechanisms for assimilation may validate one of the tentative findings of QUAL2-phase. In chapter 4, we indicated that different SI-initiatives often ‘lift’ on one and the same transformation-change. Strategic innovators mentioned that the establishment of deliberate strategic learning mechanisms for transformation may build a so-called ‘transformation-platform’ on which the creation of different SI-initiatives rests. Interviewees emphasized the difficulty of triggering behavioral change and stress the long-winded character of it. Yet, once transformation capacity is adapted it often leverages the creation of more than just one SI-initiative. In this way, transformation capacity may show a kind of ‘punctuated equilibrium’ pattern, where longer periods of small changes are interrupted by sudden, drastic changes. For instance, a new organizational structure may shorten market links, which considerably enhances and speeds up the set-up of several SI-initiatives.

Interviewees associated the creation of such a leveraging platform only with transformation capacity. This suggests that relatively more and frequent deliberate strategic mechanisms for recognition and assimilation are needed, than are deliberate strategic mechanisms for transformation.

A fifth and final argument builds upon the literature on ambidexterity.

Essentially, the issue of SI by established industry incumbents raises questions of a) the surplus value, and hence appropriateness of strategically innovating over the value of retaining the acquired industry position and, b) the chance of succeeding in executing dual strategies, or playing both games simultaneously (Markides, 1998; Markides in Mang, 2000). The latter issue pertains to the concept (or even problem) of ambidexterity (Tushman & O’Reilly, 1996; Gibson & Birkinshaw, 2004).

Even though it has been empirically demonstrated that companies can in fact successfully manage dual business models (Markides & Charitou, 2002), no agreement exists so far as to how this can be achieved with SI-initiatives. Studies on the management of new ventures within established businesses essentially pivot on arguments of a) maximizing synergies (total integration of new unit within existing organization,), or b) minimizing conflict and risk (total separation of new unit).

Among the adherents of the first approach is for example Kodama (2001; 2003). Based on his findings on SI in large, traditional Japanese corporations, he makes a plea for the inclusion of paradoxical elements (incremental innovation versus radical innovation) inside large corporations as essential triggers for growth. He proposes to incorporate new entrepreneurial organizations into the existing traditional organization and to form strategic communities to better integrate both. Other proponents of this integration strategy are Hamel & Getz (2004).

However, others have stressed reasons why the incorporation of new ventures in existing operating operations does not go without any problems (Burgelman, 1984, 1991;

Christensen & Overdorf, 2000; Christensen et al., 2002; Stringer, 2000): the existing culture and processes reflecting a well-established logic of exploitation (Crossan & Berdrow, 2003) may regard the new initiative as threatening and may consequently try to 'suffocate' it (Levinthal & March, 1993; Schein, 1993; Markides & Charitou, 2004). The addition of other dominant logics to the existing ones imposes the need upon organizations to deal simultaneously with different, often conflicting, logics (Prahalad & Bettis, 1986). Alternatively, experiments may risk premature termination under the pressure of short-term operational goals (Hamel & Getz, 2004) and traditional resource allocation processes (Christensen & Overdorf, 2000; Burgelman, 1983). Moreover, managers are confronted with strategic role conflict (Floyd & Lane, 2000).

The alternative solution that has been offered in the literature is this of 'spatial separation' (Baden-Fuller & Volberda, 1997), or 'isolation' (Leonard-Barton, 1992), a tactic that comprises to launch new initiatives (potentially including conflicting business models) by creating autonomous and physically separated stand-alone units (Burgelman, 1985; Benner & Tushman, 2003; Christensen et al., 2002; Tushman & O'Reilly, 1996; Floyd & Lane, 2000).

Empirics have demonstrated that incumbents adopting SIs do indeed highly prefer to set up independent new units (Charitou & Markides, 2003). Yet, research by Block & MacMillan (1995) has shown that most corporate ventures involve merely incremental innovations, due to difficulties to commercialize breakthrough innovations in this semi-independent structure. Furthermore, intra-corporate (inter-unit) organizational learning and synergies may be limited (Volberda et al., 2001a). Finally, managing parallel activities and new venture divisions requires a considerable amount of slack resources (Floyd & Lane, 2000). The differing opinions on the management of SI initiatives were finally reconciled by Markides & Charitou (2004) who proposed four different strategies to manage dual business models, depending on two key dimensions: 1) the degree the new and established business conflict with one another, and 2) the similarity between the new and established business (strategic relatedness). The four strategies range from total separation, over phased separation, phased integration to a total integration strategy. They argue that when the initiative does not make any use of existing assets and capabilities a spin-off or a financial investment in an external start-up is to be preferred. If, on the other hand, initiatives do not strongly deviate from the existing business model and definition, and strongly involve borrowing and leveraging existing assets and capabilities, a total integration strategy should be pursued (see also, Christensen et al., 2002; Burgelman, 1984).

However, many SI initiatives can not be classified as one of these extreme cases. Instead, they typically involve both a deviation from the existing business and a leverage of existing assets and capabilities (as discussed in section 6.1.3). Very recent research on SI in established companies (not yet available at the time our empirical study was performed) has gradually come to agree on the benefits of separating organizational subunits for new ventures that simultaneously maintain extensive links with the mother company in order to leverage existing assets and capabilities. In this case, what Govindarajan & Trimble (2005) call, a 'dual-purpose organization' possesses the ideal characteristics for SI. A 'dual-purpose organization' is characterized by new SI initiatives located in separate subunits, managed by their own general manager who reports to an overarching general manager of the entire company. Even though the new venture is geographically isolated from the established business, operational links with it enable the new venture to borrow core assets

from the latter (Govindarajan & Trimble, 2005). In his study of strategic innovators, Markides (1998; Markides & Charitou, 2004) indeed found that adopters that pursued a total separation strategy, all excelled at also *integrating* the two different businesses by implementing appropriate tactics (e.g., the use of cross-functional teams at 3M, a strong family culture at Leclerc, team-based incentives at Lan & Spar Bank). Empirics demonstrated that the more a company can exploit synergies between the established business and the new unit, the more effective the firm is in managing the two games simultaneously (Charitou & Markides, 2003). Charitou & Markides (2003) argue that these synergies moreover enable incumbents to play their trump card against start-ups (by means of their existing brands, skill sets, customer relationships and manufacturing and distribution capacity). Nevertheless, scholars assert that a sufficient level of operational (own CEO, own culture, decision autonomy) and financial autonomy of the new unit are to be guaranteed in order to minimize conflict and structural inheritance (Christensen & Overton, 2000; Govindarajan & Trimble, 2005; Charitou & Markides, 2003).

The low relative effect size of deliberate strategic learning mechanisms for transformation that we found may follow from this line of argument. More specifically, the QUAL2-findings (see chapter 4) designate that strategic innovators have to cope with different ambidextrous frictions, dependent on the phase of the SIcreation: formulation of the SIinitiative versus implementation of the SIinitiative. The higher effect of deliberate strategic learning mechanisms for the PACAP dimensions, relative to those for transformation, may indicate that the search and formulation of SIinitiatives takes place within the operating core, whereas the actual implementation is less so. This argument can also be founded upon Kanter (1983) who argued that the *generation* of an innovation involves frequent contact and closer integration with other parts of the organization, whereas the completion or *implementation* of an innovation could best be done in isolated and separate parts of the organization. The QUAL2 findings provide early confirmation of this proposition. More specifically, interviewees mention how the implementation of the initiative often takes place by the establishment of a separate unit (though seldom separated geographically), which still keeps strong bonds with the rest of the organization. The detachment of the implementation from the existing business implies that initiatives exist alongside the existing business⁴⁴, which diminishes the need for a continuous behavioral transformation of that part of the organization operating the existing business. In contrast, the search and development (the 'initiation') of the SIinitiative tends to take place within the operating core, which proves the value of deliberate strategic learning mechanisms for recognition and assimilation. Indeed, during the QUAL2-phase, only one strategic innovator indicated that the initiation of SIinitiatives was the sole responsibility of the firm's business development department. This finding hence sheds doubt on the value of separate 'exploration labs' or business development departments for the *formulation* of SIinitiatives. Baden-Fuller (1995) indeed argued that in order to achieve strategic innovations corporate entrepreneurship should be embedded in the entire organization and should not be limited to an isolated function in the organization. The focus on developing deep knowledge about the latent and future needs of existing customers and the use of

⁴⁴ One interviewee mentions that over time, the initiative may be phased in. This is however only in a later stage, when the initiative is no 'initiative' anymore, and has become 'part of normal business'.

innovative customers as a source of SI-ideas, as shown by the significant recog-indicators (see, section 6.1.1), brings further evidence to the argument that the ideas for SIinitiatives mostly develop *through the 'normal' business operations* and through the people involved in these operations.

In sum, the ambidexterity required to create SIcap is likely to center on different, complementary strategies. The initiation mainly rests on the principle of 'enriching' (Adler et al., 1999), or 'reconciliation' (Gibson & Birkinshaw, 2004): recognition and assimilation is incorporated within normal daily activities, such that the operating core is also made responsible for signaling and initiating SIinitiatives. In this respect, the establishment of deliberate strategic learning mechanisms proves especially useful to trigger path-breaking focus areas in recognition and assimilation. Yet, implementation often rests on a 'partitioning' (Adler et al., 1999) or 'separation' strategy (Tushman & O'Reilly, 1996; Benner & Tushman, 2003). Separate SI-units exist alongside traditional business departments. Alternatively, the QUAL2-data show (see chapter 4) that firms may also apply 'switching' approaches (Adler et al., 1999), where individuals are temporarily dispatched to SI-units or divide their responsibilities between both. The latter approach ensures the existence of a satisfactory level of organizational links to the traditional business (Govindarajan & Trimble, 2005).

Although the separation strategy of SI-implementation diminishes the need for deliberate strategic mechanisms for transformation, they do however still keep *part* of their value in stimulating SIcap. The establishment of new units and the creation of new operational linkages with them still require some changes to the organizational structure or a revision of procedures in the operational core. Only, changes can be expected to be less drastic and less frequent.

6.3 THE EFFECTS OF ORGANIZATIONAL AND SUPPLY CHAIN CHARACTERISTICS

In this section, we attempt to interpret the findings of the moderator analysis. We restrict ourselves to a discussion of the most important effects.

In essence, two broad categories of effects can be discerned. Firstly, the impact of these characteristics on the general level of SIcap (height of SIcap), and secondly their impact on the effectiveness of the deliberate strategic learning mechanisms (R^2), which is also related to the effects these characteristics produce on the pattern of mediation relationships. Answering the first question is a relatively straightforward exercise. Yet, pronouncing upon the value of deliberate strategic learning mechanisms to foster SIcap, given these side-conditions, is however far more complex. This difficulty can be attributed to the earlier-mentioned 'flow' character of the independent variables. More specifically, organizational and supply chain characteristics may make the establishment of strategic learning mechanisms indispensable and they may intensify the effects of strategic learning mechanisms. On the other hand, they may turn the establishment of deliberate learning mechanisms in vein, or may in contrast produce such an increase in a firm's recognition, assimilation or transformation *capacity* that the establishment of strategic learning mechanisms fostering these capacities becomes less needed or even redundant. The exploratory character of the research questions that we formulated regarding potential

moderating effects, implies that the results and interpretations are only tentative. We will discuss the findings per conceptual domain.

6.3.1 The influence of the cultural characteristics of innovativeness and risk taking (RQ1 & RQ2)

The QUAL2 analysis showed that innovativeness and risk taking are two critical cultural aspects for SICap. Existing literature in the fields of market orientation and entrepreneurship resonate this finding. Slater & Narver (1995) stressed how a focus on understanding (latent) customer needs requires an organizational culture promoting entrepreneurial values. This is because an entrepreneurial culture promotes exploration and experimentation (Baker & Sinkula, 1999). Entrepreneurial values of innovativeness and a high risk taking tolerance (Lumpkin & Dess, 1996) enhance the firm's willingness to experiment, a predisposition that is needed for SICap. These general cultural values determine how the organization is designed (Matsuno et al., 2002) and can in this respect, not only be considered as a moderator but also as an antecedent to the establishment of deliberate strategic learning mechanisms.

Let us first study the effects of innovativeness. The results of the moderator analysis show a higher SICap level and a higher R^2 in firms characterized by an innovative organizational culture. This means that cultural factors seem to work in concert with deliberate strategic learning mechanisms. In other words, an innovative culture increases the effectiveness of deliberate strategic learning mechanisms. Adler et al. (1999), for example, demonstrated how culture fosters the effectiveness of meta-routines. Entrepreneurial values seem to provide the right focus for the organization's deliberate strategic learning mechanisms. Chaston et al.'s (2004) findings provide support for this argument, showing that the management of market and customer knowledge is perceived as more important within entrepreneurial firms.

The positive effects of innovativeness can essentially be attributed to two reasons.

First, innovativeness increases the direct pay-offs of deliberate strategic mechanisms for recognition; *stocks* of assimilation and transformation capacity seem to lift their effects. A well developed culture, fostering path-breaking innovation may make the establishment of deliberate strategic learning mechanisms for assimilation and transformation less needed. Han et al. (1998) contend that innovativeness may stimulate a continuous and proactive disposition toward meeting customer needs and emphasize a greater use of information. Hurley & Hult (1998) furthermore demonstrated the beneficial effects of an innovative culture on a firm's potential to effectively implement innovations. As such, innovativeness triggers assimilation and transformation capacity and may make the establishment of mechanisms to stimulate assimilation and transformation capacity less needed. Furthermore, the moderator results indicate that innovative organizations reach higher levels of SICap. In this respect, positive feedback effects of prior initiatives may be expected to occur. More specifically, firms may have developed assimilation and transformation capacity through their prior experience in creating SIinitiatives.

Secondly, the results indicate that, next to the direct effect of deliberate strategic learning mechanisms for recognition, the establishment of strategic learning mechanisms for assimilation and transformation increase SICap even more. The results show that stimulating a critical reflection on customer and market information requires an innovative

culture. Non-innovative organizations are apparently making a shortcut in the cycle; deliberate strategic learning mechanisms to stimulate assimilation capacity do not pay off for them. Menon & Varadarajan (1992) suggested that an innovative culture facilitates the sharing and use of information. Moreover, Matsuno et al.'s (2002) findings showed that entrepreneurial values such as innovativeness and risk taking prevent market learning activities from being too narrowly focused upon the existing value system (cfr. Christensen & Bower, 1996), suggesting a positive effect of innovativeness on assimilation. When assimilation capacity is deliberately triggered, this effect is manifested all the more. The structural analyses furthermore showed that assimilation is the most critical element in SIcap. During the QUAL2-phase, strategic innovators stressed the value of deliberately stimulating assimilation in particular. The value of assimilation seems to suggest that deliberate ACAP learning mechanisms lose a great deal of their impact in organizations that do not have an innovative culture. The question hence remains whether non-innovative organizations, restricting assimilation, will ever achieve *successful* SIinitiatives (not captured in our dependent variable of SIcap).

In one of his most recent articles, March (2006) argues that exploration (like SI) does almost always involve risk (large variance and low means in returns). March (2006: 206) hence concludes that “a bias against risk is effectively a bias against exploration”. In similar vein, Day (2002) makes a plea for an ‘experimental mindset’ to develop a better market insight. In line with the literature, the QUAL2 findings identified risk taking as a second potential moderator. As regards the influence of risk taking, two effects catch the eye.

Firstly, and contrary to intuitive thought, a risk taking culture attenuates the direct effects of deliberate strategic learning mechanisms for recognition; the sole establishment of deliberate strategic learning mechanisms for recognition has no effect on SIcap whatsoever, since its effects are largely mediated by assimilation. Results indicate that organizations with a high risk taking profile do not impulsively set up SIinitiatives without stimulating prior reflection on the market. A high level of risk taking may indeed stimulate organizations to set up too many new SI-ventures. Unless the organization has unlimited slack resources (which is never the case), the number of SIinitiatives set up may simply render uneconomical. Organizations with a high risk profile may therefore establish screening activities to a greater extent. Screening in fact separates the initiation and implementation phases of innovation (Koput, 1997). The discussion and evaluation during ‘screening’ meetings will result in some ideas being selected, some ideas postponed, some ideas changed in form or content, and some simply abandoned (Koput, 1997). Screening may be enhanced through market learning activities (Matsuno et al., 2002), such as those associated with assimilation. Matsuno et al. (2002) found indeed that a better process of market learning can be a potential safeguard against undue risk-taking tendencies. In similar vein, an interviewee during the QUAL2-phase remarked: “*mechanisms that stimulate us to collectively discuss our market and our envisioned market strategy are a way to temper our –sometimes– blind enthusiasm*”. Even though deliberate strategic learning mechanisms for assimilation are not applied to a larger extent by risk-taking organizations than by risk-averse organizations, the effects these mechanisms have on SIcap are significantly larger in the former case. Organizations with a high risk taking attitude hence need deliberate strategic learning mechanisms for assimilation to leverage the effects of recognition, but once established they render much. In a sense, the full

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mediating effect of assimilation lifts organizations to a higher step in the path-breaking cycle by channeling the path-breaking elements of recognition. Assimilation entails the questioning of existing assumptions, and results seem to suggest that a risk taking attitude encourages and enables organizations to take these efforts seriously.

Secondly, the large direct effect that deliberate strategic mechanisms for assimilation exert on SIcap, suggests that a risk taking culture partially eliminates the need for deliberate transformation stimulation. A risk taking attitude intensifies managerial support for new ideas. This support seems especially required in the implementation phases of an innovation when coordination and conflict resolution are essential (Damanpour, 1991). A risk taking culture may also affect people at the middle level and operational core to change behavior. This is since risk taking values are incorporated in the organizational culture, and “culture can be a de facto governance system as it mediates the behavior of individuals and economizes on more formal administrative methods” (Tece & Pisano, 1994: 544). Triggering transformation *capacity*, risk taking may reduce the effectiveness of deliberate strategic learning mechanisms for transformation.

In conclusion, the cultural aspects of innovativeness and risk taking both enhance the value of deliberate strategic learning mechanisms for assimilation, either directly (risk taking), either indirectly via the stimulation of transformation capacity (innovativeness). This difference between the direct and indirect effect of deliberate strategic learning mechanisms for assimilation is a logical result of the conceptual meaning of both constructs. Even though innovativeness is sometimes considered as a behavioral variable, we conceptualized it as ‘openness’ and ‘willingness’ to change (e.g., Calantone et al., 2002). We hence follow Hurley et al. (2005: 281) that innovativeness is a cultural *precursor* that provides the social capital to *facilitate* innovative *behavior*. In this sense, being conceived as “cultural readiness” and “appreciation of innovation” (Hurley et al., 2005: 281), it corresponds more to the initiation stage than to the implementation stage of innovation (Hurley & Hult, 1998). Innovativeness can hence be expected to stimulate primarily the value of PACAP (Zahra & George, 2002), but fosters behavioral transformation to a lesser extent. Therefore, deliberate strategic learning mechanisms for transformation are still required to channel the effects of assimilation to the concrete creation of SIinitiatives. In contrast, a risk taking culture (‘willingness to undertake risky ventures’) incorporates a behavioral transformation component as well. A risk taking attitude will hence affect the stock of the entire ACAP cycle and attenuates as such the needs of deliberately stimulating behavioral transformation.

6.3.2 The influence of the cross-functional dissemination of market information (RQ3)

A third moderator that we selected was the extent to which organizations disseminate market information cross-functionally throughout the organization. Marketing researchers have emphasized the dissemination –both lateral and vertical– of market information throughout the organization (e.g., Kohli & Jaworski, 1990). As formal and informal contacts among different organizational departments increase the sharing and use of information, it has been found as an important antecedent to market orientation (Kirca et al., 2005). Especially, the dissemination of market information gathered by ‘front-line’

people (e.g. customer service, sales) is highly valued in the literature (e.g., Day, 2002), as was also emphasized during the QUAL2 phase.

Results of the moderator analysis show that companies characterized by a high level of cross-functional information dissemination invest more in all three categories of deliberate strategic learning mechanisms than companies with a low information dissemination profile. However, only the effectiveness of deliberate strategic learning mechanisms for recognition and assimilation (i.e. PACAP) is intensified by these efforts.

It seems logical that the outputs of a deliberate stimulation of assimilation capacity will be limited when critical reflections and discussions on customer and market issues (assim) do not involve distinct organizational functions, or when their outputs are not communicated across distinct functional domains (crossf). The dissemination of market information enables unlearning as more different perspectives are spread throughout the organization (Slater & Narver, 2000). It helps to absorb new insights into collective mental models (Day, 2002) because in organizations with many communication flows, new information is regarded with less hostility and given more value and credibility (e.g., Zaltman, 1986). Jansen et al.'s (2006) empirics showed a positive association between the free flow of information throughout the organization and acquisition and assimilation (i.e., PACAP). Our findings suggest that these positive effects of cross-functional dissemination are stimulated all the more if recognition and assimilation capacity are deliberately fostered.

In addition, cross-functional information dissemination enhances the direct effects that deliberate strategic learning mechanisms for recognition exert on SICap. In a sense, this may suggest that a high degree of cross-functional dissemination of market information may sometimes reduce the role of deliberate strategic learning mechanisms for assimilation. A closer inspection of the measures indeed reveals that crossf is closely associated with in particular *assim1*, *assim3* and *assim4*. In addition, a high level of market information dissemination, involving many people from different functional areas, also increases the perceived information quality. Research shows that a higher perceived information quality stimulates more people to use the information to change their thinking process or to implement decisions (Maltz & Kohli, 1996). In this respect, the cross-functional dissemination of market information may lower the need to establish deliberate strategic mechanisms for both assimilation and transformation.

The results finally indicate that in organizations where market information is shared cross-functionally, investments in transformation capacity turn out completely redundant. Zahra & George (2002) suggested that the free flow of information throughout the organization particularly contributes to the transformation and exploitation of new knowledge (i.e., RACAP), hence suggesting an increase in the stock of transformation *capacity*. In contrast, organizations characterized by little information dissemination largely need deliberate strategic learning mechanisms for transformation. A high level of market information dissemination may prevent the 'not invented here syndrome', enabling members to collect and use new information to a larger extent (Menon & Varadarajan, 1992). Kennedy et al.'s (2003) research findings indeed show the advantages of information dissemination in terms of a rise in stakeholder commitment. They found that the dissemination of customer information stimulated individuals to effectively deliver value to customers. One could hence argue that a lack of cross-functional information sharing, limiting wider organizational support, makes the establishment of deliberate strategic learning

mechanisms for transformation necessary to channel the effects of recognition and assimilation on SICap.

6.3.3 The influence of general information provision by customers and suppliers (RQ4 & RQ5)

The literature indicates that the amount of innovative ideas an organization may develop depends on the information the organization can get from outsiders, such as other supply chain parties (Koput, 1997). If a firm shows openness to this external information, it may allow the firm to draw in ideas from outsiders (Laursen & Salter, 2006). External information sources may furthermore bring different perspectives on information. We hence studied the moderating effects of information provision by customers and by suppliers.

As regards the effects of information provision by supply chain parties, overall, more or less similar effects were found for information provision by customers (infocus) and information provision by suppliers (infosup). Both moderators increase the effects of deliberate strategic learning mechanisms for recognition and assimilation. Information provision by customers or suppliers hence intensifies the effects of a deliberate stimulation of the path-breaking elements of PACAP.

Yet, when we compare the effects of supplier information provision to the effects of customer provision, two differences are discerned.

First, the mediating effect of deliberate strategic learning mechanisms for assimilation is more intensified when customers provide much information than in the case much information is provided by suppliers. In other words, in the case of high supplier information provision, deliberate strategic learning mechanisms for recognition produce a direct effect on SICap. This direct effect is absent in the case of high customer information provision. This difference can be attributed to several potential reasons.

