Deliberate Learning Mechanisms for Stimulating Strategic Innovation Capacity

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Prevailing studies have demonstrated the importance of learning for an organization’s innovation outcome. Both strategic management and strategic marketing theories have stressed the importance of continuously reinventing business models and creating new customer value. We extend these views by focusing on the impact of deliberate learning mechanisms on an organization’s strategic innovation capacity. To this end, we re-interpret absorptive capacity through a cognition lens. A PLS analysis on survey data suggests that strategic innovation capacity is strengthened when managers deliberately install specific learning mechanisms on the three dimensions of absorptive capacity: knowledge recognition, assimilation and exploitation. Results complement existing research by indicating the importance of deliberate action when trying to break through existing industry practices.

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Introduction
Organizational processes for information processing and knowledge management (Easterby-Smith and Prieto, 2007; Szulanski, 1996) have been studied in a substantial body of work, both in the dynamic (Eisenhardt and Martin, 2000; Teece et al., 1997; Wilden et al., 2012) and knowledge-based view of the firm (Grant, 1996). Especially, researchers in the fields of innovation and strategic marketing have illuminated the competitive value of an organization’s outside-in information processing capabilities (Arbussa and Coenders, 2007; Baker and Sinkula, 2007; Day, 2002). Not surprisingly, absorptive capacity (Cohen and Levinthal, 1990) has grown into an intensively studied
concept (Camison and Forés, 2010; Todorova and Durisin, 2007; Volberda et al., 2010), linking internal organization processes to innovation outcomes. Notwithstanding its contributions, research on absorptive capacity has so far remained predominantly confined to innovations of a technological kind (Beckeikh et al., 2006, Lane et al., 2006; Rothaermel and Alexandre, 2009) and several research gaps remain (Volberda et al., 2010).

Still, the study of non-technological types of innovation is growing steadily (Birkinshaw et al., 2008). In particular, the concept of “strategic innovation” has caught the eye of academia and business. This type of innovation follows a Schumpeterian perspective, focusing on innovation of the business model and breaking with industry rules of competition (e.g., Christensen, 1997; Kim and Mauborgne, 1999; Markides, 1999, 2006; Gunther McGrath, 2010; Teece, 2010; Yu and Hang, 2010). As companies creating these kinds of innovations show high revenue and profit growth (Kim and Mauborgne, 1999) a deeper understanding of the organizational capabilities driving strategic innovation would be highly relevant. Yet, given its nascent status, strategic innovation research shows a lack of validated and quantitative studies (Govindarajan and Kopalle, 2006). Moreover, insights on organizational capabilities for information processing in the context of technological innovation may prove difficult to transfer to the field of strategic innovation as different types of innovation may require different information search and processing strategies (Sidhu et al., 2007) and different managerial interventions (Abernathy and Clark, 1985).

The purpose of this paper is hence to explore the deliberate mechanisms that firms, seeking to stimulate their strategic innovation, can establish to affect the different dimensions of absorptive capacity. Cohen and Levinthal (1990) and Kim (1998) already argued that the development of absorptive capacity requires dedicated managerial effort. In the context of fundamentally new strategic moves, deliberate learning is considered more effective than semi-automatic experience accumulation (Zollo and Singh, 2004), even in domains where the firm lacks experience (Lenox and King, 2004). However, insights into the specific organizational mechanisms that enhance strategic learning is still limited (Barkema and Schijven, 2008). Furthermore, broadening absorptive capacity to the area of strategic innovation offers the opportunity to make the concept more reconcilable with the issue of path-breaking change (Karim and Mitchell, 2004).

Building on a literature review and field data, we re-interpret absorptive capacity through a cognition lens and argue that deliberate learning mechanisms can affect specific practices for recognition, assimilation and exploitation of new ways to create customer value. These ideas are empirically tested on a sample of Dutch industrial firms by means of variance-based structural equations modeling (PLS Path Modeling) (Hair et al., 2011a,b). Our results illustrate which deliberate mechanisms affect the different dimensions of absorptive capacity in such a way that the organization’s strategic innovation capacity is strengthened. PLS is a powerful method to bring this to the fore as it emphasizes prediction of the dependent variables (Hair et al., 2011b; Reinartz et al., 2009), in this case the strategic innovation capacity.

This study contributes to the literature in different ways. First, our findings demonstrate the value of intentionally stimulating absorptive capacity for strategic innovation. A particular contribution to the strategic management literature lies in the integration of the absorptive capacity concept with insights from sensemaking research, bringing the importance of shared mental models in an organizational information processing capability to the fore (Lane et al., 2006; Todorova and Durisin, 2007), and questioning the strong path-dependent character of absorptive capacity (Cohen and Levinthal, 1990; Liao et al., 2003). In addition, our research adds to the dynamic resource based view (Teece et al., 1997) as it further evidences how firms develop competence not only by accumulating experience but also by investing time and effort in activities that require a more cognitive effort (Kale and Singh, 2007; Zollo and Winter, 2002). Considering absorptive capacity as a dynamic capability (Narasimhan et al., 2006; Zahra and George, 2002), this study sheds light on concrete second-order mechanisms for dynamic capability creation (Danneels, 2008). Finally, our study contributes to the field of innovation management and marketing management as it illuminates micro-level implications of strategic innovation capacity.
creation (Rajagopalan and Spreitzer, 1996) by showing clearly that new value creation requires experience in specific “market driving” capabilities beyond the traditional marketing toolkit. As such, it offers managers concrete tools for stimulating proactive market approaches.

Our account begins with a conceptual integration of strategic innovation (further referred to as SI) and absorptive capacity (further referred to as ACAP). Combining existing literature with qualitative findings, we then develop hypotheses regarding different deliberate learning mechanisms for the three dimensions of ACAP: recognition, assimilation and exploitation. After explaining the quantitative research design and method, we will present and discuss the findings of the hypothesis testing. The paper concludes with theoretical and managerial implications and suggestions for future research.

Theoretical background

Strategic innovation and new value creation
Organizations’ successful growth strategies in mature industries have raised scholars’ interest in “disruptive innovation” (e.g., Christensen, 1997; Yu and Hang, 2010). Furthermore, some successful disruptive innovators succeeded in creating new markets and countering herd behavior without any technological advancement (e.g., Birkinshaw et al., 2011; Greenwood and Suddaby, 2006; Kim and Mauborgne, 1999), such as Zopa.com’s very successful introduction of the “eBay” principle to the financial services industry, or Akzo Nobel’s introduction of “Alacar” (a drive-in formula for small car damages) in personal car repair services. Researchers were therefore spurred to extend the original technological meaning of disruptiveness into a more fine-grained definition (e.g., Schmidt and Druehl, 2008). Disruptiveness has become defined in terms of new business models (Markides, 2006; Chesbrough, 2010), emphasizing the market-based dimension of the innovation (Danneels, 2003; Govindarajan and Kopalle, 2006). This type of disruptive innovation has gone under the name of “strategic innovation” in the strategic management field (Anderson and Markides, 2007; Govindarajan and Trimble, 2004, 2005; Markides and Charitou, 2004), and “value innovation” in strategic marketing (Matthyssens et al., 2008; Midgley, 2009; Sosna et al., 2010).

SI means that firms deviate from, or even actively alter, the industry rules of the game (Baden-Fuller, 1995; Govindarajan and Euchner, 2010; Govindarajan and Trimble, 2004; Markides, 1999; Miller and Chen, 1996). Yet, deviating from the rules of the game in an industry (Spender, 1989) is unlikely to produce economic rents unless a new and superior value proposition is offered as well (Jaworski et al., 2000; Slater and Narver, 2000; Sirmon et al., 2007). Examples of the latter are Cirque du Soleil’s reinvention of the circus, the exclusive “Nespresso experience” concept in the coffee market, and GE Aircraft’s selling of flight hours rather than the selling of jet engines. Hence, in this paper we define strategic innovation as a deviation of the industry rules of the game in order to offer new and substantially superior customer value.

In order to avoid a total reliance on “lucky shots” and/or to better spread risks, authors have proposed the use of portfolios of strategic innovation initiatives (Govindarajan and Gupta, 2001; Govindarajan and Trimble, 2004, 2005). Furthermore, in terms of sustained competitive advantage, studies have demonstrated the beneficial effects of a continuous innovation cycle, resting on different initiatives over time (Larsen et al., 2002). Recently, also research on business models has stressed the importance of continuous variation and innovation (Baden-Fuller and Morgan, 2010). Therefore, we focus on strategic innovation capacity; i.e., an organization’s capacity to create strategic innovation initiatives in a systematic way.

The study is focusing more on organizational aspects than on strategic market aspects: The exact content of strategic innovations initiatives as such are not targeted, but rather the processes and mechanisms that enable companies to continually create such initiatives. When using the term “strategic innovators,” we actually refer to organizations that have a higher than average strategic innovation capacity in their industry. It parallels earlier efforts to measure “entrepreneurial proclivity” (Matsumo et al., 2002)
Absorptive capacity and strategic innovation

Cohen and Levinthal’s (1990) original definition of absorptive capacity has inspired scholars from diverse management fields to use and re-conceptualize the concept (Easterby-Smith et al., 2008; Lane et al., 2006). The multidimensional construct is defined as “a set of organizational routines and processes by which firms recognize, assimilate, and exploit new external knowledge to create new knowledge and/or commercial outputs” (Lane et al., 2006; Zahra and George, 2002). In line with Cohen and Levinthal (1990) and Todorova and Durisin (2007) we name the first dimension recognition capability, which is defined as a firm’s processes aimed at identifying and acquiring new valuable external knowledge. The second dimension assimilation capability covers a firm’s processes aimed at interpreting and understanding the acquired external knowledge (Zahra and George, 2002). Assimilation combines new with existing knowledge emphasizing internal knowledge sharing and changing collective mental models (Lane et al., 2006). Finally, exploitation capability consists of structural, systemic and procedural mechanisms to harvest and incorporate assimilated knowledge into existing operations, so that exploitation can be sustained over a longer period of time (Lane et al., 2006, Zahra and George, 2002). Exploitation denotes a firm’s capacity to improve, expand and use routines and competencies to “create something new” (Flatten et al., 2011).

Conceptualizing ACAP in this way enables us to make the theoretical relationship with SI capacity explicit. First, ACAP is conceptually and empirically associated with proactive strategic behavior. For instance, Cohen and Levinthal (1990, 1994) assert that firms with higher levels of absorptive capacity tend to be more proactive, especially in high-velocity environments (Tsai, 2001; Zahra and Hayton, 2008; Zahra and George, 2002). Consequently, the concept of absorptive capacity is also related to the creation of new knowledge configurations (Henderson and Clark, 1990) and combinative capabilities (Jansen et al., 2005; Volberda et al., 2010). Second, the central role of external knowledge absorption and outside-in learning processes inherent to absorptive capacity (Arbussa and Coenders, 2007; Lane and Lubatkin, 1998; Spithoven et al., 2010) is also stressed in the literature on strategic innovation (Almeida et al., 2003; Christensen et al., 1998). Deviating from the industry rules of the game may originate from absorbing and commercially exploiting external knowledge from non-traditional domains (Van den Bosch et al., 1999; Danneels, 2008; Liao et al., 2003). 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 strategic innovation.

Learning mechanisms for strategic innovation

The value that sensemaking theory may have for absorptive capacity theory is manifest, as the fundamental absorptive capacity dimensions of recognition, assimilation and exploitation closely resemble the strategic sensemaking cycle of cognition-action processes of environmental scanning, interpretation and associated action (Gioia and Chittipeddi, 1991). Although research has raised its interest in the cognitive implications of absorptive capacity only recently (e.g., Volberda et al., 2010), Cohen and Levinthal (1990) themselves originally grounded the absorptive capacity concept in theory on socio-cognitive structures.

Taken-for-granted industry rules of the game might affect firms’ absorptive capacity since these rules also shape on an organizational level how information is noticed, how it is interpreted, and what kind of action is to be taken (Barr et al., 1992; Daft and Weick, 1984; Spencer, 1989). “Dominant logics” (Prahalad and Bettis, 1995) influence how a firm recognizes, assimilates and exploits environmental stimuli (Bettis and Wong, 2003; Sinkula, 2002). Dominant logics may help to increase efficiency but may also become toxic “blinders” (Prahalad, 2004). They may create information filters that limit search spaces (Bettis and Wong, 2003) and hence distract attention from emerging opportunities (Miller, 1993; Prahalad, 2004) and radically new strategies (von Krogh et al., 2000). Dominant logics may also create lenses that determine the interpretation systems (von Krogh et al., 2000). Because of cognitive structures assimilation tends to be local and “close in” to previous activities; new cues may be wrongly interpreted. Finally, the actions a firm chooses to deal with new cues may be inappropriate and limited to the organization’s “accepted repertoire” (Sinkula, 2002). In addition, 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).

Therefore we argue that learning mechanisms might be put in place to break down these information filters (for identifying and obtaining information); lenses (for interpreting and understanding information); and action repertoires (for incorporating new knowledge into existing operations in order to create something new). Learning mechanisms stimulate a more “open-minded” recognition, assimilation and exploitation of external knowledge. First, learning mechanisms that foster the capacity to recognize new opportunities and options (O’Connor and Rice, 2001) is expected to stimulate SI capacity as it enables deviations from existing heuristics in the organizational knowledge base (Ahuja and Katila, 2004). Acquisition of non-local (Nooteboom et al., 2007) and peripheral information (Day and Schoemaker, 2004) may help to find new market opportunities and thus facilitate entering new strategic domains (Danneels, 2003). Second, learning mechanisms that foster assimilation may have a beneficial effect on SI capacity. Scholars in the strategic innovation field have emphasized the importance of an inquiring and non-dogmatic collective mindset (e.g., Baden-Fuller and Stopford, 1994; Hamel and Valikangas, 2003). They argued further that it is not so much the possession of market knowledge, but the shared, critical interpretation of it that leads to an increased innovation effort (De Luca and Atuahene-Gina, 2007; Marinova, 2004). In the SI literature, assimilation processes, such as cross-functional discussions on the firm’s assumptions regarding its customers, market and marketing approach, have hence been promoted (Markides, 2006; Tripsas and Gavetti, 2000).

Third, learning mechanisms that stimulate exploitation can be expected to foster SI capacity, with their emphasis on implementation and knowledge-use practices (Akgün et al., 2007). New knowledge should eventually materialize in the execution of new business concepts (Tuominen et al., 2004). Exploitation consists of efficiently harvesting and incorporating assimilated knowledge into existing operations (Zahra and George, 2002; Lane et al., 2006), which might require organizational adaptations in procedures (Markides, 2006; Tripsas and Gavetti, 2000), and skills (Zander and Zander, 2005).