A first explanation may be found in the earlier mentioned ‘over-searching’ effect (Ahuja & Katila, 2004). Customers may simply provide too much information for the firm to manage and choose between, or the amount of ideas is so abundant that few ideas are taken seriously or are given a sufficient level of attention or implementation effort (Koput, 1997). In this case, deliberate strategic learning mechanisms for assimilation might diagnose this so-called ‘attention allocation’ problem (Laursen & Salter, 2006), functioning as an additional filter and ensuring information and ideas are given serious consideration. For example, research shows that in customer relationship programs stress is primarily put on the acquisition of customer knowledge, instead of on the interpretation of it. The lack of a common interpretation of customer information among different managerial domains creates problems for the integration of this information throughout the organization (Campbell, 2003). For this reason, in the case customers provide much information, deliberate strategic learning mechanisms for assimilation seem necessary to channel the effects of recognition stimulation.

Secondly, effects may be attributed to the specific type of information customers versus suppliers provide to a focal firm. Recall that the constructs ‘infocus’ and ‘infosup’ measure the general information customers or suppliers spontaneously provide about the market, competitors and other relevant organizations in the industry (see chapter 4). This kind of information is hence not to be confused with the specific path-breaking market information

that is stimulated by strategic learning mechanisms for recognition. More specifically, a supplier expects a market-oriented customer to perform better. A customer's market orientation towards his respective market hence increases a supplier's trust, cooperation and commitment towards this customer (Baker et al., 1999). So, suppliers have more successful relationships with their customers if their customers help them to gain market availability (Gemünden et al., 1996). A supplier has therefore a large interest in providing the focal firm (his direct customer) with valuable market information, in order to increase the latter's market insight. The general market information a supplier provides to his customer (the focal firm), may hence be expected to be of strategic value to the focal firm. As such, the focal customer-firm attaches a higher strategic value to the information that the supplier provides and may directly act on it, which improves the direct effect that strategic learning mechanisms for recognition have on SIncap. In contrast, the information a customer provides may be of a more operational nature. Although, we are not in the know of any research that has tackled this issue, it can be argued that the customer's business does generally depend to a lesser extent on the supplier's market orientation or performance in general terms. If customers spontaneously give information, this information can be expected to be of a more operational nature, limited to the specific transactional activity. For this reason, the fact that a customer provides information does not take away the need to establish strategic learning mechanisms for assimilation before actual SInitiatives can be created.

Thirdly, effects may furthermore be determined by the specific internal information systems dedicated to manage these different categories of information. If a supplier wants to give valuable information to his customer, chances are high that this information exchange will not take place through the traditional buyer-seller information channels. The exchange of strategic information is likely to happen at a relatively high managerial level. The higher level of managerial involvement raises organizational commitment, which in turn increases chances that the information will be effectively disseminated, used and acted upon. As such, the direct effect of strategic learning mechanisms for recognition is improved. In contrast, customers primarily address their account manager to exchange information (e.g., Coviello et al., 2002). However, the majority of organizations that have implemented key account management, have located it in the sales department and as such still consider it as a classical sales task (Wengler et al., 2006). Hence, even in the case customers do provide strategically relevant information, it is still possible that account managers are not encouraged or/and might be overcharged to transfer this information to other functions in the organization, such as marketing or business development, where this information can be further deployed (Walter et al., 2001). In the QUAL2 findings, the stickiness of customer information in the sales department was an often-cited problem.

A second distinction between the effects of both moderators is that information provision by customers may make deliberate strategic mechanisms for transformation redundant, whereas these mechanisms keep an important mediating role when information is provided by suppliers.

When customers provide much information, the establishment of strategic learning mechanisms for recognition and assimilation seem to pay off highly. In fact, the value of deliberately cranking up the PACAP cycle is highly effective. Yet, stimulating PACAP aspects seems to suffice in this case. The results suggest that if organizations, gaining much usable information from their customers, pay explicit attention to the collection and

critical reflection upon customer and market issues, they are automatically triggered to create SI initiatives. The effects of infocus hence pertain to the area of RACAP as well. Campbell (2003) found that organizational processes specifically designed to facilitate the interpretation of customer information (assim) affects the effectiveness of integration of this information throughout the organization. Indeed, during the QUAL2 interviewees mentioned that customer information takes away risk and increases organizational commitment to create SI initiatives. In addition, Helfert et al. (2002) argue that sufficient customer information increases the effectiveness of customer relationships, in that it may stimulate to jointly explore future opportunities, such as partnerships for SI. Hence, when customers provide much information, and the organization has in place mechanisms for recognition and assimilation such that the information the customer provides can be better integrated within recognition and assimilation capacity, formal stimuli for transformation are neither required, nor pay off. On the contrary, in the case of a high information provision from suppliers, the deliberate stimulation of transformation capacity remains important. This finding sheds however some doubt on the validity of the third explanation above. More specifically, the involvement of high managerial levels in the handling of strategically relevant information from suppliers would suggest the redundancy of deliberate strategic mechanisms for transformation.

6.3.4 The influence of a centralized organizational structure (RQ7)

Centralization indicates whether decision authority lies in the higher or lower levels of the organizational hierarchy (Tsai, 2002). As indicated in chapter 2, decentralized structures have traditionally been thought to fit aggressive strategies and innovation (Vera & Crossan, 2004). Yet, our findings show that firms with centralized decision autonomy achieve higher levels of SIcap.

Research has indeed produced conflicting views upon the relationship between centralization and (marketing) information use, and the relationships between centralization and innovation. This was also manifested in the QUAL2-findings. Even though many authors assert that the reduced flexibility, the lack of autonomy and employees' feeling of alienation provoked by a centralized organizational structure may lead to a smaller use of marketing information, others have argued that decentralization may instead lead to a policy vacuum, isolated knowledge generation and diffusion. The latter elements all hamper the utilization of marketing knowledge (Menon & Varadarajan, 1992) needed for SI.

The moderator analysis indicates that organizational structure mainly affects the PACAP component. Moreover, centralization increases the direct association between deliberate strategic learning mechanisms for recognition and SIcap. As a functional or hierarchical organizational form may limit the scope and flexibility of absorption (Van den Bosch et al., 1999), deliberate strategic mechanisms for recognition prove hence highly valuable. However, centralization decreases the (mediation) effects of assimilation. It seems indeed a rather logical assumption that a centralized structure channels the effects of deliberate strategic learning mechanisms for recognition more easily to concrete SI initiatives. Hage & Dewar (1973) found that a centralized structure is much more effective in promoting innovation: normal channels of communication are sufficient for leaders to receive the information and ideas needed to initiate innovation, as long as leaders are inclined to

innovate. A recent study by Kirca et al. (2005) could furthermore not confirm the restraining influence of centralization on the intra-organizational market information flow. In other words, while decentralization may stimulate bottom-up initiative, bottom-up ideas do not succeed on their own, because processes must be linked and behaviours must be constrained so that energy is not diffused (Day, 1994). As a centralized structure speeds up decisions and actions, diminishing the risks of errors of individuals who lack the needed skills or information, centralization has been considered the appropriate structural design for entrepreneurs wanting to implement their vision and strategy in an efficient way (Matsuno et al., 2002).

A *decentralized* structure, in contrast, requires deliberate strategic learning mechanisms for assimilation more strongly in order to gain any effects from deliberate strategic learning mechanisms for recognition. A possible explanation may be that decentralized organizations only materialize ideas/concepts in concrete initiatives to the degree they have become more widely supported and shared. The full mediating role of deliberate strategic learning mechanisms for assimilation may then be explained in the sense that assimilation-stimulating mechanisms foster organizational commitment by stimulating the involvement of different people in interpersonal reflection and discussion about the market/customers.

In conclusion, our findings may provide evidence for Zaltman et al.'s (1973) argument that centralization may actually have different effects on the sequential phases of innovation: search and implementation. This is because "search requires unpredictability, foolishness, and randomness, implementation requires efficiency, reliability and organization" (Koput, 1997: 529). Despite a centralized firm's improved efficiency in the implementation of SI initiatives, the ineffectiveness of deliberate strategic learning mechanisms for assimilation in this kind of organizations may carry a danger. More specifically, the ineffectiveness of deliberate strategic learning mechanisms for assimilation may imply that ideas are less circulated and that innovative ideas from less influential people are vetoed (Hage & Dewar, 1973). Because of the central path-breaking role of assimilation, it is possible that decentralized organizations, while achieving *lower* levels of SICap, will eventually achieve higher *success* rates of SI initiatives (not measured by SICap).

6.3.5 The influence of supply chain innovation potential (RQ8, RQ9, RQ10)

We finally studied the effects of moderators related to 'supply chain innovation stimulus'. In chapter 2, we referred to several authors who claim that a proactive business logic and the creation of new markets requires not only a different internal learning mode (generative rather than adaptive) but also a different external perspective on collaborations and partnerships (e.g. Tuominen et al., 2004). The value that relationships, collaborations and partnerships with other supply chain parties may have for SICap was confirmed in the QUAL data (see chapter 4).

We studied the effects of 'innovation stimulus from customers', 'innovation stimulus from suppliers' and 'general chain climate' on the effectiveness of deliberate strategic learning mechanisms for recognition, assimilation and transformation. The first moderators refer to the possibility of joint innovation with customers or suppliers, respectively. The third moderator measures the degree of absence of hostility or unaccustomedness among industry parties (see chapter 4).

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As regards innovation stimulus from customers and innovation stimulus from suppliers, a similar pattern of effects could be discerned. In both cases a high stimulation to innovate intensifies the direct effect of deliberate strategic learning mechanisms for recognition. The mediating role of deliberate strategic learning mechanisms for assimilation weakens, and deliberate strategic learning mechanisms for transformation prove to be ineffective.

Let us first digress on the effects of an innovation stimulation by customers.

Recent research by Malhotra et al. (2005) indicated that collaborations with supply chain partners influence companies' ACAP by broadening the scope and quality of the information exchanged among the partners. Collaborative partnerships increase both the intelligence generation within the partnership and the dissemination of intelligence between the partners. In this way, it can be considered as one way of market intelligence generation (Slater & Narver, 2000). More specifically, collaborative supply chain partnerships allow firms to develop a better understanding of the market and the competitive environment. Alternatively, a customer focus increases the level of collaborative relationships (Spekman & Carraway, 2006). An innovation stimulus from customers will thus intensify the effect of deliberate strategic learning mechanisms for recognition all the more.

Furthermore, partners may offer alternative perspectives on the meaning of information and may as such foster the development of frame-breaking lenses (Slater & Narver, 1995). Recent research demonstrates that learning about new customer preferences takes place through interaction with the customer (Joshi & Sharma, 2004). Interorganizational learning may in this sense lead to intra-organizational learning if the firm internalizes the collectively created experiences (Holmqvist, 2004). Even if partnerships do not involve radically innovative ventures (interorganizational *exploitation*), they may produce new intra-organizational or inter-organizational *exploration* (Holmqvist, 2004). Day (2000) even makes a plea for the development of a 'superior market-relating capability'. An innovation stimulus from customers may hence increase the stock of assimilation capacity, making deliberate strategic learning mechanisms for assimilation less needed as mediators for recognition capacity.

Furthermore, the results show that companies that are experienced in innovation partnerships with customers will gain more direct value from deliberate strategic mechanisms for recognition and assimilation. Collaboration with customers provides firms intelligence about new opportunities or new means to create superior customer value (Day, 2000) and enables them to exploit externally generated new ideas (Laursen & Salter, 2006). The beneficial effects of collaborative partnerships with customers are hence not limited to an increase in the cognition capacity of the partners; partners may also combine experience (Håkansson et al., 1999). The ability to effectively draw knowledge from these partnerships depends however on the firm's ability to sustain a pattern of interaction over time (Laursen & Salter, 2006). The experience with customer innovation partnerships creates 'collaborative know-how', the internalized experience with collaborations that determines how effectively new collaborations are entered and managed (Simonin, 1997). Collaborative know-how enables firms to better combine internal with external competences for new customer value creation, while holding collaboration risk under control (Kothandaraman & Wilson, 2001). Through their collaborative experience with customers, firms may have developed knowledge, skills and structures, which can be leveraged when entering new partnerships for SI. In this sense, experience in innovation

partnerships with customers may have created the transformation capacity, required for SIcap. A further stimulation of transformation capacity becomes redundant. The QUAL2 findings seem to confirm this argument. Interviewees mentioned the value of joint initiation and development of SIinitiatives with lead customers (e.g. the use of pilots to jointly fine-tune the initiative). The more a firm has experience in innovation-partnerships with lead customers, the more they may be expected to deploy/extend these partnerships to the joint development of SIinitiatives as well.

Finally, Danneels' (2003) study on the market of apparel retailing indicates that market knowledge that is developed through close interactions with customers is more likely to be attended to and effectively *used* than is information collected through general scanning activities. The deliberate stimulation of assimilation and transformation capacity may hence be decreased. In contrast, in the case customers do not stimulate innovation to a great extent, findings show that the entire formal ACAP cycle needs to be implemented and can as such largely affect the organization's SIcap ($R^2=0.473$).

As regards the impact of an innovation stimulus from suppliers, results resemble the results that were found for an innovation stimulus from customers. This is not surprising.

First the literature shows similar findings for collaborations with customers and for those with suppliers. Collaborations with suppliers may facilitate a firm's customer value creation (Martin & Grbac, 2003; Hogan, 2001), especially when downstream customer needs are changing (Wathne & Heide, 2004). For example, it enables reverse marketing and demand-driven manufacturing to better meet customer demands. Furthermore, suppliers that are involved in an innovative partnership, are specially selected partners that require a more extensive form of relationship management (Möller & Törrönen, 2003). Firms may consider the supplier's current capability profile as a proxy of how useful this supplier may be for other, future specific value creation projects (Möller & Törrönen, 2003). As clearly evident from the QUAL2 analysis, supplier partnerships may furthermore bring the technology needed to create fundamentally new and superior customer value (Sheth & Sharma, 1997). Based on Walter et al. (2001), Möller & Törrönen (2003) mention supplier's indirect value functions, such as the possibility of joint innovation, accruing new customers and markets, providing valuable market information, and giving access to other important actors, inside and outside the industry, that may indirectly enable the firm to create fundamentally new customer value in the future. An innovation stimulus from suppliers may hence increase the direct effects of deliberate strategic learning mechanisms for recognition and assimilation as a) experience with supplier innovation collaborations increases the efficiency and effectiveness of future supplier collaborations (van der Valk & Wynstra, 2005), and b) being able to manage supplier partnerships for incremental innovations (as captured by the measure *innosup*) is a necessary learning step to move to a higher level of supplier relationship management for innovations of a more radical nature, such as SI (Möller & Törrönen, 2003). Markides & Geroski (2003b) mention in this respect alliance creation with key suppliers as one potential strategy to achieve radical innovation.

Secondly, the similar effects an innovation stimulus from customers and one from suppliers provoke could also be attributed to a different cause. A study of the literature on supplier and customer partnerships suggests the possibility of an underlying mediating factor. More specifically, research indicates that good supplier relationship management depends on a large amount of *intra*-organizational cross-functional information sharing

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(Martin & Grbac, 2003). Reason for this is that sharing information among various organizational functions facilitates inter-functional coordination, which is in turn required for the kind of supplier partnerships that extend beyond a mere logistics focus (Sanzo et al., 2003; Ballou et al., 2000). Similarly, Helfert et al. (2002) stress that in close customer relationships, the people involved from the focal firm's side (i.e. the service provider) need to have sufficient information about the organization, the customer's needs and the market. Hence, firms experienced in supplier or customer innovation-collaborations can be expected to have in place good systems for cross-functional information sharing. Good systems for information sharing may imply that also market information is well disseminated cross-functionally. This may hence suggest a mediated moderation role of cross-functional dissemination of market information. Given this logic, it is not surprising to find a results pattern similar to the one we found for the cross-functional dissemination of market information (see, section 5.4.3.2).

Although an innovation stimulus from customers or from suppliers both exert a similar influence on the effectiveness of deliberate strategic learning mechanisms, the effects of an innovation stimulus from suppliers are however less pronounced. The effects of an innovation stimulus from suppliers on the level of SICap were indeed negligible (both groups scored a similar score), whereas firms stimulated by their customers scored significantly higher on the SICap construct. This finding is also backed by QUAL2-findings. Interviewees stressed that the impact of an innovation stimulus exerted by suppliers is far less drastic than in the case customers stimulate them to innovate. Interviewees only referred to the indirect effects of a supplier stimulus, in that suppliers may take care of the technological aspects of the SI. The proper idea for the SI initiative does however seldom come from suppliers.

Finally, we studied the effects of the general climate among supply chain parties. Our results indicate that a positive general chain climate enhances the effectiveness of deliberate strategic learning mechanisms for recognition and assimilation. The effectiveness of mechanisms fostering transformation capacity however diminishes up to a level of nonsignificance. As evident in QUAL2-citations, a favorable chain climate may reduce the perceived market risks and may as such increase transformation *capacity*, eliminating the need for any formal stimulation of transformation. In contrast, a hostile and unwilling chain climate may considerably withhold organizations from the actual implementation of SI initiatives (see chapter 4). Therefore, deliberate strategic learning mechanisms for transformation are highly needed in this case.

The effects of general chain climate may furthermore suggest an underlying mediating effect of partnerships for SI, as the one we mentioned above. In other words, general chain climate not only produces moderated mediation effects, it may in itself be considered a 'mediated moderator' (James & Brett, 1984); its influence may be determined by the effects it produces on the level of partnerships for SI. More specifically, by definition a positive chain climate is characterized by a high level of trust among supply chain parties. A high level of trust, meaning that parties consider one another as reliable and integer, logically increases parties' commitment to one another (Morgan & Hunt, 1994). In turn, a high level of commitment leads to loyalty (Moorman et al., 1992). Loyalty then diminishes free-rider behavior, which was mentioned in QUAL2 as a major obstacle to SICap (see

chapter 4). Trust and commitment (and hence little free-rider behavior) take away the perceived risk of opportunistic behavior when entering into close, strategic ‘partner’ relationships with other supply chain parties (Eggert et al., 2006; Johnson & Selnes, 2004; Day, 2000; Wucherer, 2006; Selnes & Sallis, 2003). Furthermore, Walter et al. (2001) argue how defensive or competitive relationships between vertical links in a supply chain may prevent firms from yielding the full benefits of relationship management. They illustrate how this may occur when a supplier considers its direct customer as a competitor as well. The QUAL2 (e.g. TMS) findings confirmed this proposition. Yet, as mentioned above, close relationships increase innovation possibilities and the creation of more and unique customer value (Johnson & Selnes, 2004). For this reason, this type of relationships is often needed in the context of SIinitiatives. Both an innovation stimulus from customers/suppliers and a favorable chain climate may trigger the establishment of partnerships for SI. Therefore, the influence of general chain climate results in a pattern of effects, similar to the one we observed for an innovation stimulus from customers or from suppliers.

In sum, our results indicate that if recognition and assimilation capacity are deliberately stimulated, a positive chain climate will increase a firm’s willingness and capacity to effectively set up SIinitiatives and to accordingly change organizational behavior. The mediating role of deliberate strategic learning mechanisms for transformation disappears.

In conclusion of the moderator analysis, we may pose that:

- none of the moderators produces negative effects on a firm’s SIcap. On the contrary, several moderators considerably enhance a firm’s level of SIcap. Significant, positive effects were found for innovativeness, risk taking, the cross-functional dissemination of market information, information provision by customers, centralization and an innovation stimulus from customers.
- overall, the establishment of deliberate strategic learning mechanisms is especially effective (high R^2) in organizations with an innovative culture, that disseminate market information cross-functionally, where suppliers provide much information, or in organizations operating in an adverse chain climate.
- the establishment of deliberate strategic learning mechanisms for *all three* categories of recognition, assimilation and transformation capacity (i.e. important mediation effects) proves especially beneficial in firms characterized by high levels of innovativeness, risk taking, or information provision from suppliers. In these cases, deliberate strategic learning mechanisms for transformation operate as an important mediating mechanism.
- several moderators especially intensify the effects of deliberate strategic learning mechanisms for PACAP. The direct effect of deliberate strategic learning mechanisms for recognition is particularly enhanced by innovativeness, cross-functional dissemination of market information, information provision by suppliers, centralization or an innovation stimulus from customers or suppliers. This implies that these organizational and supply chain characteristics seem to ‘lift’ the effects of deliberate strategic learning mechanisms for recognition, channeling recognition capacity to the creation of concrete SIinitiatives. In this case, the introduction of deliberate strategic learning mechanisms for recognition is useful in and of its own. Moreover, centralization and the innovation stimulus

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from customers or suppliers also weaken the (mediating) effects of deliberate strategic learning mechanisms for assimilation, increasing the strength of deliberate strategic learning mechanisms for recognition all the more.

- the cross-functional dissemination of market information, information provision by customers, centralization, and all moderators related to supply chain innovation stimulus diminish or even eliminate the effectiveness of deliberate strategic learning mechanisms for transformation. The establishment of deliberate strategic learning mechanisms for transformation in companies characterized by these 'side-conditions', seems hence entirely useless at first sight.

We have made a first attempt to interpret and elucidate these effects, yet, the exploratory character of the research questions (essentially due to the 'flow' character of the independent variables), makes further research appropriate to study these potential effects in a more detailed way.

CONCLUSIONS

SYNTHESIS OF THE STUDY

This PhD study is motivated by a search for managerial mechanisms firms may use to foster their capacity to systematically create strategic innovation initiatives.

Based on a literature study of contributions in the areas of strategic innovation, and related concepts in the managerial and scientific literature, first a definition of strategic innovation is developed. We define strategic innovation in the following way:

Strategic innovation entails the creation of new and substantially superior customer value by a new and fundamentally different way of playing the game in an existing industry. It implies the deviance from traditional industry assumptions and conventions and, as such, has the potential of altering the rules of the game in an industry.

Strategic innovation can be achieved by redefining the business model and the roles and (power) relationships in the industry.

As empirics demonstrate the value of continuous strategic innovation (e.g., Larsen et al., 2002, 2003; Govindarajan & Trimble, 2004), we take strategic innovation capacity as the dependent variable in our study. We define strategic innovation capacity as *an organization's capacity to systematically create strategic innovation initiatives.*

Our quest for specific managerial mechanisms embarks with a theoretical integration of the concepts of dynamic capabilities, absorptive capacity and strategic innovation. A further study on recent literature streams on routines enables us to finally identify semi-structured, strategic learning mechanisms. We furthermore contend that firms may deliberately establish these strategic learning mechanisms. We argue that the establishment of such 'deliberate strategic learning mechanisms for recognition, assimilation and transformation', as we call them, may foster strategic innovation capacity on two different levels. The first level is the most obvious one. Relating absorptive capacity explicitly to the literature on strategic innovation and to cognitive theories of sensemaking, we detect aspects in the three absorptive capacity dimensions that are pivotal to promote path-loosening effects. We propose that strategic learning mechanisms fostering especially these aspects may foster strategic innovation capacity.

Secondly, the semi-structured nature of these mechanisms promotes agency and hence cranks up routines' endemic change potential. In this sense, deliberate strategic learning mechanisms do not only foster the path-breaking elements in the generation and organization of market knowledge (say, absorptive capacity), but they also hold the key to relaxing the constraints on path dependency in the *development process* itself of these aspects (Coombs & Hull, 1998).

Based on a 'QUAL→QUAN' research design we study the effectiveness of such deliberate strategic learning mechanisms for strategic innovation capacity empirically. Inspired by the conceptual study, we select and study real strategic innovation initiatives and strategic innovators (business units or companies with a high level of strategic innovation capacity) during the qualitative phases. The qualitative findings, enriched by existing conceptual insights, enable us to identify, select and operationalize relevant (sub)constructs, and to

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formulate hypotheses regarding partial mediation effects among the three categories of deliberate strategic learning mechanisms. Additionally, we formulate research questions concerning the effects of several organizational and supply chain ‘side’-characteristics on the effectiveness of deliberate strategic learning mechanisms. The hypotheses and research questions are further validated in a partial least squares-study of a sample of Dutch industrial firms.