Deliberate learning mechanisms for strategic innovation

Scholars have asserted that organizations generally learn in two ways: in a quasi-automatic, unconscious way of experience accumulation, or in a more deliberate way (Arthur and Huntley, 2005). The first way of experience accumulation is believed more and more to be a necessary but insufficient condition for organizational learning and dynamic capability creation (Romme et al., 2010). Strategic settings with high levels of causal ambiguity and complexity require instead interventions of a more deliberate kind (Barkema and Schijven, 2008). Researchers have recently demonstrated the value of the latter in diverse strategic contexts, such as hospitals (Nembhard and Tucker, 2011), industrial plants (Arthur and Huntley, 2005), and in the context of mergers and acquisitions (Barkema and Schijven, 2008). This “deliberate learning” (Zollo and Winter, 2002) which has also been called “induced learning” (Nembhard and Tucker, 2011), or “planned learning” (Levy, 1965), stresses more the cognitive and conscious aspects of the learning process; the aim is to enhance the understanding of the causalities between practices and their performance implications. Managers intervene in the learning process, designing and implementing specific mechanisms that affect the ability, motivation, and experience-based learning of organization members in diverse activities for acquiring, codifying or transferring knowledge (Arthur and Huntley, 2005). Popular examples include experiments, training or suggestion programs (Nembhard and Tucker, 2011).

Already in their seminal 1990-article, Cohen and Levinthal argued that absorptive capacity will not gradually arise as a natural “byproduct” of the innovation process, but that its creation will require the dedication of explicit effort. Therefore, we argue that three categories of deliberate learning mechanisms might prove especially beneficial to foster SI capacity. Deliberate mechanisms for recognition target the “filter”; deliberate mechanisms for assimilation target the “lens”; and deliberate mechanisms for exploitation target the “action repertoires” of mental schemata (Prahalad and Bettis, 1995).
Considering absorptive capacity as a dynamic capability (Narasimhan et al., 2006; Volberda et al., 2010), these deliberate mechanisms may in fact be considered as second-order learning mechanisms (Danneels, 2008; Winter, 2003) that create and modify dynamic capabilities, and thus keep them from perishing over time (Eisenhardt and Martin, 2000; Schreyögg and Kliesch-Eberl, 2007). The idea is to install mechanisms of a higher order that modify the underlying operating routines for absorptive capacity (Zollo and Winter, 2002). We argue that deliberate mechanisms for recognition, assimilation and exploitation may foster the creation of strategic innovation capacity through facilitating a change in underlying customer or market knowledge processing capabilities, in such a way that information filters, lenses and action repertoires are redirected. For example, a routine for performing customer research would be a dynamic capability routine, as it may provide opportunities for innovation (Eisenhardt and Martin, 2000; Winter, 2003). Yet, a deliberate learning mechanism for recognition pertains to a still deeper level, and tries to deliberately affect the specific way customer research is being performed in an effort to capture “market driving” information.

In the following paragraph, we explain each category of learning mechanisms in greater detail and hypothesize their relationship with strategic innovation capacity.

**Hypotheses**

In order to start our theorizing “sufficiently close to the phenomenon under study” (Shepard and Sutcliffe, 2011), we deemed it necessary to enrich our conceptual arguments with qualitative data (Tashakkori and Teddlie, 1998). To discover the relevant aspects that deliberate learning mechanisms should target in each of the three ACAP dimensions, we simultaneously applied a literature study (see Data and Methods section, left hand side Figure 2) and a qualitative study (right hand side Figure 2). We adopted a research strategy as suggested in Flatten et al. (2011). Concerning the literature study we reviewed existing research on ACAP but also on SI and on related research streams (e.g., research on market driving). Based on the definitions of the three ACAP dimensions...
(see Theoretical Background section) three authors of this paper individually assigned crucial aspects in this literature to the three ACAP dimensions, then the three classifications were jointly discussed and agreed upon. (For example, consulting innovative customers for new ideas was related to identifying and acquiring new external knowledge, and can thus be assigned to the recognition dimension, whereas adapting the organizational structure was considered an aspect of exploitation, since structure entails “structural, systemic and procedural mechanisms” as covered by the exploitation dimension). In parallel, we performed a qualitative study with the same goal (see Data and Methods section, Figure 2). We first interviewed 61 managers (responsible for firms’ market strategy) in various Dutch industrial sectors to identify and select companies (or business units for multi-unit firms) with a high strategic innovation capacity. In these firms, we in turn interviewed 52 managers who were highly involved in the setup of strategic innovation initiatives, and asked for critical aspects in the process. Additional desk and expert research (e.g., consultancy reports about the company) as well as interviews with customers were used for data triangulation. The qualitative analyses illustrate the relevance of establishing learning mechanisms for recognition, assimilation and exploitation. Furthermore, across all companies and industries, a pattern arose where similar aspects in the absorptive capacity dimensions were deliberately stimulated. Traditional marketing research procedures turned out to be supplemented with learning mechanisms to “dig deeper” into trends; to look beyond the usual customer needs research; to critically reflect on deep market insight; and to deliberately facilitate and stimulate the use of acquired and assimilated market-driving knowledge.

Even though the literature review and qualitative study were performed separately, they still informed each other. As the arrows in the middle of Figure 2 (see Data and Methods section) show we applied an iterative research process (Danneels, 2002) between data collection and analysis (Eisenhardt, 1989; Eisenhardt and Graebner, 2007), and between theory and empirics (Orton, 1997). The resulting crucial elements that are stimulated by deliberate learning mechanisms thus reflect both the literature and qualitative results. The qualitative data, combined with the insights
from the literature enabled us to develop hypotheses on specific deliberate mechanisms that can be used for each absorptive capacity dimension (see Figure 1).

**Recognition**

By influencing the recognition capability, the way new information is sought and “filtered” is affected. Scanning an organization’s external environment is considered as the starting point of sense-making (Daft and Weick, 1984; Narayanan et al., 2011). Especially, for firms adopting radical or proactive innovation strategies, capabilities for external knowledge recognition are of critical importance (Baker and Sinkula, 2007; Liao et al., 2003). In particular, scanning more remote environmental areas helps firms to find new market opportunities, and thus to enter new strategic domains (Danneels, 2003, 2008) and to discover new business models (Gunther McGrath, 2010). Our literature study and the qualitative data reveal that deliberate mechanisms for recognition essentially stimulate insight into the following elements:

- future customer needs
- industry tendencies
- deep customer needs
- general environmental information (macro-tendencies, regulation, etc.)
- innovative customers
- other industries
- end customer
- non-customers

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- non-customers

The focus on future customer needs (Kumar et al., 2000; Slater and Narver, 1998) and industry tendencies match strategic innovation researchers’ emphasis on the development of industry foresight (Brown and Eisenhardt, 1997; Markides, 1999). In line with the more traditional business-to-business marketing literature (Day, 1999; Varadarajan and Jayachandran, 1999) strategic innovators stress the need to deeply study the most innovative existing customers and consult them for ideas. Furthermore, strategic innovators indicate the importance of gaining insights into the end-customer, non-customers (Kim and Mauborgne, 1999; Markides, 1999) and other inspiring industries (Gavetti and Rivkin, 2005; Markides, 1999). For example, an energy services provider developed a detailed scheme of all its non-customers, categorized them and developed a new business model to enhance value to them. These findings show the importance of non-local search (Lane et al., 2006; Nooteboom et al., 2007) and peripheral vision (Day and Schoemaker, 2004) for strategic innovation capacity. Strategic agility, a fundamental determinant of business model renewal and transformation, sets off with “strategic sensitivity” which implies recognition elements such as hearing the voice of the periphery and sharpening foresight (Doz and Kosonen, 2010). As such we posit:

_Hypothesis 1: Deliberate learning mechanisms for recognition are positively related to a firm’s strategic innovation capacity by fostering insights into future customer needs, industry tendencies, deep customer insight, general environmental information, innovative customers, other industries, the end customer and non-customers._

**Assimilation**

Learning mechanisms for assimilation influence the “lens” through which interpretation may be constrained (Prahalad and Bettis, 1995). Interviewees mention the deliberate stimulation of:

- critical reflections on customers
- critical reflections on markets
- critical reflections on the marketing approach
• keeping alive past critical reflections on customers and markets
• sharing critical reflections on customers and markets
• filing critical reflections on customers and markets

The qualitative study reflects the sensemaking and strategic innovation literature quite well. Strategic innovators stress the need to broach (cross-functional) discussions about customers, the market, and the business unit’s marketing approach (De Luca and Atuahene-Gina, 2007; Doz and Kosonen, 2010; Markides, 2004; Tripsas and Gavetti, 2000). New interpretations may uncover new applications of existing knowledge (Marsh and Stock, 2008). Pluralism of ideas is triggered by knowledge integration mechanisms in order to stimulate cross-functional and cross-hierarchical dialogue (Hargadon and Fanelli, 2002; Thomas et al., 2001; Weick and Roberts, 1993; Wells, 2008). Especially when external knowledge is path-breaking and does not fit with existing cognitive schemes, tools for assimilation are needed (Todorova and Durisin, 2007). Discussion of multiple hypotheses, disconfirming questions, dissenting viewpoints (Bartunek et al., 1983), creative interpretation of information, and brainstorming about possibilities (Day and Schoemaker, 2004) are identified as being useful in this respect. Explicit effort is dedicated to keeping alive insights from previous reflections in order to sharpen insight into causalities (Marsh and Stock, 2008; Zollo and Winter, 2002). Mechanisms stimulate the use of periodical, cross-functional meetings that sometimes involve external parties such as customers, specific user groups, partner companies, or university professors. Hence we put forward:

Hypothesis 2: Deliberate learning mechanisms for assimilation are positively related to a firm’s strategic innovation capacity by stimulating critical reflections on customers, critical reflections on markets, critical reflections on the marketing approach, keeping alive past critical reflections on customers and markets, and sharing and filing critical reflections on customers and markets.

Exploitation
Deliberate mechanisms for exploitation aim at better harvesting and incorporating newly assimilated knowledge into existing operations (Zahra and George, 2002). In contrast to the cognitive aspects of absorptive capacity present in recognition and assimilation, exploitation capability pertains to the behavioral component of sensemaking (Weick, 1979) and hence produces a change in operating routines that is required for strategic innovation (Almeida et al., 2003). Baden-Fuller and Morgan (2010) stress the dynamic aspect of business models which leads firms to experiment, change, refine and reinvent their business models.

For real transformation to occur, not only knowledge content should be addressed but also knowledge-use practices (Akgün et al., 2007). Recent research in the field of sensemaking by Nag et al. (2007) demonstrated that in processes of strategic change a cognitive change does not automatically infer a change in organizational practices as well; “what we know” may differ from “what we do”. Their study of the change process at TekMar shows that even though middle managers readily assimilated new knowledge content into their thinking, they failed to also apply this knowledge in the form of new business development procedures. Doz and Kosonen (2010) stress the need for aligning, integrating and grafting in business model renewal and transformation.

Our interview data also show that learning mechanisms for exploitation primarily stimulate 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
Almost all initiatives imply an adaptation of the organizational structure (Daft and Weick, 1984), such as the set-up of detached, cross-functional, temporary project teams. In addition, support to new initiatives seems extremely important (Govindarajan and Trimble, 2005). Other important factors are the stimulation of changes in procedures and ways of working (Deneault and Gatignon, 2000; Teece et al., 1997). The accommodation of new or different customer needs results in the formation or assimilation of previously unexploited skills (Zander and Zander, 2005). Chaos is avoided as it worsens market credibility and considerably retards implementation and roll-out (Ahuja and Lampert, 2001). Stimulating a strict project-driven approach, the use of implementation blueprints and the set-up of separate units are frequently mentioned as highly valuable tools in this respect. All of this leads to:

Hypothesis 3: Deliberate learning mechanisms for exploitation are positively related to a firm’s strategic innovation capacity by stimulating the firm to adapt the organizational structure, support new initiatives even to the detriment of existing business, adapt procedures, replace skills (competencies), change the way of working, and prevent organizational chaos.

Although we hypothesize positive and direct effects of the three categories of learning mechanisms and strategic innovation capacity, additional mediated effects may be expected as well (see the grey arrows in Figure 1). ACAP theory points to the complementarity of the three dimensions (Zahra and George, 2002) and some authors even assert sequentiality (Lane and Lubatkin, 1998). Mediation effects may also be derived from sensemaking theory (e.g., Thomas et al., 1993), and could be inferred from our qualitative study as well. Yet, mediation effects in this study are a little bit less straightforward than one might expect at first sight. Reason for this is the exclusive focus on deliberate learning mechanisms in our study. This implies that even though important (maybe full) mediation may be expected of recognition and assimilation through exploitation, this does not automatically imply that (full) mediation effects will also exist between the deliberate mechanisms stimulating specific path-breaking elements in the three dimensions. In other words, in this study we restrict our attention to what essentially are “flow” variables. Underlying “stock” variables (meaning underlying recognition, assimilation and exploitation capacity as they are) are not taken into account.

Data and methods

Data collection and sample description

Figure 2 shows our research design. We followed a sequential qualitative-quantitative design (Tashakkori and Teddlie, 1998). Based on a review of the literature and on an extensive qualitative research we developed our theoretical model (as specified in the Hypotheses section).

We then tested the hypothesized relationships by means of a quantitative study. We extracted a stratified random sample of 2970 companies from the DMCD database, containing more than 95% of all Dutch companies. Eight strata were defined: industrial product and service companies were each classified into four categories of company sizes (number of fulltime equivalents). We used a telephone pre-qualification method to elicit cooperation for the final Web survey (Couper, 2000). To reduce measurement error, the survey was extensively pretested following Bagozzi’s (1994) guidelines, for example, through an in-depth review by experts, an e-mail pilot. As a result of the pre-testing phase, several items/questions were re-formulated. The final measures are shown in Appendix. In line with research on strategic innovation (Kim and Mauborgne, 2004) and absorptive capacity (Jansen et al., 2006), the level of analysis was the company or business unit (for multi-unit firms). Respondents were managers in charge of market strategy (marketing managers in large companies, CEO in small companies). Although we do acknowledge the potential bias in single-informant self-report studies (Cycyota and Harrison, 2002), we followed extant strategy literature, which is characterized by the frequent use of self-reports of managers/executives to examine an organization’s (knowledge) processes and strategy (Baker and Sinkula, 2007; Hult et al.,
The telephone pre-qualification process led to 816 potential respondents of which 188 (or 23% of telephone respondents) actually filled out the web survey. Notwithstanding the use of response inducement techniques, which have proved effective in either industrial samples (Diamantopoulos and Schlegelmilch, 1996; Erdogan and Baker, 2002) or in on-line surveys (Deutskens et al., 2004) response rate remained relatively low. However, this is a “normal” rate for business studies and web surveys (Couper, 2000; Grandcolas et al., 2003; Joshi and Sharma, 2004; Umbach, 2004). We assessed nonresponse bias by comparing the sample composition in the different survey stages. Results demonstrated a slight over-representation of very large companies (+500 FTEs) and product companies vis-à-vis population data. Respondents were equally spread among up-, mid- and downstream companies. In addition, a comparison of early versus late respondents on company demographics and theoretical constructs (Armstrong and Overton, 1977) suggested that a threat of non-response bias could not be discerned on any of the variables ($P_{2-tailed} > 0.05$). The results of Harman’s one-factor test (Podsakoff and Organ, 1986) suggested the absence of common method bias.