Our empirical results enable us to distinguish several relevant path-breaking focus areas in a firm’s recognition, assimilation and transformation capacity.

Our findings regarding recognition refute the value of the prevailing ‘market-driven’ market orientation (Narver & Slater, 1990; Kohli & Jaworski, 1990; Deshpandé et al., 1993) in the case of frame-breaking innovation. Yet, our results also take the edge off skeptics’ warnings against the blinding effects of the market orientation construct (see e.g., Christensen & Bower, 1996; Hamel & Prahalad, 1994b). Empirical evidence is found for the modern ‘proactive’ market orientation view (Slater & Narver, 1998; Narver et al., 2004).

Our findings related to assimilation capacity support the insights of extant sensemaking and strategic innovation literature regarding the value of interpersonal discussion and reflection upon customers, markets and the marketing approach (e.g., Louis & Sutton, 1991; Markides, 1997, 1998).

Finally, our results on transformation capacity corroborate the theoretical distinction between the internal and external facets of frame-breaking innovation. We find early empirical support for Baden-Fuller’s (1995) belief in the superiority of innovations producing large external effects (industry rules) while imposing only small internal effects (competence leverage).

The QUAN results substantiate the usefulness of deliberate strategic learning mechanisms for the creation of strategic innovation capacity. The three hypotheses formulated are all confirmed as well. These findings imply that the effects of deliberate strategic learning mechanisms for recognition are mediated by deliberate strategic learning mechanisms for assimilation and transformation (H1 and H2). Furthermore, the effects of deliberate strategic learning mechanisms for assimilation are in turn mediated by deliberate strategic learning mechanisms for transformation (H3). In other words, deliberately enhancing recognition capacity will only fully affect strategic innovation capacity on the condition path-loosening elements in assimilation and transformation capacity are triggered as well. In turn, fostering assimilation capacity will only fully affect strategic innovation capacity if transformation capacity is triggered as well. Our findings provide empirical evidence for the argument that the different dimensions of absorptive capacity build upon each other (e.g. Zahra & George, 2002; Lane & Lubatkin, 1998): stimulating just one dimension limits its full potential.

Yet, the partial character of the mediation effects suggest the importance of ‘stock’ effects of recognition, assimilation and transformation *capacity*, associated with a firm’s unique characteristics and history.

In particular, the large direct effect of deliberate strategic learning mechanisms for assimilation is a striking result. The effect size of deliberate strategic learning mechanisms for assimilation moreover surpasses this of deliberate strategic learning mechanisms for

transformation, hence suggesting the superiority of the former as a stimulator of strategic innovation capacity. Firstly, this finding may provide evidence for the argument that, despite the beneficial effects of sensemaking in action (e.g., Weick, 2002; Bogner & Barr, 2000), in the case of strategic innovation, learning at a cognitive level is more fundamental than learning at the action level (Rajagopalan & Spreitzer, 1996). Secondly, assimilation capacity may be more susceptible to deliberate stimulation efforts than is transformation capacity. In this way, the emphasis much of the sensemaking literature has put on *steering* cognitive aspects (e.g. Thomas et al., 1993), more than behavioral aspects, seems corroborated. A third reason may be found in our operationalization of strategic innovation capacity. Our focus on a business unit's capacity to systematically create strategic innovation *initiatives*, stands somewhat midway between full exploitation (successfully commercialized) and full exploration (ideas, concepts not yet materialized in any way). This would explain a lower need of any behavioral transformation. Fourthly, findings may point to the existence of a so-called 'transformation platform' that may leverage the implementation of more than only one strategic innovation initiative. A final reason may point to the appropriateness of different ambidexterity strategies for the initiation versus implementation stages of strategic innovation initiatives.

Finally, we find that different organizational and supply chain characteristics considerably enhance a business unit's strategic innovation capacity. First, we find that firms⁴⁵ emphasizing innovative and risk taking values, with a centralized structure, where market information is cross-functionally disseminated or where customers provide much information or highly stimulate the business unit to innovate all gain significantly higher levels of strategic innovation capacity.

Different organizational and supply chain characteristics impact on the effectiveness of deliberate strategic learning mechanisms as well. The establishment of deliberate strategic learning mechanisms is especially effective in organizations with an innovative culture, that disseminate market information cross-functionally, where suppliers provide much information, or in organizations operating in an adverse chain climate.

The establishment of deliberate strategic learning mechanisms for all three categories of recognition, assimilation and transformation capacity proves especially beneficial in firms characterized by high levels of innovativeness, risk taking, or information provision from suppliers. In these cases, deliberate strategic learning mechanisms for assimilation and transformation function as important channels for recognition and assimilation capacity. Still, innovativeness, cross-functional dissemination of market information, information provision by suppliers, centralization or an innovation stimulus from customers or suppliers seem to channel the effects of deliberate strategic learning mechanisms for recognition directly to the creation of concrete strategic innovation initiatives. In this case, the introduction of deliberate strategic learning mechanisms for recognition is also very useful in and of its own. Centralization and a large innovation stimulus from customers or suppliers moreover weaken the (channeling) effects of deliberate strategic learning mechanisms for assimilation, increasing the strength of deliberate strategic learning mechanisms for recognition all the more. Finally, the cross-functional dissemination of market information, information provision by customers, centralization, and all moderators

⁴⁵ For reasons of clarity we use the term 'firm' or 'organization' in the remainder of the Conclusions. In fact, we should say 'business unit (or firm for single-unit firms)'.

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related to a supply chain innovation stimulus diminish or even eliminate the effectiveness of deliberate strategic learning mechanisms for transformation. The establishment of deliberate strategic learning mechanisms for transformation in companies characterized by these side-conditions seems hence entirely useless at first sight.

CONTRIBUTIONS TO THEORY

Refinement, integration and operationalization of theoretical concepts

A first contribution of our study lies in the development of several concepts, in terms of theoretical refinement, in terms of empirical operationalization and in terms of conceptual integration.

Firstly, our study adds to the literature on strategic innovation by the more fine-drawn delineation of the strategic innovation-concept. Although different scholars have marked the value of strategic innovation to counter hypercompetition and commoditization tendencies that intensify strategy-convergence (e.g., Markides, 1999a; Baden-Fuller, 1995), largely stemming from a managerially-oriented research tradition, contributions on strategic innovation predominantly lack scientific rigor, despite their promising ideas and instruments. Discussions regarding the properties of strategic innovation are often replete with rhetoric and counter-rhetoric, and pay only scant regard to definition or exactitude. Being conceptually underdeveloped the concept of strategic innovation hence runs the risk of many other managerial concepts that temporarily enjoy great popularity, but remain supported mainly by examples or anecdotes instead of being subjected to rigorous testing (Simonson, 2005). Providing the concept with a more rigorous underpinning is hence essential for the concept to be more than just 'a managerial fad' (Markides in Mang, 2000). Therefore, chapter 1 was entirely devoted to the theoretical enrichment of the strategic innovation-concept. We systematically inventoried all publications on strategic innovation and on related concepts (e.g. value innovation, disruptive innovation) in order to detect any underlying theoretical patterns. These insights were further contrasted to scientific contributions regarding the concept of 'strategic renewal'. Since no single description contained within the sources examined was sufficiently inclusive to represent the meaning of all others, a definition of strategic innovation was developed incrementally. This definition represents the range and variety found within all sources evaluated.

The lack of any clear definition of strategic innovation in the literature is reflected in the non-existence of any validated measure to operationalize the concept. Strategic innovation was operationalized in our study by measuring a business unit's level (or firm's level for single-unit firms) of 'strategic innovation capacity'. Although we faced the scientific quandary of measuring issues of change (Bergh & Fairbank, 2002), the conceptual definition developed in chapter 1 and the findings of the qualitative phase enabled us to finally develop a reflective multi-item measure for strategic innovation capacity.

Finally, the empirical study sheds further light on the specific mechanisms firms can use in developing strategic innovation capacity, and on the additional influence exerted by different organizational and supply chain characteristics. In this way, we attempted to enhance both the theoretical development and the managerial relevance of the concept of strategic innovation capacity.

Next to a conceptual and empirical demarcation of strategic innovation, we integrated the concept of strategic innovation capacity with the concepts of dynamic capabilities and

absorptive capacity. In this way, we respond to the often-heard critique on management research that different concepts are not sufficiently linked and do often not build on each other. This creates confusion and prevents the field from progress in theoretical insights (e.g., Markides in Mang, 2000).

Firstly, by linking the dynamic capabilities concept to strategic innovation capacity, we managed to tackle the tautology and vagueness of the dynamic capabilities concept that researchers on the resource-based view have often been blamed of. Following Zahra & George (2002) in their conceptualization of dynamic capabilities as absorptive capacity-processes and -routines, the concept becomes much more concrete. Demarcating specific path-breaking areas in the absorptive capacity-dimensions of recognition, assimilation and transformation, we did a further attempt to make the abstract concept of dynamic capabilities more tangible and action-oriented. This furthermore implies that we follow the assumption that dynamic capabilities, albeit a strategic factor, reside at the operational level within firms and not at the aggregate firm level (Ethiraj et al., 2005). Ethiraj et al. (2005) have indeed fiercely criticized the aggregate measures for capabilities, such as overall firm R&D intensity, frequently used in the literature. Aggregate measures, they argue, provide little insight into the specific micro-foundations of capabilities; they do not provide any clear answer to the ‘how’ and ‘why’ of inter-firm differences. Focusing our attention on specific managerial mechanisms that foster recognition, assimilation and transformation capacity, our results provide further insight into the intentional learning mechanisms firms may establish to develop dynamic capabilities, and to steer their development path (Eisenhardt & Martin, 2000).

Secondly, relying on this conceptual integration of the three basic constructs, we also did a first attempt to specify the absorptive capacity construct in the context of strategic innovation. The value absorptive capacity has been traditionally ascribed with in the area of technological innovation (e.g., Cohen & Levinthal, 1990) has been extended to the strategic innovation arena. Conceptualizing three absorptive capacity dimensions as important determinants of strategic innovation capacity, we answer Lane et al.’s (2002) critique that absorptive capacity researchers have so far been unable to stretch the concept beyond a pure R&D context (see also Lane & Lubatkin’s (1998) critique on R&D spending as an overall measure of absorptive capacity). Furthermore, focusing on the three antecedent-dimensions for strategic innovation capacity, we attempt to respond to Almeida et al.’s (2003) call to not just study the processes but the underlying capabilities firms rely on to manage knowledge for innovation. Studying deliberate strategic learning mechanisms that target three dimensions of absorptive capacity we furthermore try to disprove Lane et al.’s (2002) critique that absorptive capacity research to date pays too little attention “to the actual processes underlying absorptive capacity” (: M4), this despite Cohen & Levinthal’s (1990) original stress on the need to study organizational mechanisms for absorptive capacity *development*.

In addition, so far, contributions to the measurement of absorptive capacity have been poor (Van Den Bosch et al., 2003). Regarding possible operationalizations of the different absorptive capacity dimensions, Zahra & George (2002) encourage researchers to “focus on the routines and processes that organizations use to acquire, assimilate, transform, and exploit knowledge” (:199). Liao et al. (2003) have made a call for a more fine-grained, multi-item index of absorptive capacity. To date, researchers seriously lack consensus on how to measure the different dimensions of absorptive capacity (Lane et al., 2002), let alone on the underlying mechanisms to stimulate them. Linking the absorptive capacity

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concept to the strategic innovation domain, a first attempt has been made to operationalize learning mechanisms for the development of different absorptive capacity-dimensions. More specifically, founding our argument on cognitive theories (e.g. Thomas et al., 1993), we argue that deliberate strategic learning mechanisms influencing specific aspects of three absorptive capacity-dimensions could loosen path dependencies. To this end, specific elements indicated in the strategic innovation and sensemaking literature were incorporated into the three absorptive capacity dimensions, and formative multi-item indexes were built.

Zahra & George (2002) furthermore mention the value of both interview and survey methods, to capture the ongoing practices for absorptive capacity in firms. This recommendation has also been echoed in Van Den Bosch et al. (2003). Using a mixed method research design we tried to answer this call as well. The value that deliberate strategic learning mechanisms for absorptive capacity may have for a firm that attempts to create strategic innovation capacity, was empirically verified in both a qualitative and quantitative way.

Mixed method management research

Methodologically, our research design shows that mixed method research is to be considered a viable design for (strategic) management research (Creswell et al., 2002). The combination of a 'QUAL→QUAN' design (Tashakkori & Teddlie, 1998; 2003a) with Orton's (1997) iterative research process demonstrates how different research methods can be combined to develop a nascent theoretical model on new and immature management concepts and phenomena (Currall & Towler, 2003). We think the ultimate value of the mixed design reveals itself in the discussion of the findings of the quantitative phase, where findings could be interpreted by means of the insights of the prior qualitative research phases.

Traditionally, mixed method research has been promoted chiefly because of its potential to combine the methodological weaknesses and strengths of different research methods. Yet, we think our research gained as much in scientific soundness, as it did in managerial relevance. The insights from the different qualitative phases enabled us to translate abstract research concepts into concrete managerial mechanisms, of which the effectiveness could be validated on a larger scale by means of survey research. We hence fully share Rocco et al.'s (2003) assertion that in generating broader and deeper insights than mono-method research, mixed method studies have the potential to be more useful to managers as well.

Path-breaking focus areas

Our empirical results reveal several path-breaking elements in a firm's recognition, assimilation and transformation capacity that a firm can deliberately foster.

Regarding recognition capacity, our findings confirm the usefulness of recent contributions on market orientation research (e.g., Narver et al., 2004), and extend the value of a 'proactive market reorientation' to the domain of strategic innovation. Our results regarding assimilation shed doubt on the overstated value of firms' knowledge codification efforts. We hope that our findings relating to assimilation capacity will trigger researchers who study the link between knowledge management systems and frame-breaking innovation, to abandon their overly focus on information codification and filing by means of ICT-tools, in favor of methods that target the sensemaking system in itself (Dougherty et al., 2000).

Finally, our study on the path-breaking areas in transformation capacity points to a fruitful integration of research on architectural innovation, partnerships and alliances and strategic innovation.

Deliberate management and auto-evolution

Focusing our attention on deliberate strategic learning mechanisms that stimulate the path-breaking focus areas in recognition, assimilation and transformation capacity, we follow research in the conceptual domain of entrepreneurship, which has broadened from traditional questions of entry to management processes used to have the organization act entrepreneurially (Matsuno et al., 2002). We moreover share Ray et al.'s (2004) view that this focus on concrete management processes could turn the resource-based view of the firm much more managerially relevant. In this way, we also try to respond Thomas et al.'s (2001: 332) remark: "While a consensus has emerged that a strategic learning capability is an important one, there is a paucity of empirical research illustrating particular practices that organizations can institutionalize to achieve it".

Our empirical study demonstrated their relevance in fostering a firm's innovative capacity. Our results hence provide evidence for the argument that second-order competences may mitigate the effects of path dependencies (Danneels, 2002), and that moreover the development of such second-order competences can be deliberately stimulated. The high significance of deliberate strategic learning mechanisms for assimilation, in particular, validates the assertion that a) cognitive change can prevent the competency traps induced by local, experiential search (e.g., Gavetti & Levinthal, 2000), and b) this cognitive change can be deliberately triggered and institutionalized in the operating core (e.g., Bogner & Barr, 2000). This finding consequently questions the famous, though empirically under-investigated (Adler et al., 1999), exploration-exploitation (Levinthal & March, 1993), flexibility-efficiency (Adler et al., 1999), or double loop-single loop learning (Argyris & Schön, 1978) trade-off prevalent in organizational theories, and suggests the possibility of a recursive and even co-evolutionary relationship between exploitation and exploration (King & Tucci, 2002; Zollo & Winter, 2002; Ahuja & Katila, 2004).

Overall, despite the path-loosening effects of deliberate strategic learning mechanisms, the *partial* character of the mediation effects confirms the idea that deliberate strategic learning mechanisms do not operate on 'empty canvasses' (Ray et al., 2004), and that important stock-effects of the organization's recognition, assimilation and transformation *capacity* should be taken into account. Furthermore, the limited effect we found regarding deliberate strategic mechanisms for transformation may suggest a lower effectiveness of deliberate strategic learning mechanisms to foster path-breaking behavior (versus cognition). Although we argued that multiple arguments can be brought up to explain this remarkable finding, we think that in particular the creation of transformation 'platforms' and the need for the parallel implementation of multiple ambidexterity strategies for the initiation and implementation stages of strategic innovation initiatives, may prove viable future research routes. The results of our moderator analysis furthermore illustrate that organizational and supply chain side-conditions exert important influences on the effectiveness of deliberate strategic learning mechanisms as well.

In this respect, our results validate recent ideas from strategic choice theory (Child, 1997) that the impetus for organizational change comes both from strategic choices and from the auto-evolution of the system itself (Deneault & Gatignon, 2000).

MANAGERIAL IMPLICATIONS

The managerial relevance of our study logically flows from our research object: *deliberate* strategic learning *mechanisms*. We admit that a good strategy is always part foresight, part serendipity (Hamel, 1998b). Yet, our findings illustrate how serendipity can be increased, just as the creation of strategic innovation initiatives can be stimulated.

In other words, our results provide managers with the evidence that deliberate interventions can indeed foster strategic innovation capacity. Our findings show that the strategic innovation capacity of a firm is far more dependent on the establishment of such tools than on its position in the supply chain, its size and the fact whether the firm is primarily a product or a service provider. Such results hence enfeeble excuses that a firm's limited market insight is entirely due to for example its upstream position in the supply chain or its large (or small) size.

Moreover, these mechanisms are real, concrete tools to stimulate the strategic innovation capacity of a firm. Deliberate strategic learning mechanisms are relatively easy to implement and hence provide managers with handles to stimulate strategic innovation capacity on a much shorter term than can be done by the creation of generally cited enablers such as an innovative organizational culture (e.g., Markides, 1999a).

The mechanisms focus on three aspects: the stimulation of the business unit's capacity to *recognize* new external customer/market information, the business unit's capacity to *assimilate* this information, and the business unit's capacity to accordingly *act* on this (i.e. change behavior).

Our results show that a firm may stimulate its capacity to recognize new valuable information about customers and markets, by the development of a deep learning relationship with customers. Attentive listening to customers and closely studying their different buyer experience stages seem crucial. Furthermore, firms need to think about the effects changes in the business environment may exert on the needs of their customers and they should broaden their market research towards the study of non-customers. New value propositions can be discovered by linking these data to the firm's competencies. In particular a consultation of the most innovative customers for innovative ideas seems highly valuable. Yet, large-scale market research (such as customer satisfaction surveys) and desk research on general industry or societal information prove no discriminating factors. These findings all point to a new, extended role for account managers and all 'people in the field' (such as service engineers) as 'market and idea antennas'. It furthermore questions the value of separate –detached– business development departments for the initiation of strategic innovation initiatives.

In addition, we find that a business unit's capacity to critically reflect on its prevalent assumptions about the market, customers and the marketing approach is pivotal in the creation of strategic innovation capacity. Furthermore, these discussions should involve different organizational functions, such as business unit management, sales, and marketing. Codifying knowledge on the intranet or on other storage media is ineffective since not used. We hope these findings will restrain firms from their inclination to become "information-rich, but interpretation-poor systems" (Prahalad & Bettis, 1995: 6). These findings have implications for the implementation of knowledge management as well. Tsai & Shih (2004) demonstrated that firms can enhance their marketing capabilities by the application of 'marketing knowledge management'. Our results however demonstrate that

organizations should balance their knowledge codification efforts with a stimulation of conversations, critical discussions and market information flows. With respect to the latter, Day (2002) has pleaded for 'maps of the market-learning processes' in the organization. These maps describe in detail the market information flow in the organization: for example, where does the information enter the organization, how is it distributed and how can it be retrieved?

Thirdly, to stimulate actual behavioral transformation, the use of scenario patterns seems highly useful. General blueprints limit implementation chaos and describe in advance how processes may be adjusted. Furthermore the adjustment of the organizational structure, especially by the set-up of separate units and project-teams for the roll-out of initiatives, is critical. These units should however keep tight bonds with the rest of the organization. For example, employees are part-time or temporarily detached to these units. Units operate under different brand names to increase market acceptance and to better cope with potential brand interference.

The effectiveness of these different categories of mechanisms shows a reverse pyramidal structure: if firms want to gain full effects of these mechanisms, all three categories of learning mechanisms should be established. In other words, new market information is leveraged by mechanisms that foster a critical discussion of this information. In turn, mechanisms fostering behavioral change are needed to channel the effects of both the other categories. Strategic innovation capacity can hence be stimulated best when all mechanisms are in place.

Yet this is not always the case. Specific characteristics of the organization and the supply chain in which it operates, exert considerable influences. Organizations with an organizational culture that values openness towards innovation, organizations that manage to disseminate market information well across the different organizational functions, or organizations where decision authority is largely centralized gain a direct value from mechanisms that stimulate market insight. In other words, stimulating the recognition of new, valuable market information will directly lead to new strategic innovation initiatives. This is also the case for firms that gain much market information from their suppliers or that are highly stimulated by their suppliers or customers to innovate (e.g. firms with many customer- or supplier-partnerships for innovation projects).

The existence of some organizational characteristics may even make the stimulation of behavioral change completely useless. This is the case in organizations with a centralized organizational structure, or organizations where market information is well cross-functionally disseminated. This is also the case for several supply chain conditions: if customers share much information through normal working relationships, if there is little hostility among the different vertical supply chain links, and if either customers or suppliers largely stimulate the firm to innovate.

The beneficial effects of supply chain characteristics on the creation of strategic innovation capacity should convince managers to develop a strategic view on how they can leverage the knowledge embedded in networks and the supply chain. They should develop competences that can extract the maximum of information and knowledge out of network partners. The latter often implies a more strategic and long term view on supply chain relationships.

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Finally, Slater & Narver (1998) cite Drucker (1974) that the two essential activities of business are innovation and marketing. Furthermore, as confirmed in empirical studies, marketing strategy and market orientation type should match business strategy (e.g., Slater & Olson, 2001; Tuominen et al., 2004). Hence, our results have also specific implications for the marketing function in firms. More specifically, our study demonstrates that fostering an organization's strategic innovation capacity requires a balanced and integrated marketing approach. Investments in external information acquisition (the most traditional role of marketing) will not lead to new customer value creation when the other two areas (assimilation and transformation) are neglected.

First, because of its external focus the marketing department is well positioned to stimulate the outside-in process of market sensing (Day, 2002). Traditional market research methods should however be complemented with the use of nontraditional outside information sources, such as own customer visits. In this way, the critique on marketing departments for having lost market feeling, and for being too 'model-driven' may be tempered. Since our results show how the generation of deep insight into the market is not confined to the marketing function, marketers should actively involve other organizational functions in the generation of market information (Slater & Narver, 1995). Furthermore, we share Danneels' (2002: 1113) view that a second-order competence for assessing new markets (the ability to learn new domains) "could be considered as a marketing competence proper, operating at a higher level than a market or customer competence". In this respect, marketers can even become the 'haulers' of strategic innovation, by collecting market information dispersed in the organization, by triggering collective reflections on the market, and by translating these reflections into new concepts for strategic innovation initiatives. They should however mobilize different organizational functions in this process. Indeed, and in line with the market orientation literature (e.g., Slater & Narver, 1999), our study suggests that marketing activities are not the sole responsibility of the marketing department. Deliberate strategic learning mechanisms should be anchored within the entire organization. Hence, the value of deliberate strategic learning mechanisms evidence Harris' (2000) marketing paradox that developing an *external* orientation (towards the creation of fundamentally new and superior customer value) chiefly rests on *internal*, organizational characteristics.

LIMITATIONS OF THE STUDY

Despite the study's contributions to theory and practice, several limitations merit further discussion.

This study aimed to gain deeper knowledge on deliberate mechanisms firms may use to stimulate their strategic innovation capacity. Taking strategic innovation capacity as the dependent variable in this study carries with it two important conceptual limitations. Firstly, although our qualitative research sheds some light on the usefulness of strategic innovation as a growth strategy in competitive and commoditized Dutch industrial markets, a study on the benefits of such a strategy was no research goal as such. This implies our findings do not enable us to pronounce any normative judgments upon the appropriateness of strategic innovation as *the* strategic route to pursue.

Secondly, our focus on strategic innovation *capacity* bears with it an emphasis on the initiation and preliminary implementation phases of innovation projects, this to the detriment of aspects related to actual commercialization and market roll-out. The success factors of strategic innovation initiatives in terms of market growth or increased financial benefits were not explicitly taken into account.

Furthermore, taking deliberate strategic learning mechanisms as the independent variables in our study implies a focus on ‘flow’ variables. Additional effects of firms’ stocks of recognition, assimilation and transformation capacity were not given explicit research attention. Still, the findings of the qualitative research and the observation of the partial nature of mediation mechanisms point to a considerable influence these stock effects may exert on the effectiveness of deliberate strategic learning mechanisms. In other words, although our focus on concrete mechanisms enhanced managerial relevance and concretized some of the vague theoretical concepts, it considerably complicated the interpretation of the quantitative results as well. In the concrete, nonsignificant path estimates (ineffective mechanisms) may be attributed to a) a lack of organizational conditions needed to leverage the mechanisms’ effects, or in contrast b) the existence of a well-developed capacity, turning the establishment of deliberate mechanisms to foster this capacity even more, redundant.

Methodologically, several additional limitations should be noted. Although the combination of different research methods partly compensates for the weaknesses of each method in isolation, still, methodological limitations do arise.

First of all, the level of analysis of the entire study was the organization or business unit. Due to resource constraints, our data collection and analysis strategies (single-informant) assumed homogeneity among organization members regarding the constructs under study. To prevent level of analysis fallacies, this homogeneity should be further demonstrated by means of for example multi-level studies where data on an individual level are aggregated to the firm level. Indeed, only variables that prove to be homogeneous *within* companies can predict *between*-company differences (Klein et al., 1994).

As regards the qualitative phases, the QUAL2-phase led to an unequal harvest of strategic innovation initiatives across the five sectors. The confidential and strategic character of strategic innovation initiatives refrained different parties from (extensive) participation in the study. Although we triangulated the QUAL2-data on several different levels, we were unable to extend the study of these strategic innovation initiatives to full case-study research. Presumably, a deeper study of these strategic innovation initiatives would have provided a richer insight into the specific process characteristics associated with the creation of strategic innovation initiatives. In addition, both the qualitative and the quantitative study targeted firms in Dutch industrial sectors. Although we think our results may be generalizable to other Western-EU industrial sectors, findings may prove nontransferable to non-EU, or to non-industrial sectors.

The quantitative study brings several additional methodological limitations to the surface. First of all, findings may be less generalizable to small service firms. Finally, the use of the partial least squares method confirms the exploratory character of the study. Flexibility of analysis was prioritized over statistical inelegance. The choice for PLS reflects our preference for content validity (e.g. the use of formative indicators) over statistical conclusion and external validity in the exploratory phases of research, this against

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predominant traditions in management and marketing research. Moreover, the cross-sectional nature of our analysis did not enable us to fully test for the causal sequence that is implied in our conceptual model, let alone for important feedback effects among the variables studied. We recognize this as one of the most important shortcomings of our study and support the warnings expressed by Woodside (2005) and Laurent (2000) to resist the temptation to trade-off complexity and nuance for the sake of a parsimonious structural equation model. A longitudinal research design seems necessary to further validate the claims of causality and feedback effects. We were however not able to integrate this into this PhD project due to time and resource constraints. The 'QUAL→QUAN' research design we applied was already very demanding in terms of time, resources and methodological knowledge.

FUTURE RESEARCH DIRECTIONS

As is often the case in research, our study has generated at least as many questions as it answers. Evidently, there are a number of areas that require further exploration, some of which we touch on here.

Our study of the path-breaking focus areas suggests useful insights may come from a better integration of marketing and (strategic) management research. We hope market orientation researchers will broaden their focus from traditional product innovation outputs towards the domain of frame-breaking strategic innovation as well. More specifically, extending research on market orientation to study its effects on innovation types that challenge the industry rules of the game may dismiss skeptics' critiques on the blinding effects of the market orientation construct (e.g., Christensen & Bower, 1996).

Furthermore, further study should be devoted to the internal competence effects strategic innovations may produce. Studies that integrate insights on architectural innovation, competence leveraging and the value of partnerships in this, may further validate (or reject) our finding that strategic innovations rest on leveraging the existing competencies, more than on a complete competence redefinition. In this respect a stronger integration of research on strategic renewal and strategic innovation seems a promising avenue.

We hope furthermore that our results may inspire researchers to delve deeper into the study of potential moderating effects, since both the absorptive capacity and the strategic innovation literature lack clear documentation and justification of potential moderators (Van Den Bosch et al., 2003; Daghfous, 2004).

More specifically, we studied the effects of different organizational and supply chain side-conditions in isolation. It is however plausible that the combined effects of different moderators may produce different effects. Further research may combine these isolated effects into more complex moderation analyses. Our moderator analysis for the effect of supply chain innovation stimulus suggested furthermore the potential occurrence of mediated moderation effects. More specifically, we posited that the effects of an innovation stimulus from customers or suppliers may enhance the cross-functional dissemination of market information, which may in turn affect the effectiveness of deliberate strategic learning mechanisms. In addition, we argued how the effects of general chain climate may be channeled through its effect on partnerships for SI. We hence

followed Baron & Kenny (1986) that results of a moderator analysis should suggest potential underlying mediating mechanisms through which the moderator effect takes place. Future research attempts may study the mediating mechanisms suggested here.

The central role of partnerships with intra-industry and industry-foreign partnerships also questions the overly stress researchers on customer and supplier co-operations (e.g., IMP) have traditionally put on their beneficial effects in terms of efficiency gains (e.g. logistics). We would like to make a plea for the extension towards more strategic areas, such as the benefits that innovative co-productive relationships may have for the reconfiguration of industry roles and the creation of fundamentally new and superior customer value (e.g. Normann & Ramírez, 1993; Ramírez, 1999).

In addition to these research directions, directly resulting from our findings, we think our research opens up additional research opportunities.

Stock and feedback effects

The results of our research make a further search on the potential stock effects of recognition, assimilation and transformation capacity indispensable. For example, the interpretation of the causes of moderator effects was considerably complicated by the stock effects these moderators may produce on a firm's recognition, assimilation and transformation capacity. A more detailed study on stock effects seems hence appropriate to validate the tentative findings on moderating effects.

The importance of 'stock' effects of recognition, assimilation and transformation capacity, also points to the benefits of further research on positive and negative feedback loops and vicious cycles. The literature has indeed shown that innovation is a dynamic process, influenced by multiple variables that are interconnected in various feedback processes (e.g., Koput, 1997; Amis et al., 2004).

Firstly, deliberate strategic learning mechanisms fostering strategic innovation capacity may set into motion a self-reinforcing cycle of strategic innovation capacity.

It has been argued that the breadth of a firm's experience base positively affects the breadth of its assimilation structures. For example, Hargadon & Fanelli (2002) indicate that pluralism in mental schemata can be triggered by a diverse set of experience. This is because contextual variations may increase a firm's ability to change or broaden its shared managerial schemas (Dijksterhuis et al., 1999). As a result, assimilation can accommodate more diverse external signals and is hence less likely to be based in existing capabilities. In this way, broader experiences diminish the detrimental effects of path dependencies (Jarzabkowski, 2004). Since strategic innovation capacity entails by definition 'the capacity to systematically create strategic innovation initiatives', and since each strategic innovation initiative is characterized by 'the deviance from traditional assumptions and conventions', strategic innovation capacity can be assumed to broaden the organization's experience base. In a similar vein, Weick (2002) has elaborated on sensemaking by/in action. This action-based sensemaking stresses once more the value of experimental action (strategic innovation capacity) to improve or adapt sensemaking (Bogner & Barr, 2000). Following this line of logic, some authors in the field of strategic innovation have asserted that initial expectations can enhance through experiential learning across different strategic innovation initiatives (Govindarajan & Trimble, 2004; Hamel & Getz, 2004). It can indeed be argued that over time successful strategic innovation initiatives are considered (and promoted by the firm's management) as tangible manifestations of the value of path-breaking elements in absorptive capacity. In this respect, high levels of strategic innovation

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capacity may be expected to trigger absorptive capacity, which in turn stimulates an organization's strategic innovation capacity all the more. In this respect, path dependencies are not only diminished in cognition, but in action as well (experimenting with strategic innovation initiatives) (Danneels, 2003)⁴⁶. Yet, negative feedback effects may occur as well. Koput (1997) argues that a trade-off between search and implementation may take place in the sense that a higher number of strategic innovation initiatives may require more selection, implementation and roll-out efforts, taking organizational attention away from new search efforts needed for the creation of new, additional strategic innovation initiatives.

The feedback effects that deliberate strategic mechanisms for recognition, assimilation and transformation may produce remain however more difficult to predict. In line with Cohen & Levinthal (1990), Van den Bosch et al. (1999) argue that absorptive capacity promotes expectation formation (the belief in the value of exploration and absorptive capacity). Deliberate strategic learning mechanisms, triggering absorptive capacity may in this sense stimulate expectation formation. This expectation formation may in turn intensify the effort to deliberately influence the determinants of absorptive capacity, which in turn will foster absorptive capacity, etc. Hence, the establishment of deliberate strategic learning mechanisms may activate a self-reinforcing cycle of deliberate stimulation efforts. Alternatively, the increased absorptive capacity produced by deliberate strategic learning mechanisms may also lower the need for any formal stimulation mechanisms, which would point to the existence of a self-destructing cycle of deliberate stimulation efforts.

Since the determination of the precise direction of causality in a strategic relationship is a major challenge in business research (Hurley et al., 2005: 282), future research attempts should explicitly incorporate the further study of these feedback effects. Repenning's (2002) results on innovation implementations show however that "relative simple theories, if they include multiple feedback relationships and time delays, can create complicated behaviors that are hard to anticipate via intuition" (: 126). Future studies on these feedback effects are hence far from evident and require more advanced methodological approaches, such as longitudinal and multi-level studies.

Process studies

The importance of deliberate strategic mechanisms shows that senior management can enable strategy to 'emerge' by formulating the right set of organizational preconditions (Hamel, 1998b). Our study brings the process aspects of strategy to the forefront, after years of an overly emphasis on context and content aspects of strategy (Hamel, 1998b; Bogner & Barr, 2000). In this way, the strategy creation process is not restricted to a mechanical, top-down, 'directed' process. Instead, top management creates the appropriate system of context and incentives for nurturing the organic and emergent nature of this process (Leavy, 1997; Galunic & Eisenhardt, 2001). If organizational members have some

⁴⁶ We would however like to stress that these potential positive feedback effects of strategic innovation capacity do not invalidate our previous arguments about the high value direct *cognitive* learning may have in the context of strategic innovation. We only argued that the high effect size of deliberate strategic learning mechanisms for assimilation may be a sign that a direct cognitive change may be *more effective*, or that cognitive change may be *more easy to stimulate* directly.

freedom in pursuing ‘autonomous initiatives’ (Burgelman, 1991), over time the shifting contents of initiatives may bend the strategic intent towards a different direction (Lovas & Goshal, 2000). This process has been well documented in Burgelman’s (1983, 1991) studies of strategic bottom-up initiatives. Top management’s role is hence broadened to facilitating, triggering, and cranking up the organizational variation-selection-retention mechanism (cfr. Lovas & Goshal, 2000). Although our study provides insights into deliberate strategic mechanisms fostering variation, research on the specific selection and retention processes (e.g. screening, budgeting, planning) used in the creation of strategic innovation initiatives could complement our study. Whereas research indicates that cognitive hurdles prevail in reorientation (Kim & Mauborgne, 2003a,b), other hurdles (such as resource allocation and political hurdles) may hinder the actual implementation and roll-out of initiatives. In this respect, our research results may be considerably enriched by case study research providing deeper insights into the processes firms rely on when selecting, implementing and commercializing strategic innovation initiatives.

Such process studies may also validate our tentative propositions regarding the existence of transformation platforms and complementary strategies to manage ambidexterity in the different innovation stages. We think valuable knowledge may be generated when these research projects build upon existing knowledge from the domain of corporate and strategic entrepreneurship (see also Baden-Fuller, 1995). Furthermore, process insights could be borrowed from the strategic renewal and change literature to help open up the ‘black box’ of strategic innovation journeys (Baden-Fuller, 1995).

In this respect, we also see value in the incorporation of the effects of organizational politics on the selection and retention of strategic innovation initiatives. For example, Lawrence et al. (2005) have argued that the processes that lead a selection of new ideas to effective organizational action considerably depend on the political will and skill of the individuals involved. Jarzabkowski (2004: 540) has taken up a more radical position, asserting that: “path creation or change may be viewed as an essentially political process since it involves the mobilization of goals, authority structures, technology, and stakeholders”. This does not imply that power necessarily comprises a dysfunctional aspect, yet, if certain types of power are over- or underdeveloped this may lead to dysfunctional organizational behaviors. For example, Lawrence et al. (2005) distinguish between episodic (e.g., sponsors’ and champions’ informal networks and hierarchical position) and systemic forces (e.g., compensation or accreditation processes) of power. They contend that an underdevelopment of episodic power may inhibit fundamental exploration. Accordingly, unbalanced sources of power may disturb the achievement of an appropriate exploration/exploitation balance. These viewpoints reflect Winter’s (2000) argument that additional factors, such as organizational politics, may determine performance heterogeneity although they have little to do with the technical difficulties of capability development.

Value appropriation

Organizational science is concerned with both behavior and performance (Prietula & Watson, 2000). Our study targeted exclusively the first aspect. In this way we follow the cognitive research tradition on strategic change, by emphasizing aspects of the change creation in itself and not its effects in financial terms (Rajagopalan & Spreitzer, 1996). In doing so, we make abstraction as to the economic and financial consequences of choices in

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the market, i.e. the performance aspects. The latter aspects nevertheless determine the ultimate failure or success of strategic innovation initiatives (Prietula & Watson, 2000).

In other words, we exclusively focused on the 'value' dimension of the value-price-cost framework (Hoopes et al., 2003). Even though the creation of customer value has been considered as cornerstone to a firm's success, it is insufficient to achieve financial success. Despite the wide consensus that customer value drives shareholder value (Payne & Holt, 2001), customer value is neither a sufficient condition for, nor does it automatically lead to shareholder value (Cleland & Bruno, 1996). Even a firm that has created substantially superior customer value may not be able to appropriate the economic rents associated with this value. Both value creation and value appropriation are hence necessary for achieving a competitive advantage, since "Value creation influences the potential magnitude of the advantage; value appropriation influences the amount of the advantage the firm is able to capture and the length of time the advantage persists" (Mizik & Jacobson, 2003: 64). So firms that fail to attach sufficient attention on appropriation are unlikely to reap the competitive benefits of their strategic innovation initiatives.

The importance of new pricing mechanisms for strategic innovation initiatives was spontaneously brought up by strategic innovators during the qualitative research phases. Strategic pricing of a new offering (its exchange value) may be as important as the creation of fundamentally new customer use-value (Sharma et al., 2001). Dutta et al. (2003) describe for example Polaroid's inability to change their pricing processes fit for analog cameras (based on films sold) towards the market of digital imaging technology. Pricing strategy is also a prominent aspect in Kim & Mauborgne's (1999, 2000, 2004) contributions. Markides (in his publications with Charitou, 2003, 2004) and Christensen et al. (2002) stress these same aspects in strategies to scale-up markets for strategic innovations. Yet, literature in industrial marketing, management and economics, generally assuming that firms can automatically impose the 'appropriate' prices, has given only scant attention to a firm's ability to set or change prices (e.g., Hinterhuber, 2004). Dutta et al. (2003) however found that the specific organizational processes firms use for setting or changing prices are a firm-specific capability that may even create a basis for competitive advantage.

Furthermore, as Bowman & Ambrosini (2000) indicated, although value may be created by organizational members, the actual appropriation of value (in monetary terms) is determined by the perceived power relationships between economic actors (buyers and suppliers). Bowman & Ambrosini (2000) hence attach a more external notion to the issue of value appropriation. Mizik & Jacobson (2003) argue that firms that do not have the capacity to lower competitive forces are unable to appropriate the value they created. In this respect, both the resource-based view of the firm, focusing on internal resource idiosyncrasies, and theories of competitive strategy deriving from industrial organization, focusing on a firm's external relationships, each tell half of the story. They complement each other in that the resource-based view tackles value creation (use value) and industrial organization theory focuses on value capture (exchange value).

Further research could hence link our insights on strategic innovation (and the creation of fundamentally new and superior use value) to the study of industrial bargaining relationships. In this way, the assumed relationships between the creation of surplus use value and firm profitability could be tested. After all, it is exchange value that determines a firm's profitability, and it is the prospect of profits that motivates firms to innovate (i.e. to create value) in the first place.

An alternative route is to study the performance effects of strategic innovation strategies. Markides & Charitou (2004) developed a measure to indicate perceived success in adopting a new business model along nine performance criteria. They assert that although self-assessment performance measures may be biased, their reliability has been demonstrated as well. When more objective performance measures are used, the time lapse between the initiation and performance effects of strategic innovation initiatives should be taken into account. Brews & Hunt (1999) found a time lag of 4 years between a new strategy and the performance effects that can be attributed to it. To circumvent this problem, for firms quoted on the stock exchange, stock market data may be used. Mizik & Jacobson (2003) argue that stock market data provide an estimate by financial markets of the total *expected* value of a strategy and are hence a more reliable performance measure than the more traditional measures of sales or profits.

The appropriateness of strategic innovation strategies

Finally, in analogy with for example the literature on organizational learning (Crossan & Berdrow, 2003), strategic innovation research has left practitioners and researchers with an overly normative view of strategic innovation as an exclusively beneficial strategy. Yet, strategic innovation is by definition not always inherently superior to the existing play and is consequently not *the* appropriate prescription for every organization; the question of being better or being different than competitors depends on the organizations' history (core competences) and the industry's evolution and dynamism (Floyd & Lane, 2000; Markides, 2000b). Barr et al. (1992) mention in this respect the probability of making 'type I-errors', meaning that the considerable expenses in time, effort and costs that strategic innovation entails are not always required. Sometimes a nonroutine strategic response is developed when a –far less costly– routine response would have sufficed. Barr et al.'s (1992) view has later been echoed by Winter (2000, 2003), arguing that even though the investments in dynamic capabilities are inefficient if they are not targeted at explicit change efforts, too much change may however increase cost burdens as well if the disruption costs outweigh the benefits that result from a specific change effort. Thus, if opportunities for competitive change are relatively infrequent, firms relying on mere ad hoc problem solving may be at a cost advantage over firms that heavily invested in systematic dynamic capabilities. Indeed, cost differences in resource deployments determine differential firm performance (Zott, 2003). Next to the emphasis Hamel & Välikangas (2003) put on increasing the magnitude and frequency of strategic transformation, they add that the real trick is to simultaneously reduce the investments in it too (i.e. time, expense and emotional energy required to effect the transformations). Principles companies can apply to increase their innovation efficiency are offered in Hamel & Getz (2004), e.g. a high ratio of radical innovations to incremental innovations. Managers should hence pay attention to the trade-offs in making investments in dynamic capability development (Ethiraj et al., 2005) and strategic innovation capacity. Yet, the costs firms incur to establish new resource configurations are often hidden and rarely quantified (Zott, 2003). Winter (2003 : 994-995) maintains: "That investing in dynamic capabilities (of whatever order) can be a partial hedge against the obsolescence of existing capability, and can sometimes yield relatively sustainable advantage, is obvious from the nature of 'dynamic capability', as defined here. That this cannot be uniformly or inevitably advantageous is equally obvious, from the meaning of 'investing': the thought experiment of raising the costs while holding the gross benefits constant makes the net benefit disappear, and certainly the world is capable of turning such

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a thought experiment into a real experiment. The concept of dynamic capability is a helpful addition to the tool kit of strategic analysis, but strategic analysis remains a matter of understanding how the idiosyncratic attributes of the individual firm affects its prospects in a particular competitive context". Following this logic Eisenhardt & Martin's (2000) assertion that dynamic capabilities are necessary (albeit not sufficient) conditions for competitive advantage becomes debatable. Thomas (1996) indicates that industries with low levels of dynamic resourcefulness (i.e. the ability to generate new strategic assets) will compete in a static way, i.e. based on Porter's 'Five Forces'. This same argument has been put forward by Kim & Mauborgne (1999), who argue that cost leaders and differentiators can still prosper in certain industries. Further research should consequently study the appropriateness of strategic innovation strategies, and hence of investments in deliberate strategic learning mechanisms. These studies may for example control for the existence of industry hypercompetition (for a possible operationalization, see e.g. McNamara et al., 2003).