**Measures**

Due to the lack of any validated operationalizations of the constructs we had to develop new measures. We used the literature study and the qualitative findings (Figure 2) to specify the contents of the construct before indicators were formulated (Bagozzi, 1994; Rossiter, 2002).

**Independent variables**

To operationalize the learning mechanisms of the different dimensions of ACAP we followed the procedure as shown in Flatten et al. (2011). Measures that we developed for the independent variables were based on accepted definitions of the ACAP dimensions (e.g., Cohen and Levinthal, 1990; Lane et al., 2006; Todorova and Durisin, 2007) and fully built on the crucial aspects in each dimension that we had detected in the literature review and qualitative study (see Hypotheses). Combining a literature review and qualitative study is furthermore considered a valid design for formative measurement construction (Reinartz et al., 2004).

*Deliberate learning mechanisms for recognition*, as perceived by people in charge of market strategy, are deliberately established mechanisms that radically affect an organization’s capacity for identifying and acquiring new valuable external knowledge. *Deliberate learning mechanisms for assimilation* are deliberately established mechanisms that radically affect an organization’s capacity for interpreting and understanding the acquired external knowledge, and *deliberate learning mechanisms for exploitation* are deliberately established mechanisms that radically affect an organization’s capacity for improving, expanding and using routines and competencies to “create something new”.

All independent variables were operationalized in a *formative* specification mode. The appropriateness of the formative measurement mode was verified using the guidelines by Fornell and Bookstein (1982), Chin (1998), Diamantopoulos and Winklhofer (2001) and Jarvis et al. (2003). The theoretical and qualitative study revealed that deliberate learning mechanisms stimulate specific aspects (e.g., the study of non-customers) but these aspects may be stimulated to a larger or smaller extent dependent on the firm, or even on the kind of initiative. Accordingly, learning mechanisms for different aspects are not interchangeable (not inter-correlated) by definition. As one well-chosen formative indicator captures each aspect (Rossiter, 2002), removing indicators would alter the contents of the constructs (Diamantopoulos and Winklhofer, 2001; Williams et al., 2003). In the concrete, the constructs *deliberate learning mechanisms for recognition*, *for assimilation* and *for exploitation* consist of respectively 8, 6, and 6 dimensions (derived from the literature and qualitative study) that are each captured by one item (Rossiter, 2002). All items measured on five-point scale with 1: strongly agree — 5, strongly disagree (n/a category added).

For *deliberate learning mechanisms for recognition*, Bagozzi and Heatherton’s (1994) framework on “partial aggregation models” (the discrete components model) was used for the dimensions *general environmental information* (R04) and *deep customer insight* (R03). For *environmental information* we decided to do so because it enabled us to use an existing scale (Matsuno et al., 2002: market intelligence
For customer insight, the combination of reflective indicators illustrated the specific contents of the dimension in a clearer way. Environmental information was measured by means of three reflective indicators (see Appendix) and insight was based on four reflective items (see Appendix).

**Dependent variable**
In line with the continuous innovation cycle (Baden-Fuller and Morgan, 2010; Larsen et al., 2002), that we explained in the theory section our focus is on portfolios of initiatives. Therefore, we focus on “strategic innovation capacity”. We followed Baden-Fuller’s (1995) advice to not relate this innovation capacity to some absolute standard, but to consider it in relation to the ability of main competitors. In this way, emphasis is put on the deviance from industry rules, more than on the internal deviance from past market strategies. An additional advantage was that comparative questions lead to a higher measurement quality (Andrews, 1984). Strategic innovation capacity, as perceived by people in charge of market strategy, is the BU’s (firm’s) capacity, relative to its main competitors’ capacity, to systematically create strategic innovation initiatives that entail the creation of new and substantially superior customer value by a redefinition of the business model and/or an alteration of the roles and relationships within the selected industries. The construct was measured by seven reflective indicators (see Appendix), which were all formulated comparatively in relation to main competitors (Baden-Fuller, 1995). The construct is furthermore operationalized as a continuous variable (Jaworski et al., 2000). The lack of any conceptual consensus about the nature and measurement of customer value (e.g., Payne and Holt, 2001) made us define customer value in broad terms at the beginning of the survey, instead of capturing it in a separate measure.

All items of the independent and dependent variables were measured on a five-point scale with 1: strongly agree — 5, strongly disagree (n/a category added).

**Control variables**
We controlled for potential homogenization effects of the business unit’s (firm’s) size (e.g., Charitou and Markides, 2003), its supply chain position (e.g., Jacobides and Winter, 2007; Jaworski et al., 2000) and its type (e.g., Nijssen et al., 2006).

**Analytical approach**
We opted for PLS path modeling over covariance-based SEM to analyze our model for the following reasons (cf. Hair et al., 2012; Reinartz et al., 2009). First, our model is exploratory in nature rather than confirmatory. Second, we employ both formative and reflective scales. Third, the number of observations is relatively small. All PLS path modeling analyses were performed using smartPLS 2.0 (Ringle et al., 2005), using a path weighting scheme.

All control variables, being categorical, were re-coded into formative dummies (k-1 categories) (Falk and Miller, 1992). Given the highly insignificant effects of the control variables we followed the principle of parsimony and excluded them from all further analyses.

The suggestions put forward by Kristensen and Eskildsen (2010) were followed in dealing with missing values in our data set (<10% of the cases and missing values appeared to be completely at random). Bootstrap percentile confidence intervals were constructed to assess whether the relationships in our model are statistically significant. Following Preacher and Hayes (2008), the number of bootstrap samples was set equal to 5000, with each bootstrap sample containing the same number of observations as the original sample. Furthermore, we allowed for individual sign changes in the bootstrap procedure (Hair et al., 2012; Henseler et al., 2009).

In case other analytical approaches are employed, this will be mentioned explicitly in the text.

**Measurement properties**
In assessing the psychometric properties of the scales under study it is important to distinguish between formative and reflective scales as this impact the type of properties that are relevant and the way in which these properties are to be assessed (MacKenzie et al., 2005).
For the multiple item constructs employed, strategic innovation capacity is measured using a reflective scale and all three deliberate learning mechanisms are tapped using a formative measurement model. All relevant measurement model estimates are presented in Table 1 below. The indicator descriptives and intercorrelations are summarized in Table 2.

**Preliminary analyses**
As mentioned previously, existing reflective measurement items were used to tap two elements of deliberate learning mechanism for recognition. Following Baumgartner and Homburg (1996) we averaged these items and included them as formative indicators (i.e., one formative indicator for general environment information and one indicator for deep customer insight) order to reduce model complexity. To test whether our data were indeed appropriate for this strategy, we ran a separate confirmatory factor analysis in AMOS (Bagozzi and Heatherton, 1994), which showed a good model fit (inc. good alternative fit indices).