APPENDIX IA: STRATEGIC INNOVATION CONTRIBUTIONS

Publication	Term	Definition	Focus of article	Key elements in article
Baden-Fuller, 1995	Strategic innovation Used as synonym for strategy innovation	“Strategy innovation is a new configuration of the organization involving new routines, new skills, and new competencies, which either has altered, or has the potential for altering, the rules of competition in an industry” (:S7) Classification of strategic innovations: “those that alter the balance of power within an industry or market sector, which I call the <i>rules of the game</i> ; and those that alter the geographical, product or service boundaries which I call the <i>boundaries of the sector</i> ” (:S7) “Some innovations introduce a new set of rules and a new set of boundaries simultaneously” (:S8)	Concept of strategic innovation situated in research, role of corporate entrepreneurship	<ul style="list-style-type: none"> • <i>Strategic</i> of organizational innovative capacity, by the differential effects of the innovations on the firm and its environment (industry rules): 1) renewal (no external effect, large internal effect) → 2) rejuvenation (large external effect, large internal effect) → 3) leadership innovation (large external effect, small internal effect) • A firm’s corporate entrepreneurship (proactiveness, teamwork, learning), relative to its competitors’ entrepreneurship, determines a firm’s strategic innovation capacity
Schlegelmilch, Diamantopoulos & Kreuz, 2003	Strategic innovation	“Strategic innovation is the fundamental reconceptualization of the business model and the reshaping of existing markets (by breaking the rules and changing the nature of competition) to achieve dramatic value improvements for customers and high growth for companies” (: 118) “applying innovation to corporate strategy” (: 118)	Concept of strategic innovation, drivers, outcomes, initial attempt to construct operationalization	<ul style="list-style-type: none"> • 3 key elements of SI: 1) fundamental reconceptualization of business model, 2) reshaping of existing markets, 3) dramatic value improvements for customers: customer at center of strategic thinking • Drivers of SI: culture, process, people, resources • Outcomes of SI: new competitive positioning, customer value
Pitt & Clarke, 1999	Strategic innovation	“The purposeful orchestration and directed application of organizational skills and knowledge” (:301)	Management of strategic innovation	<ul style="list-style-type: none"> • Management of strategic innovation = management of knowledge deployment - Manage two counter-acting learning cycles (formal + interactive cycle) - Balance conflicting resource constraints and innovation priorities within and between three innovation domains: entrepreneurial domain (choice of products-markets), engineering domain (choice of technologies), direction of innovation domain (strategic managerial problems that impact growth and profit potential in the long term)
Markides, 1997	Strategic innovation	“Strategic innovation occurs when a company identifies gaps in the industry positioning map, decides to fill them, and the gaps grow to become the new mass market” (: 12) “Strategic innovation takes place when a company tries to satisfy customer needs based on new strategic assets that are unfamiliar to existing competitors” (: 20)	Concept of strategic innovation; how to strategically innovate?	<ul style="list-style-type: none"> • Break rules of the game: change game, not play better • Not always appropriate strategy (depends on nature of industry, positioning, ...), is just one possibility; focus of article is not on ‘when?’, but on ‘how?’ • Gaps = 1) new/neglected customer needs, 2) new/neglected customer segments, 3) new ways of producing/delivering/distributing existing/new products/services to existing/new customer segments • Gaps can be identified by luck, experimenting, unrelated actions, or proactive thinking approach • Proactive thinking approach: redefine the business ‘who-what-how’ + start thinking process in different sequence → later on institutionalize innovation • May start out as niche, but is no niche strategy
Markides, 1998	Strategic innovation	“A fundamental reconceptualization of what the business is all about that, in turn, leads to a dramatically different way of playing the game in an existing business” (:32) “when a company identifies gaps in the industry positioning, goes after them, and the gaps grow to become the new mass market” (:33)	How can established firms strategically innovate?	<ul style="list-style-type: none"> • Most SIs come from new entrants but possibly also from established industry players • Identify and exploit new who-what-how positions • 4 major obstacles established companies need to overcome: 1) inertia of success, 2) know what to change into, 3) know when the idea is a ‘winning idea’, 4) how to implement

Publication	Term	Definition	Focus of article	Key elements in article
Markides, 1999a	Strategic innovation	"New strategic position" (new "who", new "what", or new "how") (: 38) "Proactively breaking the rules in an industry" (: 59) "Proactively establishing distinctive strategic positions that were critical to shifting market share or creating new markets" (: 59-60)	How to be prepared, and take advantage of others' SIs?	<ul style="list-style-type: none"> Successful companies continuously question the basis of their business and the assumptions behind their successful formulas Two options for established companies: 1) become the innovator (need for ambidexterity), 2) exploit someone else's innovation (monitoring system to recognize early SIs, prevent structural and cultural inertia, processes to experiment, build right competences, manage transition to new strategic position)
Markides, 1999b	Break-through strategy	(no formal definition) Play the game differently, break the rules of the game by identifying new who-what-how combinations	Principles underlying every successful breakthrough strategy	<ul style="list-style-type: none"> Often SI comes from small niche players or new entrants (because established companies focus too much on 'how', i.e., becoming better instead of different), but established players cannot afford not to strategically innovate 6 fundamental principles for every breakthrough strategy: 1) choose unique strategic position, 2) generate as much options as possible, 3) make clear choices among options, 4) combine choices into 'reinforcing mosaic', 5) mosaic should fit with firm's environment without sacrificing flexibility, 6) appropriate organizational support for mosaic
Mang, 2000 (interview with Markides)	Disruptive strategic innovation	"New way of playing the game in the business" (: 360) "cannibalizes the existing way of playing the game" (:361): it may conflict with existing customers, distributors, suppliers, existing culture, incentive systems, values, beliefs, ... Is <i>not complementary</i> strategic innovation, "whereby the innovation helps develop the existing business" (: 361)	Interview about Markides' general ideas about strategic innovation	<ul style="list-style-type: none"> Combination of planned top-down and emerging bottom-up strategy process: top decides on who-what-how question, which forms the boundaries within which people can operate and experiment Start strategic planning process from different points: switch among market analysis, internal competence analysis, customer needs analysis Galvanize entire organization into active thinking and continuously challenge things taken for granted → create sense of urgency (positive crises, variety in thinking process, culture)
Markides, 2000	Strategic innovation	"Redefining the business" (: 6) "when a company is able to switch from its dominant way of thinking to an alternative way" (: 6)	Reflection on academic strategy research and application of ideas to SI	<ul style="list-style-type: none"> Active thinking: start thinking process from different angles (e.g. external versus internal analysis) Combination of emerging and planned strategy: creative and intuitive but supported by logical and rational analyses
Larsen, Markides & Gary, 2002	Strategic innovation	"Strategic innovation focuses on changing firm-level strategy over time to identify unexploited positions in the industry ahead of rival firms" (: H1)	Simulation study on effects of SI on company and industry	<ul style="list-style-type: none"> Results demonstrate that interorganizational imitation in an industry decreases average firm profits. Continuous SI is capable of sustaining excess profits on a company level. It may also increase average industry profitability, hence rejuvenating the industry.
Markides & Geroski, 2003a	Strategic innovation (vague)	(no formal definition)	Strategic innovation and established players: what should they focus on?	<ul style="list-style-type: none"> Innovation = discovery of idea & initial market testing (pioneering) + mass market consolidation (scaling up). Pioneers seldom dominate markets afterwards. Established companies are better fit for the latter activity. They should focus on 'scaling up' markets discovered by pioneers. Scaling up can be done by standardizing products, cutting prices, scaling up production, creating distribution networks, building alliances, etc.

Publication	Term	Definition	Focus of article	Key elements in article
Markides & Geroski, 2003b	(No specification, but radical innovation is understood)	(no formal definition)	Strategies to scale up markets for non-pioneering companies	<ul style="list-style-type: none"> Pioneers often do not have real first-mover advantages; established firms do 6 scale-up strategies: 1) focus on average customer (price), 2) drive down costs (market share → econ. of scale), 3) no technological gimmicks but reduce customer risk by branding and direct communication, 4) build distribution network, 5) alliances with key suppliers and producers of complementary products, 6) protect market by exploiting first-mover advantages Underlying competences required for these strategies are exactly where established firms excel
Charitou & Markides, 2003	Disruptive strategic innovation	“Strategic innovation means an innovation in one’s business model that leads to a new way of playing the game. Disruptive strategic innovation is a specific type of strategic innovation – namely, a way of playing the game that is both different from and <i>in conflict with</i> the traditional way” (: 56)	How should established companies respond to disruptive SIs in their industry?	<ul style="list-style-type: none"> “different from” = in scope, differentiation, manufacturing systems, etc...; “in conflict with” = different KSFs, requires new combination of activities (e.g. distribution), new supporting cultures & processes, new customers, etc... Characteristics of disruptive SI: 1) emphasis on different product or service attributes, 2) usually starts out as small, low-margin business, 3) grows to capture a large share of established market 5 ways for established firms to respond: 1) focus on and invest in traditional business, 2) ignore the innovation, 3) attack back by disrupting the SI, 4) adopt the innovation by playing both games, 5) embrace the SI completely and scale it up Choice of appropriate response dependent on ability to respond & motivation to respond
Markides & Charitou, 2002	Strategic innovation	“different and conflicting business model” (: 3) New business models “emphasize different product or service attributes to those emphasized by the traditional business models of the established competitors” (: 4)	Cf. Markides & Charitou (2004)	Cf. Markides & Charitou (2004)
Markides & Charitou, 2004	Strategic innovation	“Using radically different business models” (: 22)	How can established companies embrace SIs, and reconcile the new with their old business model?	<ul style="list-style-type: none"> 4 strategies to manage dual business models dependent on nature of conflicts between new & old business model: 1) separation, 2) phased separation, 3) phased integration, 4) integration Success factors for separation: operational & financial autonomy, own culture & budgetary systems, own (internal) CEO Success factors for integration: consider SI as opportunity instead of threat, leverage existing, approach in pro-active and strategic manner, do not suffocate SI by existing policies
Markides, 2004	Radical innovation	“An innovation is considered radical if it introduces major new value propositions that disrupt existing consumer habits, and it undermines the competences and complementary assets on which existing competitors have built their success. This is the kind of innovation that creates entirely new markets” (: 36)	Established players and radical innovation	<ul style="list-style-type: none"> Pioneers often lose from established firms in dominating markets + established companies can become more innovative, but can not simply take over the organizational characteristics of pioneers in radical innovation → established firms should attack when the market is just created, steal away innovation from pioneers, and should focus on scaling up (and dominating) the new market (6 strategies, cf. Markides & Geroski, 2003b) Established firms should subcontract the <i>creation</i> of radical innovation to the market (VC of start-ups, equity stakes in them, alliances with them). Alternatively, start-ups should subcontract the <i>consolidation</i> of their products to established firms

Appendix I

Publication	Term	Definition	Focus of article	Key elements in article
Markides & Geroski, 2004	4 types of innovation Focus on radical innovation	"Innovations are considered radical if they meet two conditions: first, they introduce major new value propositions that disrupt existing consumer habits and behaviors [...] and second, the markets they create undermine the competences and complementary assets on which existing competitors have built their success" (: 27)	Concept of radical innovation	<ul style="list-style-type: none"> • 4 types of innovation, depending on their effect on a) consumer behavior and b) competitors' competences: 1) incremental innovation (minor disruption of customers, enhances competitors); 2) major innovation (major disruption of customers, enhances competitors); 3) strategic innovation (minor disruption of customers, destroys competitors); 4) radical innovation (major disruption of customers, destroys competitors) • Radical innovation: create brand new markets, disrupt both customers and competitors, based on different set of scientific principles, result from a haphazard supply-push process: first-mover advantages for the ones that scale up the market (cfr. Markides, 2004) 3 domains where rules of the games can be changed: <ul style="list-style-type: none"> • Who: redefinition of customer base by uncovering a hidden but large customer segment • What: reinvention of customer value by discrete products to total systems and solutions • How: redesign end-to-end value chain architecture to increase value and/or slash costs • Conventional planning & control systems can create barriers in strategic experiments (as initial predictions may not match eventual outcomes) → Planning practices in strategic experiments must emphasize learning, not accountability • Apply 'theory-focused planning': 1) no detailed figures, but focus on small number of critical unknowns, 2) focus on assumptions underlying the predictions, 3) use trend graphs, 4) review outcomes frequently, 5) look at trends over time, 6) no financials but leading indicators • Strategic experiment must deviate from traditional business ('forgetting') but must simultaneously exploit the latter's existing assets and capabilities ('borrowing') • 'Dual-purpose organization' has ideal DNA for strategic experiments • Isolate strategic experiment in separate subunit, but select and establish small number of operational links with mother company • Enumeration and explanation of specific aspects of the 'forgetting challenge' and of the 'borrowing challenge' are provided in article
Govindarajan & Gupta, 2001	Strategic innovation	(no formal definition) Radically change the rules of the game (: 3)	Concept of strategic innovation	
Govindarajan & Trimble, 2004	Strategic innovation	"A strategic innovation is a creative and significant departure from historical practice in at least one of three areas. Those areas are design of the end-to-end value chain [...]; conceptualization of delivered customer value [...]; and identification of potential customers [...]" (: 69)	Usefulness of 'theory-focused planning' in strategic experiments	
Govindarajan & Trimble, 2005	Strategic innovation/ strategic experiments	"Through [the] this process of strategic innovation, organizations explore fundamental questions of business definition, by altering at least one of the following: the identification of potential customers [...]; the conceptualization of delivered customer value [...]; the design of the end-to-end value-chain architecture [...]. Strategic innovation proceeds with strategic experiments" (: 48) Strategic experiments: 1) depart from the firm's proven business definition (and its underlying assumptions about success formulas), 2) leverage existing assets & capabilities, 3) are not simply product-line extensions, geographic expansions or technological improvements, 4) target emerging and poorly defined industries, 5) are launched before any competitor, no clear success formula, 6) have high potential for revenue growth, 7) require development of some new knowledge & capabilities, 8) are confronted with multiple uncertainties (customers, value chain...), 9) remain unprofitable for some time, 10) produce feedback that is delayed and ambiguous (: 48)	How can established companies manage a mature business and strategic experiments simultaneously?	

Publication	Term	Definition	Focus of article	Key elements in article
<p>Styles & Goddard, 2004</p>	<p>Strategic innovation</p>	<p>(no formal definition) Invention of new business models or strategies (: 63)</p>	<p>Concept of strategic innovation + tool for creating it</p>	<ul style="list-style-type: none"> • Successful firms in mature industries do exist: → they invented a new game and are genuinely different from industry rivals: they broke out of industry's strategic convergence: challenged and overturned some accepted industry <i>assumptions</i> (different theory on how to compete), did something genuinely different that <i>customers</i> like and reward, constructed different <i>business model</i> • 'Strategy Wheel' = tool for strategic innovation creation: a) performance measurement, b) analyze current business model, c) competitor analysis, d) challenge industry assumptions, e) understand the future (macro-environment), f) understand the future (industry), g) develop strategic ambition, h) new business design

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APPENDIX I.B: RELATED CONCEPTS TO STRATEGIC INNOVATION

Publication	Term	Definition	Focus of article	Key elements in article
Kim & Mauborgne, 1997	Value innovation	(no formal definition)	What entails the new strategic logic for high growth?	<ul style="list-style-type: none"> Findings based on large cross-industry, international research: high-growth companies (revenues & profits) differ from low-growth companies in their strategic logic (no difference in start-up or not, private-public, young-old mgrs) Value innovation logic = 1) industry assumptions: shape industry conditions, 2) strategic focus: competition is not benchmark but quantum leap in value (reshape industry's value curve), make the competition irrelevant, 3) customers: no segmentation, target mass by stressing what all customers value, let some existing customers go, 4) assets & capabilities: leverage but if needed, build new, 5) product & service offering: total solution offering, beyond industry's traditional boundaries LT: Fundamentally different value curve → geographical expansion & operational efficiency → econ. of scale → beat competition (imitation) or new value innovation on different value platform (product, service, or delivery)
Kim & Mauborgne, 1999b	Value innovation	"Value innovation is quite different from building layers of competitive advantages and is not about striving to outperform the competition. Nor is value innovation about segmenting the market and accommodating customers' individual needs and differences. Value innovation makes the competition irrelevant by offering fundamentally new and superior buyer value in existing markets and by enabling a quantum leap in buyer value to create new markets" (: 42-43)	Concept of value innovation + Impact of knowledge economy on innovation	<ul style="list-style-type: none"> Value innovation is innovation outside the conventional context: innovation not as technology but as value → buyer, not competition, at the center stage of strategic thinking Value innovation anchors innovation with buyer value (no mere technological innovation, no mere value creation) Innovations are endogenous (not determined by market conditions) → importance of knowledge and ideas → ease of spillovers, imitation → strategic pricing for demand creation + target costing for profit creation → rapid economies of scale → imitators at cost disadvantage
Kim & Mauborgne, 2000	New business idea (value innovation is understood)	(no formal definition)	Tools to evaluate commercial potential of new business idea	<p>3 analytical tools:</p> <ul style="list-style-type: none"> Buyer utility map: link utility levers (e.g., convenience, productivity) to 6 buyer experience stages (purchase to disposal) → discover new utility position Price corridor to the mass: study substitutes → price bandwidth that captures the mass, specify exact level that hinders imitation Business model guide: have strategic price set cost target, build partnerships, choose appropriate price model (e.g., rent, time-share)
Kim & Mauborgne, 2002	(no term provided)	(no formal definition)	Strategy canvas as alternative approach to strategic planning	<ul style="list-style-type: none"> Build strategy canvas = Draw value curve: identify key factors of competition in industry, position competitors and own company relative to their investments in each of these factors Good strategy if value curve shows focus and divergence from others' value curves and can be summarized in one tag-line
Kim & Mauborgne, 2004	Blue ocean strategy	"Blue oceans denote all industries <i>not</i> in existence today – the unknown market space, unattended by competition. In blue oceans, demand is created rather than fought over. There is ample opportunity for growth that is both profitable and rapid. There are two ways to create blue oceans [...] companies can give rise to new industries [...] in most cases, a blue ocean is created from within a red ocean when a company alters the boundaries of an existing industry" (:77-78)	Concept of blue ocean strategy	<ul style="list-style-type: none"> Technology can be involved but is not defining (no large R&D investment required) Incumbents are not at a disadvantage; blue ocean often within core business Creates strong brand equity Strategic logic behind blue ocean strategies: 1) create uncontested market space (no environmental determinism), 2) make competition irrelevant (competition not as benchmark), 3) create and capture new demand (no exploitation of current demand), 4) rejection of low-cost versus differentiation trade-off, 5) whole system of price, cost and utility is aligned within the pursuit of a low-cost <i>and</i> differentiation strategy jointly

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Publication	Term	Definition	Focus of article	Key elements in article
Hamel, 1996	Industry revolution, revolutionary strategy	<p>Rewrite the industry rules (: 69-70)</p> <p>"Shackled neither by convention nor by respect for precedent, these companies [rule breakers] are intent on overturning the industrial order. They are the malcontents, the radicals, the industry revolutionaries" (: 70)</p> <p>"Rule breakers set out to redefine the industry, to invent the new by challenging the old" (: 71)</p>	<p>Concept of industry revolution + principles to develop revolutionary strategies</p>	<ul style="list-style-type: none"> • 3 kinds of companies in every industry: rule makers (incumbents that built the industry), rule takers (follow the rule makers), rule breakers (revolutionaries) • 9 routes to industry revolution: 1) Reconceive product/service (radically improve value equation, separate function from form, 'joy' of use), 2) Redefine market space (new customers, individuality of offer, increase accessibility), 3) Redraw industry boundaries (scale up or down, disintermediation, transcend an industry's boundaries) • 10 principles to discover revolutionary strategies: strategy making is not planning, is subversive, is free from experience (senior mgt), involves revolutionaries, engages people by having them engender change, encourages new perspectives, is a democratic process, brings top and down together, welcomes strategy activists
Hamel, 1998a	Industry revolution	<p>"the kinds of fundamental change in business models that are transforming industries" (: 19)</p> <p>"innovation at the level of the business model" (: 23)</p>	<p>Concept of industry revolution + increasing need in new economy</p>	<p>New economic landscape (information age) ends potential of incrementalism and increases need for industry revolution, "a non-linear world requires non-linear innovation":</p> <ul style="list-style-type: none"> • From a product-centric to a systemic view of innovation • From innovation as the product of visionaries to innovation as the product of activists • Senior management needs to set strategic boundaries (convergence) that bound the scope of innovation (a rich menu of options and experiments) • Individuals should look through new lenses (= systematic deconstruction of existing industry orthodoxies, study trends that have the potential of game-changing discontinuities, define firm in terms of competencies instead of products/services) to reveal new possibilities
Hamel, 1998b	Strategy innovation	<p>"Strategy innovation is the capacity to reconceive the existing industry model in ways that create new value for customers, wrong-foot competitors, and produce new wealth for all stakeholders. Strategy innovation is the only way for newcomers to succeed in the face of enormous resource disadvantages, and the only way for incumbents to renew their lease on success" (: 8)</p>	<p>Concept of strategy innovation + increasing need in new economy</p>	<ul style="list-style-type: none"> • In a discontinuous world strategy innovation is the key to wealth creation, i.e. non-linear strategies to invent new industries or dramatically reinvent existing ones • The goal is not to have earnings exceed the cost of capital but to earn a disproportionate share of the industry wealth creation (= share of total market capitalization of all firms in a particular competitive domain) • Goal is game of strategy innovation (revenue growth), not cost cutting • Strategy creation is emergent → create organizational conditions to stimulate emergence: 1) new voices, 2) new conversations, 3) new passions, 4) new perspectives, 5) new experiments
Hamel, 1999	New business ideas, radical innovation, nonincremental innovation, ...	<p>(no formal definition)</p> <p>"the invention of new business models [...] or the radical redesign of existing business models" (: 83)</p> <p>"unconventional ventures [...] aimed at reinventing the company and the industry" (: 82)</p>	<p>How to increase the wealth creating potential of incumbents?</p>	<ul style="list-style-type: none"> • New economy demands radical, nonincremental innovations: entrepreneurship, no stewardship • Incumbents should adopt "the Silicon valley way of doing business" • Create internal market for ideas, for capital and for talent

Publication	Term	Definition	Focus of article	Key elements in article
Hamel & Välikangas, 2003	Strategic resilience	"the ability to dynamically reinvent business models and strategies as circumstances change. Strategic resilience is not about rebounding from one-time crisis. It's not about rebounding from a setback. It's about continuously anticipating and adjusting to deep, secular trends that can permanently impair the earning power of a core business. It's about having the capacity to change before the case for change becomes desperately obvious" (: 53-54)	Concept of strategic resilience + challenges to address in order to build it	<ul style="list-style-type: none"> Eventually all strategies decay, but new economic forces (hyperturbulence) change the key to success even more from "momentum" to "resilience" 3 essential forms of innovation: 1) <i>Industry revolution</i> is creative destruction, innovation in industry rules; 2) <i>Strategic renewal</i> is creative reconstruction, innovation in business model; 3) <i>Strategic resilience</i> is capacity for continuous reconstruction, innovation in values, processes & behaviors 4 crucial barriers to resilience: 1) Cognitive (no denial of changes, meet free-thinking employees, face the strategy decay), 2) Strategic: value of experimentation, 3) Political: dedication of (financial, human) resources, 4) Ideological (no optimization creed but strategic resilience creed)
Christensen & Overdorf, 2000	Disruptive change/ Disruptive innovation	Sustaining innovation is responding to evolutionary changes in the market; Disruptive innovation is handling or even initiating revolutionary changes in the market (: 71) "disruptive innovations create an entirely new market through the introduction of a new kind of product or service, one that's actually worse, initially, as judged by the performance metrics that mainstream customers value [...] they don't] address the next-generation needs of leading customers in existing markets [...] they have] other attributes [enabling] new market applications to emerge [...]that ultimately can] address the needs of customers in the mainstream of the markets as well" (: 72)	How can established companies develop capabilities for disruptive innovation?	<ul style="list-style-type: none"> Organization's capabilities reside in resources, processes and values Established companies have processes and values fit for sustaining innovation For disruptive innovation: not so much resources but new processes and values need developing → 3 ways to achieve this: <ol style="list-style-type: none"> create internally (new patterns of working through new team compositions) through separate spinout organization through acquisition (stand-alone or integration into parent company) Choice depends on the fit of the new business with the current organizational processes and/or values: <ol style="list-style-type: none"> new processes, same values → create internally same processes, new values → spin-out (possibly development in-house, but commercialization by spin-out) new processes, new values → spin-out
Christensen, Bohmer & Kenagy, 2000	Disruptive innovation	"disruptive technologies and business models that may threaten the status quo but will ultimately raise the quality of the product/service for everyone" (: 104) "cheaper, simpler, more convenient products or services that start by meeting the needs of less-demanding customers" (: 104)	Concept of disruptive innovation + application to US healthcare industry	<ul style="list-style-type: none"> Let market forces play out: be open to disruptive innovations Disruptive innovations improve over time and grow to meet the needs of the mainstream market Disruptive innovations enable a larger population of less-skilled people to do in a more convenient, less expensive setting things that historically could be performed only by expensive specialists in centralized, inconvenient locations (e.g. mainframe versus PC) → growth opportunities in low-mid tiers of market: focus on simplification, not on complex solutions for complex problems
Christensen, Johnson & Rigby, 2002	Disruptive innovation	"genuinely disruptive innovations [...] result in the creation of entirely new markets and business models" (: 22)	Litmus tests for successful disruptive innovation plans	<ul style="list-style-type: none"> 2 strategies for turning ideas into plans + corresponding litmus tests: <ol style="list-style-type: none"> <i>Create an entirely new market</i>: a) does the innovation give customers access to products/services that were too expensive or too complex?, b) does the innovation target customers who like a simple product?, c) does the innovation help customers in doing more easily and effectively what they had already tried to do before? Or <i>Disrupt the prevailing business model from the low end</i>: a) does the innovation target the low-end of the market that is currently over-served?, b) does the innovation rest on a different business model where profit margins are thinner but net asset turns higher? (lower price → lower costs → different cost structure, distribution, operating processes required) After passing the litmus tests, build an innovation engine to nurture continuous disruptive innovation

Publication	Term	Definition	Focus of article	Key elements in article
Normann & Ramirez, 1993	Value reinvention/ Value constellation	<p>"Their [successful firms'] focus of strategic analysis is not the company or even the industry but the <i>value-creating system</i> itself, within which different economic actors [...] work together to <i>co-produce</i> value. Their key strategic task is the <i>reconfiguration</i> of roles and relationships among this constellation of actors in order to mobilize the creation of value in new forms and by new players [...]" (: 66)</p> <p>"The result is an integrated business system that invents value by matching the various capabilities of participants more efficiently and effectively than was ever the case in the past" (: 67)</p>	Concept of value reinvention & value constellation	<ul style="list-style-type: none"> Value reinvention surpasses firm boundaries towards the entire value-creating system of different economic actors → reconfiguration of roles and relationships Distinction between products and services is breaking down Value has become more dense: more opportunities for value creation packed into one offering Conceive entire value-creating system: design, mobilize and train players
Jaworski, Kohli, & Sahay, 2000	Market-driving organization	<p>"a business orientation that [...] implies influencing the structure of the market and/or the behavior(s) of market players in a direction that enhances the competitive position of the business" (: 45)</p> <p>"The term market driven refers to learning, understanding, and responding to stakeholder perceptions and behaviors within a given market structure. In contrast, the term driving markets refers to changing the composition and/or roles of players in a market and/or the behavior(s) of players in the market" (: 47)</p>	Concept of market-driving	<ul style="list-style-type: none"> Inspired by literature on market orientation + on environmental management (changing industry rules) Drive markets by: <ul style="list-style-type: none"> 1) <i>Shaping market structure</i>: <ul style="list-style-type: none"> - construction, or - deconstruction, or - functional modification of supply chain and/or 2) <i>Shaping market behavior</i>: <ul style="list-style-type: none"> - directly, or - indirectly
Kumar, Scheer & Kotler, 2000	Market-driving company	<p>"market driving companies [...] gain a more sustainable competitive advantage by delivering a leap in customer value through a unique business system" (: 129)</p> <p>"radical innovation on two dimensions – a discontinuous leap in the value proposition and the implementation of a unique business system" (: 130)</p> <p>"market drivers revolutionized their industry by changing the rules of the game and 'driving' their markets" (: 130)</p>	Concept of market-driving + challenges for incumbents to become market-drivers	<ul style="list-style-type: none"> market drivers 1) trigger industry break points, 2) do not base themselves on traditional market research, 3) teach potential customers to consume the discontinuous value proposition high risk, but leads to a more sustainable competitive advantage no traditional market research (leads to incremental innovation); address deep-seated, latent or emerging customer needs by forward sensing & seeing things differently: revolutionary marketing channel reconfiguration, exploit business network, overwhelm customer expectations obstacles for successful incumbents: serendipity in process, high risk, bias against more innovative breakthrough ideas, prior investments in status quo → need for ambidexterity upstream creative challenge: vision & environment to generate breakthrough ideas + downstream implementation challenge: capital, fortitude and risk tolerance to have ideas succeed project-based development

Publication	Term	Definition	Focus of article	Key elements in article
Carrilat, Jaramillo & Locander, 2004	Market-driving organization	<p>Combines/borrows definitions from Jaworski et al. (2000) and Kumar et al. (2000)</p> <p>“the [market-driving] company will strengthen its capabilities and lead customer value opportunities in new directions by altering the structure of the market and influencing the behavior of actors” (: 9)</p> <p>“market-driving companies are able to match customer value opportunities with their capabilities precisely because they drive the structure of the market” (:7)</p>	<p>Concept of market-driving + framework of processes required to create & implement a market-driving strategy</p>	<ul style="list-style-type: none"> ● market-driving strategy leads to superior business performance ● market-driving = <i>internal</i> focus: firm’s ability to create innovative products delivered through unique business systems (cfr. Kumar et al., 2000) + <i>external</i> focus: firm’s ability to disrupt the market (cfr. Jaworski et al., 2000) ● market driving allows the firm to better match customer value opportunities with its own capabilities ● no strict following of customer voice: actively influence market instead of responding to it ● need for transformational leadership to create adhocratic culture during initial phase, organizational changes and interfunctional coordination during transitory implementation phase ● new customer value opportunities are enhanced by customer interaction (hence possibly to the advantage of service firms?)

Appendix I

APPENDIX II: MEASURES OF ALL VARIABLES (as used in final web survey, translated from Dutch)

1. CONTROL VARIABLES

a) Position in supply chain

Where would you position your business unit (firm) in the supply chain?

1 (raw materials)	2	3	4	5	6	7	8	9	10 (end customer)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

b) Business unit (firm) type: product or service firm

Is your business unit (firm) *mainly* a product or service firm? Please, specify which type of products/services it *mainly* supplies.

Mainly PRODUCTS? <input type="checkbox"/>		Mainly SERVICES? <input type="checkbox"/>	
Wich <i>mainly</i> ?		Wich <i>mainly</i> ?	
Raw material	<input type="checkbox"/>	Maintenance, Repair & Installation	<input type="checkbox"/>
Finished materials & semimanufactures	<input type="checkbox"/>	Control (security, technical)	<input type="checkbox"/>
Machine components & semimanufactures	<input type="checkbox"/>	Transport, Storage & Logistics	<input type="checkbox"/>
Finished machines & devices	<input type="checkbox"/>	Wholesale & Dealership	<input type="checkbox"/>
Equipment, Manufacturing supplies & Spare material	<input type="checkbox"/>	Consultancy, Counseling & Training	<input type="checkbox"/>
Office supplies	<input type="checkbox"/>	Other...	<input type="checkbox"/>
Finished consumer products	<input type="checkbox"/>		
Other ...	<input type="checkbox"/>		

c) Business unit (firm) size:

How many people does your business unit (firm) employ (in FTEs)?

Less than 100	<input type="checkbox"/>
100-199	<input type="checkbox"/>
200-499	<input type="checkbox"/>
More than 500	<input type="checkbox"/>
I don't know exactly	<input type="checkbox"/>

II. BASIC CONSTRUCTS

a) Deliberate strategic learning mechanisms for recognition (recog)

recog1	We use general mechanisms that stimulate us to focus our market research more on future customer needs than on current customer needs.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
recog2	We use general mechanisms that stimulate us to detect fundamental changes in our industry (e.g. technology, competitors, regulation).	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
recog3	We use general mechanisms that stimulate us to study the likely effect that changes in our business environment will have on our customers	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
recog4	We use general mechanisms that stimulate us to frequently collect and evaluate general macro-economical information (e.g. interest rate, exchange rate, GDP, industry growth rate, inflation).	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>

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recog5	We use general mechanisms that stimulate us to maintain contacts with officials of government and regulatory bodies (e.g. Ministry of Economic affairs, Chambers of Commerce) in order to collect and evaluate pertinent information.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
recog6	We use general mechanisms that stimulate us to collect and evaluate information concerning general social trends (e.g. environmental consciousness) that might affect our business	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
recog7	We use general mechanisms that stimulate us to study the behavior of our customers throughout the different experience stages of our product/service (e.g. search, purchase, use, disposal).	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
recog8	We use general mechanisms that stimulate us to reveal <i>trends</i> in the behavior of our customers throughout the different experience stages of our product/service	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Recog9	We use general mechanisms that stimulate us to study how the different features of our products/services meet the needs of our customers throughout the different experience stages of our product/service	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
recog10	We use general mechanisms that stimulate us to consult innovative customers for new, interesting business ideas.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
recog11	We use general mechanisms that stimulate us to focus our market research on other industries as well.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Recog12	We use general mechanisms that stimulate us to retrieve information about the needs of the <i>end</i> customer.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Recog13	We use general mechanisms that stimulate us to gain a well-founded insight into the reasons why our non-customers aren't our customers.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>

b) Deliberate strategic learning mechanisms for assimilation (assim)

Assim1 ^R	We do not use any general mechanisms that stimulate us to share our critical reflections about our customers/market with each other.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Assim2	We use general mechanisms that stimulate us to frequently discuss the assumptions that we have about our customers.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Assim3	We use general mechanisms that stimulate us to frequently discuss the assumptions that we have about our market(s).	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Assim4	We use general mechanisms that stimulate us to keep alive past critical reflections about our customers/market.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Assim5	We use general mechanisms that stimulate us to frequently discuss the assumptions that we have about all aspects of our market(ing) approach.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Assim6	We use general mechanisms that stimulate us to systematically file our critical reflections about customers/market (e.g. in a data base, on the intranet).	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>

^R = reversely coded item

c) Deliberate strategic learning mechanisms for transformation (transf)

Trans1	We use general mechanisms that stimulate us to adapt the organizational structure to better cater the needs of a (planned) new offering	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Trans2	We use general mechanisms that stimulate us to replace our skills (competencies) to better cater the needs of a (planned) new offering	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Trans3 ^R	We do not use any general mechanisms that stimulate us to prevent chaos in view of a (planned) new offering	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>

Trans4	We use general mechanisms that stimulate us to support new projects, even if they possibly may take away from sales of existing products/services	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Trans5 ^R	We do not use any general mechanisms that stimulate us to adapt our procedures to better cater the needs of a (planned) new offering.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Trans6	We use general mechanisms that stimulate us to change our ways of working to better cater the needs of a (planned) new offering	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>

^R= reversely coded item

d) Strategic innovation capacity (explo)

To create new and substantially superior customer, we take, *in comparison to our competitors*:

Explo1	... more initiatives to collaborate in an untraditional way (i.e. unusual in our industry) with parties in our supply chain, such as suppliers or customers.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Explo2	... more initiatives to collaborate in an untraditional way (i.e. unusual in our industry) with parties <i>outside</i> our supply chain	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Explo3	... more initiatives to change the traditional roles and relationships in our industry	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Explo4	... more initiatives to change our business model	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Explo5	... more initiatives to create a market approach that is unusual in our industry	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Explo6	... more initiatives to break the traditional power relationships among the different parties in the supply chain	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Explo7 ^R	... fewer initiatives to deviate from the traditional rules of the game	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>

^R= reversely coded item

III. MODERATORS

a) Innovativeness (innovat)

Cult1	When it comes to problem solving, we value creative new solutions more than the solutions of conventional wisdom.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Cult2	Top managers here encourage the development of innovative marketing strategies, knowing well that some will fail	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Cult3	We frequently try out new ideas.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Cult4	We always look for new ways to do things	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Cult5	We are creative in our methods of operation	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>

b) Risk taking attitude (risktak)

Cult6 ^R	We value the orderly and risk-reducing management process more highly than leadership initiatives for change.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Cult7 ^R	Top managers in this BU (firm) like to "play it safe"	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Cult8 ^R	Top managers around here like to implement plans only if they are very certain that they will work.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Cult9 ^R	Innovation in our BU (firm) is perceived as too risky and is resisted.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>

^R= reversely coded item

Appendix II

c) Crossfunctional dissemination of market information (crossf)

crossf1	Marketing personnel spends time discussing customers' future needs with other functional departments.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
crossf 2	Our BU (firm) periodically circulates documents (e.g. reports, newsletters) that provide information on our customers.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
crossf 3	We have cross-functional meetings very often to discuss market trends and developments (e.g. customers, competition, suppliers)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
crossf 4	We regularly have interdepartmental meetings to update our knowledge of regularly requirements.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
crossf 5	Technical people in this BU (firm) spend a lot of time sharing information about technology for new products with other departments	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
crossf 6	Market information spreads quickly through all levels in this BU(firm)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
crossf 7	Top managers frequently meet to discuss customer trends.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
crossf 8	Ideas to improve customer satisfaction are openly shared at all levels in this BU (firm).	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
crossf 9	When planning new or changed products/services, we use a team approach that involves all functional areas	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>

d) information provision by customers (infocus)

Nwinfo1	Through our working relationships with customers we obtain general information about the market.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Nwinfo2	Through our working relationships with customers we obtain general information about our competitors.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Nwinfo3	Through our working relationships with customers we obtain general information about other relevant third organizations.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>

e) Information provision by suppliers (infosup)

Nwinfo1	Through our working relationships with suppliers we obtain general information about the market.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Nwinfo2	Through our working relationships with suppliers we obtain general information about our competitors.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
Nwinfo3	Through our working relationships with suppliers we obtain general information about other relevant third organizations.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>

f) Formalization (form)

struct1 ^R	I feel that I am my boss in most matters.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
struct2 ^R	A person can make his own decisions without checking with anyone else.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>
struct3	The employees are constantly being checked for rule violations.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	n/a <input type="checkbox"/>

^R= reversely coded item

g) Centralization

struct4	There can be little action taken here until a supervisor approves a decision.	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
struct5	A person who wants to take his own decision would be quickly discouraged here	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
struct6	Even small matters have to be referred to someone higher up for a final answer.	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
struct7	I have to ask my boss before I do almost anything	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

^R= reversely coded item**h) Innovation stimulus from customers (innocus)**

nwinno1	Our customer relationships lead to the joint development of production processes.	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
nwinno2	Our customer relationships lead to the joint development of new products/services	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
nwinno3	Our customer relationships lead to the adoption of new technologies	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
nwinno4	Our customer relationships lead to prototype testing.	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
nwinno5	Our customer relationships lead to the joint introduction of new concepts.	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
nwinno11 ^R	We explicitly have to pay attention to customer education.	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nwinno14	Customers reward us when we invest in them; they seldom show free-rider behavior.	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

^R= reversely coded item**i) Innovation stimulus from suppliers (innosup)**

Nwinno6	Our supplier relationships lead to the joint development of production processes.	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nwinno7	Our supplier relationships lead to the joint development of new products/services	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nwinno8	Our supplier relationships lead to the adoption of new technologies	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nwinno9	Our supplier relationships lead to the joint introduction of new concepts.	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

j) Supply chain climate (chainclim)

nwinno10 ^R	We are hostile against some parties in the supply chain since they systematically prevent us from developing or launching new concepts	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nwinno12 ^R	We have hostile relationships with parties before and after us in the supply chain.	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nwinno13 ^R	We feel quite unaccustomed vis-à-vis other parties in the supply chain	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nwinno15 ^R	Due to hostility or opportunism, collaborations in the supply chain are often ad hoc (opportunity driven).	1	2	3	4	5	n/a
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

^R= reversely coded item

Appendix II

APPENDIX III: SUMMARIZED FINDINGS OF QUAL2 PER INDUSTRY

Table A: Functional Food industry: independent variables

	Focus groups-2	Interviews
Recognition	Market research of end customer, end market and distribution Study long-term tendencies of market needs Develop 'helicopter view' of industry Study EU regulation (safety, patenting, etc...)	Study end customer needs (to create market pull + enhance corporate image) Reveal future customer needs (to convince customer about new value concepts) Trendwatching about industry and market Study legal environment User groups with large & innovative customers Develop customer intimacy (CRM-tools + account mgt + 1:1 visits to talk about specific needs) Study other industries (e.g. cosmetics: shorter life cycles) General market research
Assimilation	Discuss market (level of maturity, future developments, etc...) Discuss industry (future strategies of other supply chain parties, etc...)	So much internal discussion about market that, eventually, customers become involved in discussions too Discuss market information and link to new ideas and to possible technology Regularly question marketing and customer approach among marketing, business development and key account managers (initiative from buzz. dev.) Re-apply recent insights about markets & customers in new initiatives Structured market discussions are crucial; "we do it a lot, but it can always be more and better" Guidelines to set up S/initiative (but deviation is permitted)
Transformation	Restructure organization in function of key-account management	Adjust procedures: more central role of account management and marketing Stress on different skills (outsourcing basic R&D) Restructure in function of market New separate unit, responsible for new market concepts + corporate venturing dept. Linked to performance appraisal Behavioral change takes time (all disciplines too optimistic) Concepts only implemented in existing BUs, once entirely developed and finished to prevent chaos of implementation Re-organize organization in function of broader, more LT-market tendencies (alliances, account management, etc...) Formal process to consider new concepts, even if detrimental to existing business Temporary project teams: technologist, business developer & marketer

Table A (ctd.): Functional food industry: critical internal & external factors

	Focus groups-2	Interviews
Culture	Dare to jointly develop with customers, to use exclusivity contracts or forward integration	Many ideas from all over the organization Structured support from top for new initiatives (e.g prizes for new ideas, new mission) A mindset of 'customer-focused creativity' Proportion of returns should come from new concepts Entrepreneurial mindset ("anyone is convinced innovation is needed", "we are scored on our innovation ratio") Investment risks are considered of lower importance when concept is promising Any idea from whoever in the organization is worth considering
Structure	Freedom to use customers as try-outs for new concepts if this may increase their satisfaction	BU independent of corporate company in terms of launch new concepts BU has own specific marketing and business development unit Short lines Taking up initiatives is highly stimulated "It is easy for everyone to come up with new ideas" Follow right paths Highly formalized process
Cross-functional information dissemination	Intranetsite with customer and market information Frequent discussions among account managers and business development	Joint customer visits with account manager, marketer, business developer Sales has information, but to increase the success rate of SI, marketing should push the SI creation process: strong information dissemination between both parties
Supply chain information potential	Important customer info about new market developments and indirect customers Information from suppliers regarding new competitors, new regulations,...	Customer info about their respective customers
Supply chain innovation potential	Customer desires new concepts, since his respective customer desires this Customers primarily trigger process innovation Use customers for prototype testing (preferably the large ones) If customer unwilling regarding SI: invest in customer education (slow, risk-averse food manufacturers) Food manufacturers want to get rid of their market risk: triggers new role for ingredient supplier Suppliers are needed for concept development since production can be outsourced to them and own focus on marketing/commercial aspects: preferred, multiple partnerships Conservative food industry fears forward integration Retailers are adherents to the 'efficiency mantra'; new concepts not welcomed	Traditional food manufacturers are unwilling to invest in new marketing concepts Unwillingness and fear of market risk of food manufacturers is trigger for ingredient producers to embark these activities themselves Create added value jointly with customer ("in the food industry, it is a superseded idea to first develop a product and to market it afterwards") Search for synergetic effects between your own and the customer 's competences Use innovative customers as pilots for new concepts Customers require exclusivity contracts: dangerous and uninteresting as small market potential afterwards Supplier's technological knowledge creates room for development of own marketing competences Often triple alliances Forget private brand producers: they are only in for cost improvements Downstream puts entire chain under pressure (low cost, no innovation) No real strained relationships between up- and downstream, but still manage all stakeholders along entire supply chain

Table B: Truck & Trailer industry: Independent variables

	Focus groups-2	Interviews
Recognition	<p>Study fleet & leasing companies (end customer), study further downstream than OEM</p> <p>1:1 deep discussions with customer: create learning relationship</p> <p>Study customer's business processes: look for problems and needs that are customer's non-core activity</p>	<p>Study customer's entire consumption cycle and entire work process</p> <p>Retrieve general industry information (legislation, environmental policy, etc.)</p> <p>Study needs of fleet owners (end customer)</p> <p>Study non-end customers</p> <p>Small discussion groups with direct customers and branch federation</p> <p>1:1 deep relationships with customers: "the worst thing is to know just enough about your customer to offer the wrong things"</p> <p>Study market tendencies (e.g. consolidation)</p> <p>Study other, related industries (fleet management, adhesive foils, insurance, etc.)</p>
Assimilation	<p>Critically discuss customers' perceived value of existing and new products/services/concepts</p> <p>Discuss market (new segmentations required?)</p> <p>Frequently discuss marketing approach (pricing: returns on life-cycle?, exclusivity?, how far to interfere downstream?, etc.)</p> <p>Take the time to systematically discuss more long term market and industry developments (but takes a lot of energy), do this in a very structured way</p>	<p>Frequent discussions about marketing approach (rethinking of distribution, re-segmentation)</p> <p>Do much effort to think beyond the current and daily business: discussions about the market (e.g. why do we not serve the lower part of the market?)</p> <p>Before concepts are launched there are strong cross-functional market discussions between all functional areas</p> <p>Ideas often arise simultaneously at different organizational corners: 'cross-fertilization' about customers/markets is required: discuss cross-functionally and also involve external people</p> <p>Discussions on perceptions and assumptions about customers (become larger, more professional, different needs, different approach needed)</p>
Transformation	<p>Rethink processes in order to channel innovative ideas/initiatives more easily through the organization (requires new structures, new working processes)</p> <p>Procedures to set up SI/initiatives very quickly (e.g., temporary cross-functional project teams)</p> <p>The organization has developed a basis to support new initiatives, even if they are less compatible with existing business</p> <p>Routinize the process of SI/innovation as fast as possible; internal anchoring speeds up the roll-out considerably, and time-to-market is as important for SI as it is for new products</p>	<p>Separate unit for co-ordination of launch of new concepts (on corporate level)</p> <p>Separate group of marketing & sales people set up for each new SI/initiative (other activities of SI, e.g. technical aspects, outsourced to existing BU)</p> <p>'Project support manager' for SI/initiative: only to co-ordinate efficient roll-out</p> <p>New ways of working: technical & business consultants become customer antenna: should mobilize rest of organization</p> <p>"The art is to have procedures that enable you to <i>continuously</i> adapt your service to customer needs, and in turn, to <i>continuously</i> adapt your organization to this"</p> <p>Search for systematical ways to stimulate sales to execute new concepts (e.g. let them join in SI development, personal bonus structure for new initiatives)</p> <p>Adapting and changing the organization is the fundament of success, but it takes a lot of time and a structured approach to do so: use blueprints (general guidelines, beacons, but still local deviation is possible dependent on specific market requirements)</p> <p>Describe processes in detail beforehand to prevent chaos of launch (especially required in the case of SI)</p> <p>"we try a lot, but if we take up something we do it seriously and in a structured way"</p>