**Psychometric properties of reflective measurement scale**
Inspection of the eigenvalues of the construct’s inter-item correlation matrix ($\lambda_1 = 3.85; \lambda_2 = 0.88$) provides support for the construct’s unidimensionality (Karlis et al., 2003; Tenenhaus et al., 2005). The construct’s composite reliability statistic equals 0.88 which well exceeds the recommended cut-

<table>
<thead>
<tr>
<th>Table 1. Loadings and weights of the measurement model.</th>
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<td><strong>Construct</strong></td>
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Note: R01—R08, A01—A06, and E01—E06 denote the indicator variables for the deliberate learning processes of respectively recognition, assimilation, and exploitation. S01—S07 are the indicators used to tap strategic innovation capacity.
off level of 0.70. Within-method convergent validity is indicated by the magnitude and statistical significance of the construct indicators as well as by the amount of average variance extracted (0.52). Finally, discriminant validity is evidenced as the square root of the average variance extracted (i.e., 0.79) of strategic innovation capacity exceeds its correlation with the three deliberate learning mechanisms (i.e., correlation coefficients with respectively recognition, assimilation, and exploitation are 0.47, 0.50, and 0.48).

Psychometric properties of formatively specified constructs
Analysis revealed that multicollinearity does not play a role in the formative measurement models at hand as all VIF values were below the recommended cut-off level of 5 suggested by Hair et al. (2011b). In particular, the maximum VIF values for the formative constructs were 2.51, 1.99, and 1.63 for, respectively, the deliberate learning mechanisms of recognition, assimilation and exploitation.

To evaluate the performance of the formative measurement models used in our study, the indicator weights and their statistical significance are the statistics of interest (Hair et al., 2012). From the figures presented in Table 1 we can conclude that our formative measurement models perform well, with exception of two items for the deliberate learning mechanism of recognition (i.e., items R04 and R07) and one item for both the deliberate learning mechanism of exploitation (i.e., item E02) and the deliberate learning mechanism of assimilation (i.e., item A06). In line with Bollen and Lennox (1991) and Diamantopoulos and Winklhofer (2001) these items will be retained in the remainder of the estimation procedure, as the item resulted from an extensive qualitative study (see Figure 2), and omitting a formative indicator seriously would comprise the validity of the scale.

Results: structural model
Model performance
Model performance was assessed as follows. First, bootstrapped R² values were constructed following Tenenhaus et al. (2005). Subsequently, we constructed the accompanying percentile bootstrap confidence intervals (cf. Ohtani, 2000). Second, we ran a blindfolding procedure to determine the cross-validated redundancy index for strategic innovation capacity.

Overall, our model shows a good fit to the data as evidenced by the magnitude and confidence intervals of the bootstrapped R² values for the endogenous constructs. Formally, we can conclude that all R² values are statistically different from zero as none of the percentile confidence intervals contains the value of zero. In particular, we see that all R² values exceed the cut-off level of 0.19 (Chin, 1998). Even though a strict application of Hair et al.’s (2011b) rules of thumb for marketing studies would suggest a weak-moderate R² value, these values should always be interpreted in view of their research context (Hair et al., 2011b, 2012). If deliberate learning mechanisms can explain a variance of 0.36 in innovation capacity on a BU/firm level this can be considered as high, given the potential effects of so many other internal (e.g., organizational culture) and external (e.g., innovation appropriability regime in sector) factors. A similar conclusion is reached when this value is compared to other innovation studies in prestigious journals (e.g., Cui and O’Connor, 2012; Zhou et al., 2005). The bootstrap R² values as well as the accompanying bootstrap percentile confidence intervals are presented in Table 3 below. The Stone-Geiser Q² for strategic innovation capacity is larger than 0 (Q² = 0.18) and is therefore also indicative of an acceptable model performance (Henseler et al., 2009).

Interpretation structural model coefficients
Table 3 below summarizes all relevant structural model coefficients as well as the bootstrap percentile confidence intervals. Furthermore, we report the f² effect sizes for all relevant and statistically significant relationships.

Regarding the three categories of mechanisms, we find that strategic innovation capacity is directly and positively influenced by learning mechanisms for assimilation (b = 0.26; CI₉₅: [0.10; 0.43]) and
learning mechanisms for exploitation \((b = 0.24; \text{CI}_{95} : [0.06; 0.42])\). Thus, hypotheses H2 and H3 are supported by the data. Medium effect sizes are found. There is however no empirical evidence for a direct relationship between strategic innovation capacity and learning mechanism for recognition. Therefore, hypothesis H1 is not supported by the data.

Analysis also reveals that significant relationships exist among the three learning mechanisms. The learning mechanisms for assimilation are positively influenced by the learning mechanism for recognition \((b = 0.70; \text{CI}_{95} : [0.61; 0.77])\). In turn, the learning mechanisms for exploitation are a function of both learning mechanisms for assimilation \((b = 0.38; \text{CI}_{95} : [0.21; 0.56])\) and the learning mechanism for recognition \((b = 0.37; \text{CI}_{95} : [0.19; 0.54])\).

To fully understand the pattern of relationships among the learning mechanisms and strategic innovation capacity, a formal mediation test needs to be conducted. Following the procedure put forward by Sattler et al. (2010), analysis shows that the effect of learning mechanism for recognition is fully mediated by learning mechanisms for assimilation \((b = 0.18; \text{CI}_{95} : [0.07; 0.31])\) and learning mechanisms for exploitation \((b = 0.09; \text{CI}_{95} : [0.02; 0.18])\). In addition to the statistically significant direct effect of learning mechanisms for assimilation on strategic innovation capacity mentioned above analysis points out that there is also an indirect effect via learning mechanisms for exploitation \((b = 0.09; \text{CI}_{95} : [0.02; 0.19])\). Thus, the effect of learning mechanisms for assimilation on strategic innovation capacity is partially mediated by the learning mechanisms for exploitation.

Finally, the empirical results show that all three deliberate learning mechanisms have a statistically significant overall (i.e., total) effect on strategic innovation capacity. In order of decreasing impact, the total effect are as follows: learning mechanisms for recognition \(b = 0.52 (\text{CI}_{95} : [0.41; 0.63])\), learning mechanisms for assimilation \(b = 0.35 (\text{CI}_{95} : [0.18; 0.52])\), and learning mechanisms for exploitation \(b = 0.24 (\text{CI}_{95} : [0.06; 0.42])\).

### Importance-performance analysis

As all exogenous constructs in our model are tapped using formative indicators we are in the position to determine the impact of each separate indicator on the focal endogenous construct strategic innovation capacity. Together with the performance on each indicator this leads to an importance-performance analysis. The value of this analysis is that it permits the identification of improvement initiatives that can be subsequently addressed with targeted management activities. This is particularly relevant in light of today’s orientation on accountability and measurable results (see also Rust et al., 2004).

To conduct this analysis the following two steps were undertaken. First, to assess the performance level (i.e., y-axis), all indicators were rescaled to a 0 to 100 range. The resulting performance scores

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1 We thank the editor and a reviewer for bringing this to our attention.
are summarized in the upper part of Figure 3. Second, the importance of each formative indicator on strategic innovation capacity (i.e., x-axis) follows directly from the inner and outer model coefficients presented in respectively Tables 1 and 3, and follows a similar procedure as the determination of so-called total effects in a structural model. Note that the bootstrap results allow us to assess the statistical significance of the indicators’ importance in influencing strategic innovation capacity. As evidenced by the figures presented in the upper part of Figure 3, all formative indicators that have a statistically significant weight estimate (see also Table 1) also have a significant impact on strategic innovation capacity. Combining the importance and performance figures leads to the plot that is presented in the lower part of Figure 3.

The interpretation of the importance-performance analysis results is as follows. The importance score indicates the change in strategic innovation capacity as a result of a one point increase in the indicator. The higher the importance score, the further to the right on the x-axis. As such, the more an indicator is located to the right in Figure 3 the higher its impact on strategic innovation capacity. For instance, if the score regarding “mechanisms that stimulate insight why non-customers aren’t customers” (i.e., item R08) increases by one point, strategic innovation capacity improves by 0.17.

The performance score provides an indication of the room for potential improvement. The higher the performance score, the less room for further improvement. This means for example that there is more room for improvement regarding the mechanisms tapped by item R08 than those captured by item R03.

Disregarding investment costs of the various improvement initiatives for a moment, the results of the importance-performance analysis suggest the following actions. The items in the relative right part of the plot (i.e., R03, R08, R06, A04, A05, and E01) indicate mechanisms that have a high impact on strategic innovation capacity and are as such strategicaly important candidates for investments to at least maintain the performance level of these elements (in this case, A04), or further improve the performance level (R03, R08, R06, A05, and E01). The items located on the relative left hand side of the plot still have a statistically significant though lower impact on strategic innovation than the items located further on the

<table>
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<tr>
<th></th>
<th>Importance</th>
<th>Performance</th>
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<th>Importance</th>
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<tbody>
<tr>
<td>R01</td>
<td>0.09</td>
<td>50.55</td>
<td>A03</td>
<td>0.10</td>
<td>38.49</td>
</tr>
<tr>
<td>R02</td>
<td>0.10</td>
<td>49.29</td>
<td>A04</td>
<td>0.12</td>
<td>60.30</td>
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<tr>
<td>R03</td>
<td>0.19</td>
<td>49.77</td>
<td>A05</td>
<td>0.12</td>
<td>42.90</td>
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<tr>
<td>R04</td>
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<td>A06</td>
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<tr>
<td>R05</td>
<td>0.09</td>
<td>67.37</td>
<td>E01</td>
<td>0.11</td>
<td>49.57</td>
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<tr>
<td>R06</td>
<td>0.11</td>
<td>39.18</td>
<td>E02</td>
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<tr>
<td>R07</td>
<td></td>
<td></td>
<td>E03</td>
<td>0.06</td>
<td>62.15</td>
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<tr>
<td>R08</td>
<td>0.17</td>
<td>38.79</td>
<td>E04</td>
<td>0.07</td>
<td>46.24</td>
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<tr>
<td>A01</td>
<td>0.10</td>
<td>53.30</td>
<td>E05</td>
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<td>57.60</td>
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<tr>
<td>A02</td>
<td>0.05</td>
<td>57.68</td>
<td>E06</td>
<td>0.08</td>
<td>46.49</td>
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</table>

Figure 3. Results importance-performance analysis
right of the x-axis. For these lower-impact items as well, the relative position on the y-axis (i.e., performance) reflects their improvement potential. The practical implications stemming from the importance-performance analyses are discussed in greater depth in the last section.

Discussion of the findings
The study reveals an intricate pattern among on the one hand deliberate learning mechanisms and on the other hand strategic innovation capacity. To fully understand this phenomenon one has to take into account both the direct and indirect (i.e., mediated) effects of the variables. Taking into account the entire nomological web put forward in our conceptual model (see also Figure 1) our empirical results show that all three deliberate learning mechanism contribute positively and significantly to the advance of an organization’s strategic innovation capacity. For the sake of clarity, we below discuss the findings of our study per deliberate learning mechanism.

Deliberate learning mechanisms for recognition
Hypothesis 1 could not be accepted, meaning that we could not find a positive direct effect of deliberate learning mechanisms for recognition on strategic innovation capacity. However this does by no means imply that this category of learning mechanisms is totally useless in stimulating strategic innovation capacity. We found significant relations with learning mechanisms for assimilation and exploitation. The mediation analyses demonstrate indeed total mediation of the effects of recognition mechanisms through learning mechanisms for assimilation and exploitation. Investing in mechanisms for recognition apparently only pays off on the condition exploitation, and assimilation in particular, are deliberately stimulated as well.

In other words, noticing environmental information will only lead to effective renewal if it first leads to a renewed understanding (Becker, 2001). Marinova (2004) found that only when interpretation updates market knowledge, an increased innovation effort could be discerned; Hamel and Valikangas (2003) consequently refer to the term “cognitive challenge”. These results confirm Zollo and Winter’s (2002) assertion about the value of deliberate learning mechanisms in situations of high exploration, such as strategic innovation. For instance, deliberate learning mechanisms for assimilation may be required to stimulate formal integration processes for organizational information dissemination, interpretation and the identification of trends (Zahra and George, 2002).

The formative measurement model that we applied enables us to pronounce upon the individual recognition learning mechanisms as well. The performance-importance matrix (Höck et al., 2010) shows the high importance of different recognition mechanisms. Of all learning mechanisms, mechanisms stimulating a deep insight into current customers and into non-customers seem most important. Overall, our results for the recognition mechanisms suggest a more modern, proactive, even “market-driving” form of market orientation (Narver et al., 2004; Tuominen et al., 2004; Yannopoulos et al., 2012). Non-local search (Nooteboom et al., 2007) and peripheral vision (Day and Schoemaker, 2004) might help to find new market opportunities and thus to facilitate entering new strategic domains (Danneels, 2003). For example, studying non-customers, other industries, changes in the industry and future customer needs may prevent a “contraction of the opportunity horizon” (Hamel and Prahalad, 1994). However, going too far away may become counter-productive, as shown by the irrelevance of studying end customer needs. Such information may produce new value propositions that deviate too much from the customer’s business perception (Woodall, 2003).

The value of mechanisms that stimulate the consultation of innovative customers finally shows the value of the lead user technique beyond the area of product development (Sharma et al., 2001). Lead users face new market needs earlier (Lüthje and Herstatt, 2004) and may help to uncover latent market needs (Amit and Schoemaker, 1993) and new customer solutions (Slater and Narver, 1998; Yannopoulos et al., 2012). Our findings are hence in line with Lilien et al. (2002) who posit that a lead-user technique may systematically generate ideas for breakthrough innovations.
Deliberate learning mechanisms for assimilation

Hypothesis 2 was accepted; our analysis shows that learning mechanisms for assimilation even have the largest effect size (see Table 3) on strategic innovation capacity.

In addition to their direct effects, deliberate mechanisms for assimilation are also mediated by mechanisms for exploitation. These mediation effects substantiate the argument of the ACAP literature about the complementarity of the different ACAP dimensions (Lane and Lubatkin, 1998; Todorova and Durisin, 2007). However, the mediation effect is only partly. First, the remaining direct effect may provide evidence for Zahra and George’s (2002) argument that it is foremost the first two dimensions of ACAP that enhance a firm’s strategic flexibility and its reconfiguration capacity. Other authors have also argued that in the context of strategic innovation, learning at a cognitive level is more fundamental than learning at the action level (Rajagopalan and Spreitzer, 1996). As a consequence, the more extreme and path-breaking the level of innovation (such as SI), the more cognitive aspects (and thus assimilation, not exploitation) may come to the fore. A different explanation for the partial mediation effect may be that assimilation capacity is just more susceptible to deliberate stimulation than is exploitation. The sensemaking literature seems for example more concerned with steering cognitive aspects than behavioral aspects (e.g., Thomas et al., 2001). This argument would imply that although exploitation capacity may in and of itself still have an important mediating role for assimilation, this role may need less deliberate managerial fostering, or may be less susceptible to it. A third reason may be attributed to the operationalization of strategic innovation capacity. Our focus on strategic innovation initiatives, standing somewhat midway between full implementation (successfully commercialized) and initiation (concepts not yet materialized), could explain a lower need of exploitation as well.