Table B (ctd.): Truck & Trailer industry: critical internal & external factors

	Focus groups-2	Interviews
Culture	<p>People should be creative enough to take up opportunities that pass their way</p> <p>A mentality change from engineering to commercial customer thinking</p> <p>Have the drive to look for new opportunities and to pursue them</p> <p>Try things out but balance innovation capacity, in order to prevent an unneeded loss of current competences</p>	<p>Taking up new concepts should be normal business. "our right to exist is justified by setting up new SIconscepts, to redefine the industry"</p> <p>It is everyone's responsibility to continuously take up new initiatives</p> <p>All is in the mindset, "we allow much", "there is no mentality of "wait, stop with these strange ideas!"</p> <p>"people should be able to cope with continuous change and they should express an innovation mindset. If they cannot, they can simply not stay, as they may destroy entire departments!"</p> <p>The BU manager is the key person to create an innovative mentality</p> <p>Every SI is risky, it is a new venture, unknown territory</p> <p>Keep on trying in the market</p> <p>Take the risk to lose some customers if there is the opportunity to gain other/more customers/profits</p> <p>Take the risk to clash with other industry parties (when you redefine industry, this is inevitable)</p> <p>People are not really punished when concept does not work out, simply because of the market</p>
Structure		<p>Much freedom on local level to manipulate/serve own customer base</p> <p>Especially for service concepts, each country has its own decision power</p> <p>Much freedom to experiment, to try out something in the market</p> <p>Philosophy is to develop new concepts bottom-up (from local to global and from business people to strategy people): Personal initiative is highly applauded</p> <p>Formalized process</p> <p>Launch is highly dependent on BU management</p>
Cross-functional information dissemination	<p>Transparency in the organization is required</p> <p>The marketing and strategic departments should take the time to systematically discuss market tendencies with sales. This is an awkward and time-consuming process but very much needed.</p>	<p>Use many formal structures to share market information internally, cross-regionally and cross-functionally</p> <p>Marketing does rarely visit customers, in fact they have little concrete market and customer information. "they don't know what is happening in the market". Still, they are the ones who develop new concepts, therefore much cross-functional interaction is needed → Much effort to structure and formalize internal information dissemination, in order to make market info available to everyone.</p> <p>Regular, periodical meetings with sales, technology & marketing (& services) to discuss market tendencies</p>
Supply chain information potential	<p>Customers give valuable information about other industry parties, especially those more downstream</p> <p>Use suppliers for information about other competitors</p>	<p>Use customers (e.g. car importers) to get general market information</p> <p>Deliberate customer contacts to get information about the general market (really important for market for new concepts, about which you have only limited information)</p> <p>Suppliers provide valuable information about other relevant organizations (e.g. adhesive suppliers give info about advertising business)</p>
Supply chain information potential	<p>Do it jointly with your customers (it's demotivating if you're the 'sole fighter' + easier to convince customers of concept's benefits: many customers adhere to the 'not invented here syndrome')</p> <p>OEM 'lifts' upstream parties, pushes them to innovate; just as transporters & loaders push trailer & truck producers</p> <p>Push and help suppliers to innovate because this is needed in the LT</p> <p>"My dream is that when I'm 50, my customers won't think in terms of components anymore, because this is a huge bottleneck for our SI", "you want to make life easier for your customer, but some just want to keep doing it the old-fashioned way"</p> <p>It's a choice between downstream integration or joint development with customers</p> <p>Early supplier involvement (conceptual & design phase) prevents many practical technical problems in later phases (and some SIs involve technological issues as well)</p> <p>Involvement, co-operation and education of other supply chain parties are often put on hold out of fear of their potential free-rider behavior</p> <p>Other direct upstream customers are often more amenable to the development of new concepts than the arrogant, "we can do it ourselves" OEMs</p>	<p>The customer should trust you; should allow you to help him</p> <p>Deep co-operations with customers grow in importance</p> <p>Joint service development of upstream party and importer for dealer</p> <p>Many co-operations with suppliers, suppliers really stimulate to jointly innovate, but this is primarily in the technological area</p> <p>Many SInitiatives have been launched under "hidden" names, in order to give the impression as if from new, other party to prevent hostile reactions from other supply chain parties (e.g., from customers, branch federation)</p> <p>New SInitiatives sometimes grow so that eventually there comes a clash with new, different enemies (e.g. insurance companies)</p> <p>"in our industry, every party watches the others with Angus' eyes"</p>

Table C: Graphics printing industry: Independent variables

	Focus groups-2	Interviews
Recognition	<p>Deep customer insight: be as close as possible to customer; know his entire business process: "it's all about pinpointing demand, knowing your customer's needs", "everything is about a good interaction between supplier and customer, not only about technical issues, but also about real needs"</p> <p>1:1 customer relationships: think jointly with customer</p> <p>Study your customers, what they want and what they really do with your offer: "show him you know his processes and show him where his processes touch on your own core competences"</p> <p>Information about the end-market (to know better product-markets)</p> <p>Industry tendencies: "you need an industry vision"</p> <p>Study not really new industries, but new segments in the industry, different supply chain activities</p> <p>Study innovative customers and the ones that are open towards innovation</p>	<p>1:1 relationship management is the only way to know what the customer really wants (=role maintenance, sales + CRM): "it's not new, it's just back to basics, back to the past, decode, have normal, personal contact with the customer", "Customers walk in and out of our building, sometimes their visits are even too frequent"</p> <p>Study other industries "our industry doesn't exist anymore"</p> <p>Study latent customer needs: "user marketing"; dialogue with the customer <i>and</i> the concrete user(s) of the offer + internet user groups (customers discuss problems and solutions)</p> <p>Study industry tendencies: "it is important in our industry to look ahead"</p> <p>Gather general market information (via branch federations, consultancies)</p> <p>Customer days around specific topics</p> <p>Knowledge about customer's business: "if you want to sell something, talk to the customer about his business, his processes, not about technologies and machines!"</p> <p>Follow the customers' markets (future customer needs)</p>
Assimilation	<p>Discussions about market: deep and clear market segmentation required for offering total solutions</p> <p>Discussions and reflections about customers and marketing approach: "In a B2C market you fragment yourself completely color-blind: in a B2B business, you should deeply think about who you approach, why and how. And believe me, this is even more required when considering a SI"</p>	<p>Many meetings to discuss market (internally + with partner-companies, lunch-meetings with 5 innovative customers, etc.)</p> <p>Meetings about customers, offerings and marketing approach (with service, marketing, strategic planning)</p> <p>Many discussions about marketing approach (how to approach new customers, new markets?)</p> <p>High importance of internal soundboarding session (to question assumptions)</p>
Transformation	<p>Different skills ("if you want to do something different with your core competences, you'll need different people, with different skills", people, and not the machines, are becoming the production system, refocus from production on purchasing, outsource and co-ordinate)</p> <p>Constantly rethink procedures (better flow from pre-print to after-press)</p> <p>Organize things faster, the way tasks are carried out needs continuous adapting</p> <p>Persist, even at the detriment of existing customers</p> <p>"If you stick to the core of printing, you'll be dead"</p> <p>"to win outside, is to start inside"</p>	<p>Reorient from a printer to a service center (pre-press in separate BU, crossfunctional teams per account manager, customer teams, eliminate middle-management)</p> <p>Persist in new ways of working, even though this takes time</p> <p>Change procedures to better serve the customer 1:1</p> <p>"continuously revising procedures is a natural way to of reacting to new market needs"</p> <p>"setting up Sliminitives is not a storm, it is a babbling process"</p> <p>"we were copy boors, now we're service providers"</p> <p>"A strategic changes always requires a behavioral change up to the lowest level: it is a complete picture" (e.g., change programs to change employee behavior; establishment of 'transformation manager'); the most important part is the investment in the people "teach them how to pull, instead of the traditional technology push"</p> <p>Change the way of working: "an old organization + new tools = a very old organization"</p> <p>New competences take a long time and much effort</p> <p>Skills: IT knowledge (recruit), "topple the organization and topple competences", "turn services from a maintenance club into a powerful marketing instrument"</p> <p>Develop new processes together with employees (acceptability, supportive basis)</p> <p>The key is a quick and smooth reaction (internal adaptation) to market signals</p> <p>Continuously build and rebuild the entire organization</p>

Table C (ctd.): Graphics printing industry: critical internal & external factors

	Focus groups-2	Interviews
Culture	<p>Change the culture, it has to support the marketing approach Everyone in the organization should continuously react to customer needs, and show him they understand him and want to help him "sticking your neck out and starting something completely new is far more important than defending your traditional market" Have the courage to go to the end-customer and jump over traditional links in the supply chain</p>	<p>No technical mentality "We don't work with marketing people; everyone has the responsibility to be market-focused" Developing and introducing SI is not possible when you should continuously fight to have the permit to do so Dare to change the business (but do it gradually) Go to the market and see what happens "you set off on an adventure and you don't know where it is going to bring you"</p>
Structure		<p>Empower even the lowest levels Anyone can come up with new ideas, they are all considered very seriously, independent of whose idea it was in the first place; but implementation decided by BU mgmt The organization is as flat as possible with very short lines The BU has much freedom to establish new market concepts Use a very strong bottom-up approach: "as the string is within the management, not within the people, it is the people who should come up with ideas. So, enable them to do so." People <i>have to</i> show initiative</p>
Cross-functional information dissemination	<p>Avoid separate streams of concept development and market information (sales): both should be strongly interwoven</p>	<p>Cross-functional working helps to stimulate cross-functional information dissemination Many cross-functional links, but many of them are informal Continuous stream of market and customer information from sales Cross-functional meetings to discuss market information (sales+ service + marketing+ IT + strategic planning) "the development of SImitatives is in fact one process of customer information reaction. Sure, everyone has his own role in this process, but it remains one interlinked process with, obviously, much cross-functional information sharing" "Every employee has to know how and what the customer thinks"</p>
Supply chain information potential	<p>Customer provide valuable information about market tendencies A close relationship with customers makes it possible to use them as an information source Suppliers provide information about market and technological evolutions that can make one's own business more efficient</p>	<p>Customers are often eager to share interesting market information Suppliers provide information about competitors and about new technological developments, but not about the market (they need us, the customer for this)</p>
Supply chain innovation potential	<p>If a signal on the end market stimulates a supplier to change, he stimulates his suppliers in turn to join in Huge bottleneck if the customer's purchasing department is not willing to think differently, non-traditionally (e.g. thinking in terms of documents and not in papers) Suppliers launch technological innovations with business value for us (e.g. IT companies, logistics, etc...) Triple partnerships for total solutions (OEM+media supplier+IT company+printer) The market is so small that one man's breath is the other one's death: hostility impedes innovative efforts</p>	<p>Co-operations with customers stimulate to not set in one's habits, to keep one's own ideas fresh "the fact that we are innovative is for sure dependent on our innovation capacity, but, above all, we have good customers" Joint development with customer during contract gives one a head position for SI with this customer (lock-in and trust) Customer restraint can be a large bottleneck: invest in playing on the customer to convince him about the new value OEMs push printers to better serve their customers, OEM helps in developing new and better offers Involve non-traditional suppliers in early phase of concept (e.g. IT companies, consultancies) If the direct customer does not like the new concept (though the end customer does), many companies become scared and stop it Due to the increasing hostility in the industry many innovations are not welcomed by industry parties. Innovations still increase hostility and stimulates acts of revenge. This prevents many to take up SI.</p>

Table D: Traffic Management Systems industry: Independent variables

	Focus groups-2	Interviews
Recognition	<p>Think jointly with customer, know his process and how he thinks: Regular 1:1 visits and discussions Study customer needs and traffic policy in entire world (to convince local customers) Consciously study future customer needs and develop L.T. market view: be the predecessor of the market Study end customer/users (car drivers) Study customers of other BUs (e.g. property developers) Study other, related industries (automotive)</p>	<p>General market information by means of existing general market reports Study L.T. market tendencies Study other industries (automotive, in-car telematics) Know general political/legal policy Deep customer knowledge; they need traffic contents Study non-customers; private parties (RAI, amusement parks, etc.) 1:1 relationship with direct customers Small user groups with innovative customers (conferences) Study traffic users (car drivers, tourists, etc.); end customers Study customer information collected by service/customer support</p>
Assimilation	<p>Frequent discussions and brainstorm sessions about future customers and markets (L.T. future scenarios) Systematically question marketing approach: from 'how' to 'what' Discuss customers (e.g. why not private parties?) Question the entire supply chain and the way the industry is organized</p>	<p>Internal discussions to share new ideas about markets and customers (though often in formally) Many discussions about bottlenecks in the industry (though often informally) Brainstorm meetings about future market developments, own role in industry and current marketing approach Specific product/market user groups to critically discuss market (also used in early stages of SI initiatives as sounding board)</p>
Transformation	<p>Change the way assignments are executed (thinking in solutions requires a different way of working: more service-based, more logistics-focused, etc.) Downward interference; buy customer and integrate in existing BU Change in production methods (outsourcing, purchase basic elements, bundle and sell as total solution) Use new tools (e.g. use new electronic tools for customer contact)</p>	<p>Separate, limited unit for SI (focus on marketing & sales, hire other competencies from existing BU) Change from a technical to a service-based company: different mentally and different way of working Other market needs require diversification of activities "we're fast in setting up new businesses; the launch is quick but the execution takes time" Much training in non-technical areas: communication, entrepreneurship, etc... Change processes; far more co-operation between different BUs (difficult process) Product development and project management follows very strict procedures, but the commercialization phase is far less structured</p>

Table D (ctd.): TMS industry: critical internal & external factors

Culture	Focus groups-2	Interviews
	<p>Willingness to think ahead, to take initiative, to take the lead in the industry/market</p>	<p>Recruit people more on their market insight and entrepreneurial competences than on technical competences “we’re bursting of ideas, everyone here is...the tricky thing is however the budget” Enthusiastic strategic top and readiness to fight against lower, technical levels “New things always cost a lot of time and energy, but we are convinced they eventually will work out” Push the market, “we do not develop on customers’ demand, we simply develop and then push the demand” Push through the initiative, even when political policy is put on hold Take risks, but do it in a smart way (without millions of investments) The market for a SI is always new, it is uncomfortable after years of focus on your core-market. But dare to invest, free your best people for this</p>
Structure		<p>Each BU defines its own working procedures, fit to the specific product/markets they serve SI even increases the need for each BU to define and redefine its own way of working Each BU has its own market innovation and business development role (less initiated by the company top) Much freedom to experiment in job</p>
Cross-functional information dissemination		<p>Cross-functional meeting to couple market information to technical possibilities Regular meetings between marketing, sales, product management & customer service Cross-functional consideration and consultation is needed to avoid the technology-driven trap Importance of a multi-functional board of the BU</p>
Supply chain information potential	<p>Participate in working groups/seminars of every position in the supply chain to gain a complete picture of the industry Suppliers are a valuable information source of market and competitor information if they are an influential party in the supply chain (e.g. 3M, studies Vialis)</p>	<p>Direct relationships with parties in the entire industry, along the supply chain to get market information and information about other relevant organizations (e.g. service and content providers, Michelin, ANWB, etc.) Suppliers also study our customers (to better their service); learn something from them as they have a different perspective on our customers Suppliers provide information about foreign, exemplar markets</p>
Supply chain innovation potential	<p>Joint development with customers (they feel involved and we share investment risks) Partnerships with multiple parties to share risks and competencies</p>	<p>Close co-operation with municipalities; allows one to develop the concept with one city, then roll out to others (“it always spreads like an oil stain”) Close co-operation often implies joint marketing efforts too (increases power base) The joint development (with cities) of entirely new concepts is top priority Particularly German software suppliers push to invent new concepts (the German IT market is much more advanced) SI has often a technical component too, innovative suppliers indirectly facilitate SIs in this way Suppliers push to outsource a part of the production, this frees up resources to develop new market concepts Many multi-level, multi-party co-operations for fundamentally new concepts: still, strong win-win relation is required Smart (relation) management of customers (cities) is required. It takes a lot of time but it may prevent the large bottleneck of fire-riding behavior The trust between public and private parties has gone since long, but trustful co-operation is crucial factor for LT industry development</p>

Table E: Energy industry (electricity): Independent variables

	Focus groups-2	Interviews
Recognition	<p>Gather general market information (EU policy and Dutch policy constantly change) Look at other industries with similar characteristics (e.g. telecom) Study the energy consumer (end customer) Study the entire customer business process/ consumption cycle Develop deep industry insight about new tendencies (new entrants, foreign energy companies, etc.)</p>	<p>Study end customer needs Study market in a detailed way (new products, etc.) Use general market research for macro-tendencies Invite customer groups 1.: deep relationships with customers ("be proactive to help the customer define his own needs", "I eat more with my customers than with my family", "I want my account and project managers to feel as if they're employees of the customer") Focus on innovative customers and study their needs Study non-customers (develop detailed market segmentation) Study future customer needs (e.g. chaos in market will persist, environmental regulations will intensify)</p>
Assimilation	<p>Reflections about the customer (e.g. are they similar to foreign energy consumers?) Regular discussions about the market (e.g. what will be the impact of new intermediaries and foreign grants?) Much thought about marketing approach (pricing, advertising, independent party as service provider, etc.)</p>	<p>Reflections about customers jointly with customers and marketing dept. (deep & clear segmentation, do they indeed want a low price?) Thinking and discussing market tendencies has become part of the daily business, many meetings for this Discussions about market (do we belong to the industry? organize 'theme presentations') Involving different people in critical strategic discussions deepens the discussion, it helps to question your perspective and approach Discussions about customer approach (via top management) Keep alive past insights (let customers pay for pilots, not too much diversification, customer does not care to pay a lot, as long as he has no trouble, green energy sounds as expensive, internet is not the right medium to approach consumers, corporate large customers take an awfully long time to decide, etc.)</p>
Transformation	<p>Rethink internal working processes: avoid faulty administration and back-office at any price. "You can not solve an organizational problem by implementing a tool like SAP". Different way of working (no 8-5) Separate unit for services "it doesn't work without a business transformation", "how can you smoothly turn the entire tent into a different direction?"</p>	<p>Change the way work is done (e.g. one national helpdesk) Develop new procedures, this is often the bottleneck ("the back-office should be faulty for credibility reasons") Change way of working (e.g., joint project team with customer) Adapt the organizational structure (e.g., creation of marketing unit)</p>

Table E (ctd.): Energy industry (electricity): critical internal & external factors

	Focus groups-2	Interviews
Culture	Importance of market-driven culture Dare to keep investing in fundamentally new offers, despite the continuous fluctuations in legislation	Market changes are 'fun', they keep things in motion People are eager to develop new market-growing concepts Open attitude towards SI: If a customer needs something, make it fit within the strategy Be a trendsetter; even though the risks is high, you have to push things on the market Cowboys
Structure		New concepts always arise bottom-up from the BU (even though afterwards check with corporate strategy) Freedom to launch new business concepts in our BU No staff functions, everything is integrated within the business Only two layers in the organizational structure Ideas come from many people, everywhere in the organization but BU mgr decides
Cross-functional information dissemination		Cross-functional meetings with sales are necessary to inform marketing about the latest developments in the market: "there is no better market research than discussions with sales people" Dinner meetings with presentations about particular market developments The most fundamental SIs always arise <i>between</i> different people: many cross-functional channels Many structures to promote the internal dissemination of market information, but the informal channel is as important
Supply chain information potential		Regular brainstorm sessions with customer-partners End-customer information via customers Information about feasibility of new SIs from direct customers Suppliers provide information about other and new relevant organizations (e.g. IT companies) Suppliers give info about the market
Supply chain innovation potential	Set up joint initiatives with customers (compatible knowledge & competences, e.g. installation companies and energy companies) "The one's breath is the other's death": much hostility when SIs are launched Importance of credibility towards other supply chain parties The industry is still settling, is still immature, everyone is 'expecting and watching the others', this impedes innovative market initiatives by all parties	Use customers to coach each other, they can better teach each other than the supplier can and it frees up the supplier's time for new things SIs are often joint projects with customers Use customers to develop (extend) one's own business towards other domains Customers should be educated about new concepts Partnerships with suppliers for the technological aspects linked to SI Suppliers jointly think about new market opportunities Prefer franchise formulas over acquisitions of customers/contractors: creates much hostility The tensions between the different supply chain parties retard the innovation process (although formerly one company) Solve tensions between parties on a personal level: "opposite organizations, that doesn't work, but 2 persons from opposite companies, this may work quite well!"

APPENDIX IV: ASSUMPTION CHECK EXPLORATORY FACTOR ANALYSES

Assumption check separate EFAs:

- Sample sizes of all EFAs met the cases-to-indicator ratio of 5:1 (Iacobucci, 1994). Furthermore, the minimum sample size was above 150, which is considered as ‘fair’ (Tabachnick & Fidell, 2001c; Iacobucci, 1994). Missing values were pairwise deleted.
- Normality: The EFA solution is enhanced when data are normally distributed. Since no statistical inference is used here, if data fail to meet this criterion the solution may be degraded but is still useful (Tabachnick & Fidell, 2001c: 588). (Univariate) normality was assessed by skewness and kurtosis, by histograms, by normal probability plots and by the Kolmogorov-Smirnov test for normality. Many variables showed a mild skewness (values of -1 to +1) or kurtosis (values of -1 to +1) in different directions, which is not problematic as statistical inference was not used (Heck, 1998). However, *nwinfol* was more seriously negatively skewed and positively kurtotic. Also, *nwin12* was negatively skewed. Overall, a Kolmogorov-Smirnov test indicated that all variables failed in normality ($p < 0.05$), and since the direction of skewness differed among variables the EFA solution may be weakened (because of lower correlations). Nonetheless, we decided not to transform the data since main analyses would be run through PLS, which does not assume data normality (not inference-based). Transforming data only in order to optimize the EFA results (which on top can cope relatively well with non-normality) is not worth the disadvantages of transformation, such as changing existing and validated scales and hampering interpretation (Tabachnick & Fidell, 2001b; Allison, 1998).
- Linearity: Since correlations (on which the EFA is based) only take linear relationships into account, the solution is degraded when linearity fails (Tabachnick & Fidell, 2001c). Linearity was examined by the inspection of scatter plots. Variables appeared to be more or less linearly related so that a suboptimal solution may be possible. (Skewness in different directions did however not lead to curvilinear relationships among the variables).
- Outliers: Since univariate and multivariate outliers may distort solutions, they were removed from the analysis (see section 5.1.3). In order to make full use of all available data, for the separate EFAs we did not remove the previously identified multivariate outliers among all constructs, but we identified multivariate outliers among the indicators *per construct domain* (because the separate EFAs were restricted to a specific construct domain). Mahalanobis distance was calculated by performing a regression analysis with all indicators per construct domain as the independent variables and the response number as the dependent variable (Tabachnick & Fidell, 2001a). Several multivariate outliers were found; for the cultural variables we identified three multivariate outliers, for the chain information domain six, for the structural constructs six (and one univariate outlier on *struct3*, as previously indicated, see section 5.1.3), for chain innovation stimulus one, for crossfunctional information dissemination none, and for the dependent variable three multivariate outliers were found. Further study of these outliers (by comparison of the outlier scores to average indicator values of the remaining sample) revealed that they represented cases with inconsistent

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answering patterns among the indicators per construct domain. All these outliers (together with the in section 5.1.3 mentioned univariate outliers) were removed from the separate EFAs.

- Factorability was checked by means of the Bartlett's test of sphericity (H_0 : Correlations are zero). For all EFAs results were significant. Also, the anti-image correlation matrix was inspected and showed small values on off-diagonal elements. Finally in each EFA the Kaiser-Meyer-Olkin's measure of sampling adequacy largely exceeded the 0.6 lower boundary (Tabachnick & Fidell, 2001c).

First, the appropriateness of the oblique rotation method was examined. For all constructs the factor correlations confirmed the appropriateness of an oblique rotation (for the exact factor correlations, see Table 5.1, last column). Only, for the constructs of the domain of chain innovation stimulus, the correlations were relatively low, only the correlation between innocus and innosup was higher (0.341). Since this highest factor correlation is still a borderline value the more interpretable orthogonal rotation was chosen for further examination. Factor intercorrelations never exceeded 0.8, meaning that there is no danger of too many factors being extracted and a higher-order factor analysis being more appropriate (Iacobucci, 1994).

Then the number of factors to be extracted was decided upon, based on a combination of several methods (Heck, 1998). Although we could a priori define the number of factors (= number of constructs) per construct domain, we checked this number with the scree test (Cattell, 1966) and the Kaiser criterion. The Kaiser-eigenvalue criterion implies that factors with eigenvalues greater than one are retained. However, the underlying logic of the Kaiser criterion is to maximize variance, which is not the goal of FA. In addition, this rule does not always perform well empirically; in PCA often too few components are extracted and in FA it can result in too many (Iacobucci, 1994). Overall results of the three methods indicated that the hypothesized number of factors could be retained in the analysis.

As all manifest variables would account for 100% of the common variance, the goal is to account for as much common variance as possible with the fewest number of factors (Heck, 1998). Consequently, the proportion of variance extracted (of each factor and of all factors as a group) was examined and proved satisfactory in all factor solutions.

Finally, once the number of factors was examined, loadings and communalities could be studied. A measured variable's communality is its total variance minus its uniqueness; communality comprises the variance caused by common factors, which are shared with other measured variables (Iacobucci, 1994). So the communality of a manifest variable is its variance accounted for by the factors (Tabachnick & Fidell, 2001c). Communality is calculated by summing the squares of the loadings of the indicators on all factors. Since clear cut-off values for communality are lacking in the literature, evaluation of communality is a relatively subjective act (Wijnen et al., 2002).

Assumption check joint EFA:

- Sample size did not meet the cases-to-indicator ratio of 5:1 (Iacobucci, 1994) as 45 items were entered in a FA on 182 cases. However, when there are several high loading variables (which could be expected since measures had already been refined based on the results of the separate EFAs) a smaller sample size, of for example 150, is considered as adequate (Tabachnick & Fidell, 2001c; Iacobucci, 1994). Missing values were pairwise deleted.
- Normality: cfr. results of separate EFAs
- Linearity: Given the number of variables, inspection of all pairwise scatter plots was not possible. We ran a spot check on a few plots which were expected to be the worst (those with the most discrepant distributions; e.g., skewed versus normal distribution, or negatively versus positively skewed). These plots did not reveal any serious linearity problems.
- All outliers identified in section 5.1.3 on data cleaning (i.e., the univariate outlier and the multivariate outliers among all indicators and constructs) were discarded.
- Factorability was checked by means of Bartlett's test of sphericity ($p < 0.000$), inspection of the anti-image correlation matrix and by Kaiser-Meyer-Olkin's measure of sampling adequacy (0.756). Results proved satisfactory.

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APPENDIX V: POWER ANALYSIS FOR THE MODERATOR ANALYSES

In short, with any statistical test, the researcher runs the risk of two kinds of mistakes: rejection of H_0 when in fact it is true (type I error), or acceptance of H_0 when in fact it is false (type II error) (Bagozzi & Baumgartner, 1994). The probability of making a type I error is expressed in the α -level the researcher chooses (e.g. 0.01). The probability of making a type II error is denoted as β . The complement of β indicates the probability of correctly rejecting the null hypothesis and is known as the power of the test ($1-\beta$) (Reynolds & Diamantopoulos, 1996). Reporting statistical power is especially important when the statistical analysis does not reject the null hypothesis (i.e. when an insignificant effect is found) (Cook & Campbell, 1979). This is because an insignificant result can appear because a true relationship is absent, but can also be due to the sample being too weak to detect a reasonably sized (e.g. with a 0.95 confidence interval) effect (Cook & Campbell, 1979). Larger sample sizes reduce sampling error in that their estimates better approximate the population parameters, which results in higher statistical power. However, although the high power of a large sample size increases the probability of a rejection of the null hypothesis, it does not necessarily increase the probability of *valid* rejection (Sawyer & Peter, 1983). Hence, results are less reliable when the test is significant and power is high (because a trivial misspecification may cause the rejection of H_0), or when the test result is non-significant and power is low (because a priori the chances of finding significant results were very low) (Saris et al., 1987). However in the context of SEM, power levels have been reported only seldom (Saris et al., 1987).

Since sample sizes are considerably reduced in a median-split analysis, running the risk of making type I errors is reduced, while the chance of type II errors is increased. In other words, significant results of the subgroup analyses would be very reliable, while insignificant results would be less fail-proof. The latter risk made it necessary to first check sample sizes for adequate power levels before subgroup analyses could be interpreted.

We adopted sample size-rules developed for multiple regression analysis, as PLS rests on simple and multiple regressions (see chapter 3).

Green (1991) severely criticized the application of over-simplified rules of thumb that are based on a minimum ratio of number of cases to number of predictors (e.g., Tabachnick & Fidell, 2001b; Harris, 1975). Relying on the power-analytical work by Cohen (1988), Green (1991) proposed two more complex rules of thumb (one for R^2 s, and one for beta coefficients), as a function of the number of predictors and of effect sizes as well. Both these rules determine the required sample size for an alpha level of 0.05 and a power level of 0.8. He uses 0.05 and 0.8 based on Cohen (1988). Cohen (1988) argues that the relative risk of making a type I and type II error can be expressed as a 4 to 1 ratio. Setting the alpha level on 0.05 implies that the probability of a type II error should be set at 0.2 ($0.05 \cdot 4$), or at a power level of 0.8. He considers a power level of 0.8 as appropriate for the behavioral sciences (Green, 1991).

We first applied Green's (1991) formula for the multiple correlation of SICap. Although Cohen (1988) based his power analysis on medium effect sizes, Green (1991) advises researchers to not blindly follow this guideline but to consider the magnitude of the effect envisioned in their study. Since the R^2 of SICap in the hypothesized model was large (0,353 see section 5.3.3.2) a large effect size (>0.26) could be expected here as well.

Appendix V

Applying Green's (1991: 504) formula for a large effect-size led to a minimum sample requirement of 39 cases for the subgroups.

In the formula for the partial correlations, the largest multiple regression involved in the PLS model was considered: the multiple regression to compute the weights of the recog indicators. (This largest multiple regression could not be considered to apply the formula for multiple correlations since recog, being an exogenous variable in the model, does not yield an R^2 value in the PLS analysis). If we base ourselves on the results of the formative indicators in the hypothesized model (section 5.3.3.1), a medium-large (0.13-0.26) effect size could be expected. Green's (1991: 507) formula resulted in a minimum subgroup sample size of 31 for a large effect, and 60 for a medium-sized effect.

We then selected the largest result of both formulas (39 versus 31-60) as the minimum sample size requirement for the moderator study (Green, 1991).

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NEDERLANDSTALIGE SAMENVATTING (SUMMARY IN DUTCH)

Globalisering van de economie en een toename van technologische innovatie hebben ertoe geleid dat de structuur in veel industrieën regelmatig verandert. Lagere toetredingsbarrières maken ruimte voor agressieve nieuwe toetreders op de markt (McNamara et al., 2003). Hierdoor verhoogt de concurrentiedruk, en afspraken tussen bestaande spelers vervagen langzaamaan (D'Aveni, 1995a). Bedrijven voelen zich bedreigd, en in een wanhopige poging om hun eigen marktaandeel beschermen, trachten ze vooral om marktaandeel van hun rechtstreekse concurrenten af te snoepen (Markides, 1999a). Met het oog op snelle winsten, zoeken ze alle hun toevlucht in dezelfde wapens: kostenverlagingen, kwaliteitsverbeteringen of beide tegelijkertijd. Omdat ze elkaar bestrijden met dezelfde middelen ontstaat op de duur een heftige prijsconcurrentie (Larsen et al., 2003), waardoor marges en winsten gevoelig dalen (D'Aveni & Gunther, 1994). Dit fenomeen wordt 'hyperconcurrentie' genoemd (D'Aveni, 1995a).

Bovendien merken vele bedrijven dat hun producten en services sneller commodities worden (Rangan & Bowman, 1992). Om zich te differentiëren zoeken ze naar drastischere manieren dan incrementele productaanpassingen (Styles & Goddard, 2004; Day & Montgomery, 1999).

Ook in industrieën die minder onderhevig zijn aan technologische innovaties, aan internationale concurrentiedruk of aan klanten die steeds veeleisender worden, vertonen bedrijven de neiging om strategieën te volgen die gelijkaardig zijn aan deze van concurrenten. Omdat managers beperkt zijn in hun vermogen om informatie te verwerken, gebruiken ze mentale structuren die hen helpen om omgevingsinformatie eenvoudiger en duidelijker te maken (Porac & Thomas, 1990). Door de sociale interacties binnen een industrie ontstaan er zo ook op industriënniveau een aantal gedeelde overtuigingen over wie 'de concurrent' is en hoe men het best kan concurreren (Huff, 1982; Spender, 1989; Sutcliffe & Huber, 1998). Deze overtuigingen worden zelden of niet in vraag gesteld en bedrijven maken hun strategieën consistent met deze overtuigingen, waardoor die op zich nog meer ingeworteld geraken. Deze spiraal maakt het erg moeilijk voor individuele bedrijven om los te breken uit het concurrentierecept van hun industrie (Abrahamson & Fombrun, 1994; Johnson & Hoopes, 2003; Porac et al., 1989).

De vaststelling van deze tendensen wekte de interesse van academici op voor een soort van innovatie die fundamenteel 'ontwrichtend' is. Managementonderzoekers raden bedrijven aan om radicaal af te wijken van de bestaande conventies in hun industrie, en om een fundamenteel nieuw en ander concurrentiespel te spelen (Govindarajan & Gupta, 2001). Een dergelijk nieuw concurrentiespel is uiteraard enkel zinvol als het ook nieuwe en méér waarde aan de klant biedt (Miller & Chen, 1996). Dit soort innovatie wordt 'strategische innovatie' genoemd (Markides, 1997, 1998). Dit is het type innovatie dat wij onderzochten.

Onderzoekers hebben bovendien aangetoond dat het duurzaam concurrentievoordeel dat bedrijven kunnen realiseren met één enkele 'one shot' strategische innovatie, beperkt is (Govindarajan & Gupta, 2001). Daarom raden ze bedrijven aan om portfolio's van meerdere strategische-innovatie-experimenten uit te werken (bij voorbeeld om risico te beheersen). We bestudeerden bijgevolg de capaciteit van bedrijven om *systematisch* strategische-innovatie-initiatieven te kunnen creëren: 'strategische-innovatiecapaciteit'. Meer bepaald gingen we op zoek naar specifieke mechanismen die managers doelbewust

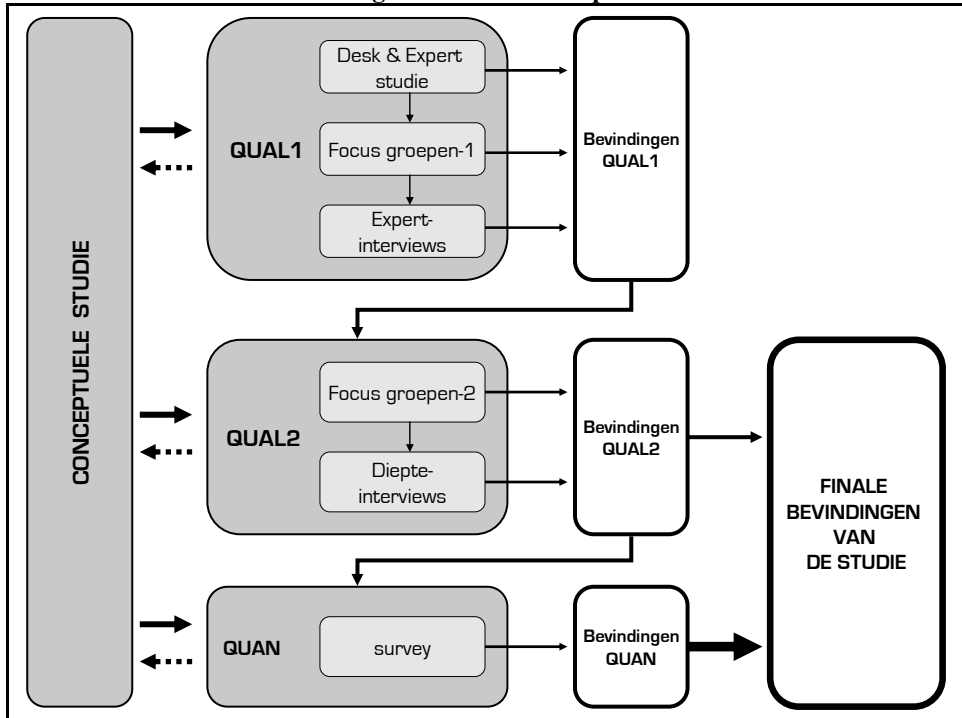
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kunnen opzetten om de strategische-innovatiecapaciteit van hun business unit of bedrijf te verhogen.

De keuze voor dit onderzoeksonderwerp reflecteert uiteraard onze interesse voor dit soort innovatie, alsook ons geloof in de waarde ervan in bepaalde omstandigheden. Echter, we kunnen op basis van dit onderzoek geen normatieve uitspraken doen of strategische-innovatiestrategie altijd, overal, en voor elk bedrijf een aangewezen strategie is.

Het onderstaande schema geeft weer hoe we dit onderzoek uitvoerden.

Figuur: Onderzoekopzet



De figuur geeft weer dat de studie is opgebouwd uit een conceptueel (links) en een empirisch luik (rechts).

De box uiterst links in de figuur geeft de conceptuele studie aan. Het onderzoek rond strategische innovatie, en zeker dit rond aansturingsmechanismen voor strategische-innovatiecapaciteit, staat nog in zijn kinderschoenen. Vooraleer we dit soort van innovatie dus empirisch konden onderzoeken, dienden we eerst een aantal begrippen goed af te bakenen. De conceptuele studie bestond uit twee grote delen.

Ten eerste bestaat er in de literatuur nog steeds geen duidelijke omschrijving en definiëring van het concept 'strategische innovatie'. Daarom onderzochten we de literatuur rond strategische innovatie en rond gelijkaardige concepten. Op basis van een vergelijkende

studie van al deze bijdragen, konden we bepaalde patronen afleiden en uiteindelijk een definitie voor strategische innovatie(capaciteit) ontwikkelen.

Eens we het concept duidelijk afgebakend hadden, zetten we onze zoektocht voort naar specifieke managementmechanismen die strategische-innovatiecapaciteit zouden kunnen stimuleren. We argumenteren dat de integratie van bepaalde theoretische concepten mooie perspectieven biedt. Voortbouwend op inzichten uit recente literatuur rond routines konden we uiteindelijk mechanismen achterhalen die bedrijven doelbewust kunnen opzetten ter verhoging van hun strategische-innovatiecapaciteit. Deze zijn semi-gestructureerd. Er bestaan drie categorieën van deze mechanismen: mechanismen die een bedrijf stimuleren om beter marktinformatie te herkennen (herkenningscapaciteit), mechanismen om beter deze herkende informatie te assimileren (assimilatiecapaciteit), en tenslotte mechanismen die het bedrijf ertoe aanzetten om gemakkelijker op basis van deze geassimileerde informatie te handelen (transformatiecapaciteit).

Het empirisch luik bestaat uit drie grote delen: twee kwalitatieve en een kwantitatief onderzoek. Het kwalitatieve gedeelte richt zich tot vijf Nederlandse industriële sectoren: energie, printing, trucks & trailers, functionele voeding en verkeersbeheersingssystemen.

In het eerste kwalitatieve onderzoek (QUAL1) selecteerden we ‘echte’ strategische-innovatie-initiatieven en ‘echte’ strategische innovatoren. ‘Echte’ betekent dat we de initiatieven die recent ondernomen werden in de vijf onderzochte sectoren, stelselmatig vergeleken met de heersende concurrentie-opvattingen in deze sectoren. We onderzochten hiertoe vak- en industrietijdschriften, namen 12 explorerende interviews af en hielden een discussiegroep met 11 managers uit deze sectoren. Per sector werd er ook een focusgroep (5 in totaal) gehouden waarin alle partijen in de keten vertegenwoordigd waren. Tenslotte werden er ook nog 28 bijkomende ‘expert’-interviews afgenomen.

De geselecteerde ‘echte’ strategische-innovatie-initiatieven en ‘echte’ strategische innovatoren werden verder bestudeerd in de tweede kwalitatieve fase (QUAL2). Opnieuw werden focusgroepen georganiseerd en we interviewden 18 strategische innovatoren en hun klanten. Op basis van QUAL2 kregen we een eerste beeld over de kenmerken van de aansturingmechanismen.

Deze voorlopige bevindingen werden statistisch getest op een representatieve steekproef van alle Nederlandse industriële bedrijven. Voor de interpretatie van onze resultaten steunden we enerzijds op bestaand onderzoek en ook werden de gegevens van QUAL2 opnieuw bestudeerd. Hiermee kwamen we tot de finale bevindingen van ons onderzoek.

Onze resultaten tonen dat ‘doelbewust opgezette mechanismen voor strategisch leren’ aanzienlijk de strategische-innovatie-capaciteit van een bedrijf beïnvloeden. Wat betreft mechanismen voor herkenningscapaciteit, wijzen onze resultaten op het belang van een hechte relatie met de klant. Aandachtig luisteren naar klanten en het goed bestuderen van de manier waarop zij de producten en diensten die een bedrijf aanbiedt in hun eigen businessprocessen gebruiken, kunnen leiden tot ideeën voor nieuwe waardeproposities. Het raadplegen van de meest innovatieve klanten voor nieuwe businessideeën blijkt bijzonder effectief. Een sterke focus op bestaande klanten maakt een bedrijf niet blind, maar tegelijkertijd is het toch belangrijk om ook niet-klanten te bestuderen. Grootschalig marktonderzoek en algemeen ‘desk research’ (de traditionele activiteiten van de marketingafdeling) zijn ineffectief. Onze bevindingen wijzen vooral op een nieuwe, verrijkte rol voor account management en alle ‘mensen in het veld’ (bv. service engineers)

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als informatie- en idee-antennes. Ook voor marketingafdelingen brengt onze studie interessante resultaten.

Wat betreft herkenningcapaciteit blijkt het bediscussiëren van, en het collectief reflecteren op, de assumpties die het bedrijf heeft over zijn markt en klanten cruciaal. Deze discussies moeten bovendien meerder bedrijfsfuncties betrekken; voornamelijk sales, marketing en business unit management blijken hierin een centrale rol te vervullen. Het coderen en opslaan van inzichten in databanken of op het intranet levert geen resultaten op. Deze informatie wordt immers zelden gebruikt. Hieruit kunnen belangrijke lessen getrokken worden voor het opzetten van kennismanagementprogramma's en de neiging die bedrijven vertonen om "information-rich, but interpretation-poor systems" te worden (Prahalad & Bettis, 1995: 6).

Wat betreft het stimuleren van transformatiecapaciteit is vooral het veranderen van de bedrijfsstructuur belangrijk. Onze resultaten suggereren de waarde van aparte units voor de effectieve implementatie van strategische-innovatie-initiatieven. Vaak worden mensen intern uit het bedrijf tijdelijk of half-time gedetacheerd naar deze units. Bovendien vergen strategische-innovatie-initiatieven geen fundamenteel nieuwe bedrijfscompetenties, maar creëren bedrijven een hefboomeffect door hun bestaande competenties anders in te zetten of ze te combineren met de competenties van andere (industrie-vreemde) bedrijven in allianties.

Onze resultaten wijzen er bovendien op dat de effectiviteit van deze drie categorieën van mechanismen een omgekeerde piramide vormt. Met andere woorden, deze mechanismen bouwen op elkaar voort. De effectiviteit van mechanismen voor herkenningcapaciteit zal pas ten volle benut kunnen worden als ook mechanismen voor assimilatie en transformatie worden toegepast. Hetzelfde geldt voor de relatie tussen assimilatie- en transformatiemechanismen. De effectiviteit van deze mechanismen is echter ook afhankelijk van bepaalde organisatie-eigenschappen. Zo zal bijvoorbeeld een innovatieve bedrijfscultuur de effectiviteit van de drie categorieën van mechanismen verhogen, terwijl het opzetten van assimilatie- en transformatie-mechanismen dan weer niet zinvol blijkt in een gecentraliseerde structuur. Bovendien zijn er ook een aantal eigenschappen van de externe bedrijfsketen waarin een bedrijf actief is, die de effectiviteit van deze mechanismen bepalen. Zo zal bijvoorbeeld een niet-vijandig ketenklimaat (geen vijandigheid in de verticale relaties, dus tussen een bedrijf en zijn klanten en leveranciers) de effectiviteit van transformatie-mechanismen doen afnemen.

Bovendien blijken mechanismen voor herkenning en assimilatie effectiever dan deze voor transformatie. Vooral het stimuleren van assimilatiecapaciteit heeft een erg groot effect op de strategische-innovatiecapaciteit van een bedrijf. Dit zou kunnen betekenen dat het gemakkelijker is om cognitieve verandering aan te sturen dan een gedragsverandering. Onze resultaten suggereren ook dat het erg belangrijk is deze herkenningcapaciteit en assimilatiecapaciteit in de gewone bedrijfsvoering in te bedden. Ideeën voor strategische-innovatie-capaciteit ontstaan in en tijdens de 'gewone' business. Op basis van dit resultaat kunnen we de waarde van aparte business development- en marketingafdelingen voor het initiëren van nieuwe strategische-innovatie-initiatieven in twijfel trekken. Daarentegen lijkt het aangewezen om de effectieve implementatie van initiatieven wél in aparte units te laten gebeuren. Deze units opereren op de markt onder aparte merknamen. Deze afgezonderde units beperken het risico en verhinderen mogelijke chaos in de organisatie. Met betrekking

tot dit laatste, lijkt ook het gebruik van blauwdruk-patronen erg waardevol; blauwdruk-patronen beschrijven mogelijke procesveranderingen vooraf, maar laten de mogelijkheid tot context-specifieke invulling in de concrete uitvoering.

Algemeen draagt ons onderzoek bij aan managementtheorie door de verfijning en integratie van verschillende strategische concepten. Managementtheorie is bovendien vaak bekritiseerd voor haar hoge abstractieniveau. Wij maakten sommige van de 'vage' theoretische managementconcepten zeer 'tastbaar' en vertaalden ze naar concrete bedrijfsprocessen. Onze resultaten bevestigen bovendien recente inzichten rond 'strategic choice' theorie (bv. Child, 1997). Managers kunnen zeer bewust strategische keuzes maken, en de strategische richting die een bedrijf opgaat wordt niet volledig bepaald door zijn geschiedenis (evolutionary economics) of de industrie waarin het opereert (population ecology). Managers kunnen door het opzetten van de juiste mechanismen de innovatiecapaciteit van hun bedrijf gedeeltelijk 'knedden' en kunnen dus ook de strategische-innovatiecapaciteit van een bedrijf doelbewust stimuleren. Echter, een bedrijf is niet volledig plastisch en de mechanismen die het management inzet werken niet op 'een wit blad'.

Summary in Dutch

CURRICULUM VITAE

Lislore Berghman (°Antwerp, May 3, 1977) received her Master's degree in Applied Economics cum laude from the University of Antwerp (Belgium), where she is currently a research and teaching assistant at the Faculty of Applied Economics. Her research interests include strategic management and industrial marketing, especially the creation of radically innovative strategies. Her research has been published in international journals such as the *Journal of Managerial Psychology* and *Industrial Marketing Management*. Lislore Berghman has presented her work on international conferences, such as The European Group of Organization Studies and the Strategic Management Society. The book "Waardecreatie en Innovatie in de Industrie" (value creation and innovation strategies in industrial markets), which she wrote jointly with Koen Vandenbempt and Paul Matthyssens, received the award of Management Book of the Year in 2004 (Belgium) and the PIM Marketing Literature Award in 2005 (The Netherlands).

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Strategic Innovation Capacity

A Mixed Method Study on Deliberate Strategic Learning Mechanisms

Managers of Western industrial companies are eagerly looking for effective weapons to fight the hypercompetition and commoditization tendencies they are confronted with. In recent years, management scholars have been trying to answer their calls, propounding 'strategic innovation' as an appropriate means to counter the competitive threats that intensify strategy convergence among the different firms in an industry. They have recommended firms to deviate from the existing industry rules of playing the game, in order to create fundamentally new and superior customer value. Yet, research on this kind of innovation is still in its infancy. Even though the phenomenon of strategic innovation did arouse (marketing) managers' interest, academia has so far been unable to provide managers with concrete handles they may use to stimulate their firm's capacity for strategic innovation. Moreover, insights have been supported mainly by examples or anecdotes, and contributions tend to lack scientific rigor and corroboration despite their promising ideas.

This book is hence motivated by a scientific quest for any mechanisms firms can use to deliberately crank up their strategic innovation capacity. It builds on insights from the management literature, integrates several theoretical concepts and translates them into concrete business practice. The book reports the results of qualitative and quantitative empirical studies of Dutch industrial firms. Evidence is provided that the establishment of specific managerial mechanisms may indeed foster a firm's strategic innovation capacity. The book distinguishes several categories of mechanisms, specifies what elements these mechanisms should target, how different mechanisms work in concert and finally, what effects organizational and supply chain characteristics may produce on the effectiveness of these mechanisms.

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