The importance of the different learning mechanisms for assimilation (see weights and performance-importance matrix) validates Slater and Narver’s (1995) proposition that exposing new information to multiple interpretations and holding constructive discussions on long-held assumptions about customers and markets lead to a redefinition of the business in a frame-breaking way. In this sense, the results also substantiate arguments developed in the literature on strategic innovation regarding the importance of questioning the assumptions that a firm has about its customers (Markides, 2004), markets and marketing approach in general (Hamel and Getz, 2004; Slywotzky, 1996). The findings illustrate the value that stimulating collective critical reflections and discussions may have for changing cognitive frameworks (Kuwada, 1998). Codifying (or filing) these reflections (Zollo and Winter, 2002) prove however not useful, mirroring findings for product innovation that it is not a better storing or filing system but a better sensemaking system in itself that directly affects a firm’s innovation capacity (De Luca and Atuahene-Gina, 2007; Dougherty et al., 2000). Overall, our findings on assimilation mechanisms seem to support the value that deliberate efforts may have for changing mental frameworks, as exemplified in the extant literature on sensemaking (Thomas et al., 2001) and provide further evidence to Barr et al.’s (1992) empirical findings that strategically proactive firms stay open to adjustments of their mental frameworks and show how constructive conflict can be nurtured with the aim of entering new markets (Danneels, 2008) or uncovering new business models (Chesbrough, 2010).

Deliberate learning mechanisms for exploitation

The positive effect of deliberate learning mechanisms for exploitation leads to the acceptance of H3. Stimulating specific elements in a company’s exploitation capacity helps fostering the company’s strategic innovation capacity. A medium effect size was found. As already noted, deliberate mechanisms for exploitation also have an important mediating role for both the other categories. These results seem to validate Thomas et al.’s (1993) proposition that noticing external information facilitates strategic action only through its effects on strategic interpretation. In other words, deliberately increasing recognition capacity will affect strategic innovation capacity to a larger extent on the condition assimilation and exploitation capacity are triggered as well. In this respect, the findings empirically validate Zahra and George’s (2002) argument that for the
creation of ACAP as a coherent dynamic capability, all dimensions play complementary roles and build upon each other. Deliberately stimulating recognition, assimilation and exploitation capacity could then be considered as differential steps in the learning process (Lane and Lubatkin, 1998).

The weights of the individual items, and the results of the performance-importance analysis give an idea of the importance of the individual exploitation mechanisms. The effect of mechanisms that stimulate a change in organizational structure, ways of working, and even procedures validate insights from the strategic innovation literature and illustrate how growth in new domains changes the established pattern of internal organization (Zander and Zander, 2005). Changes in these structural organizational aspects are perhaps positioned at a relatively fundamental level and can be considered as a necessary condition to leverage the effects of mechanisms targeting other exploitation aspects (Christensen and Overdorf, 2000). Also, Doz and Kosonen (2010) stress the value of organizational aspects for the creation of strategic agility in the context of new business models.

The insignificance of mechanisms that foster the replacement of organizational skills echoes discourses on strategic innovation whether competencies need replacing, developing, changing, stretching, reconfiguring or mere exploiting. Lilien et al. (2002) for instance found that breakthrough innovations seem to fit existing competencies surprisingly well as increased chances of acceptance and funding will make them pass the organizational “screening” barrier more easily. This brings further evidence to the argument that strategic innovators will be more inclined to leverage than to completely transform their existing skills. Furthermore, strategic innovation initiatives, which are frame-breaking to the industry, are not necessarily frame-breaking to the initiating organization (Baden-Fuller, 1995). The idea of combining, reconfiguring and leveraging — internal and external — resources in view of new value propositions has moreover been tackled in contributions to the resource-based view as well (Danneels, 2003; Lew and Sinkovics, 2012; Peteraf and Bergen, 2003; Sirmon et al., 2007; Zander and Zander, 2005).

Conclusion and implications
In this paper we studied the deliberate learning mechanisms that firms can establish to foster their capacity for strategic innovation. We re-conceptualized absorptive capacity from a cognitive perspective and studied categories of deliberate mechanisms for recognition, assimilation and exploitation. Building on a literature review and a qualitative study we detected aspects in the three absorptive capacity dimensions that may foster a more “open-minded” recognition, assimilation and exploitation, and may in this respect seem pivotal for the stimulation of strategic innovation capacity. We hypothesized positive associations between deliberate learning mechanisms that stimulate these aspects and a firm’s strategic innovation capacity, and performed a PLS analysis on data obtained from Dutch industrial companies.

Theoretical contribution
Our findings suggest the value of investing in absorptive capacity also for the sake of non-technological, path-breaking, strategic innovation. As such, our study contributes to research on absorptive capacity, the dynamic resource-based view and strategic innovation.

First, we did one of the few attempts to stretch the absorptive capacity concept beyond a pure technological context (Lane et al., 2006) and add a demand-oriented dimension (Murovec and Prodan, 2009). Studying deliberate learning mechanisms we follow Cohen and Levinthal’s (1990) original (though barely answered) call to study organizational mechanisms for absorptive capacity development. Results on the different learning mechanisms show that organizations can influence absorptive capacity even in domains where they lack prior experience (Lenox and King, 2004). These findings question the strong path-dependent development of absorptive capacity that several authors hypothesized (Bergh & Ngah-Kiing Lim, 2008; Cohen and Levinthal,
Danneels’ (2003, 2008) empirical findings indeed show that experiential learning is ‘self-limiting’, constraining the range of market information and strategic options considered. Our findings on deliberate learning mechanisms reflect and illustrate the growing belief in the value of deliberate learning efforts — in contrast to quasi-automatic experience accumulation — in the context of radically new strategic moves (Barkema and Schijven, 2008; Zollo and Singh, 2004) and business model rethinking (Sosna et al., 2010).

Our mediation analysis shows that deliberate mechanisms for assimilation and exploitation can directly foster strategic innovation capacity. Yet, important mediation effects can be discerned as well. In particular the effect of deliberate mechanisms for recognition seems fully mediated by the two other categories of learning mechanisms. These findings provide early evidence for the argument that the different dimensions of absorptive capacity build upon each other (e.g., Camison and Forés, 2010; Lane and Lubatkin, 1998; Zahra and George, 2002): stimulating just one dimension limits its full potential.

Many of the aspects that deliberate learning mechanisms foster in each of the absorptive capacity dimensions reflect the importance of sensemaking in absorptive capacity (Todorova and Durisin, 2007; Van den Bosch et al., 2003; Volberda et al., 2010). In particular, the value of deliberate assimilation stimulation stresses the importance of shared mental models in an organizational information processing capability (Todorova and Durisin, 2007). Deliberate learning mechanisms for assimilation show the largest direct relationship with strategic innovation capacity. Firstly, these findings would corroborate the proposition that in the context of strategic innovation, learning at a cognitive level (essentially captured by assimilation capability) may be more fundamental than learning at the action level (Rajagopalan and Spreitzer, 1996). Secondly, assimilation may simply be more susceptible to deliberate stimulation efforts than is exploitation. This argument would be in line with the sensemaking literature that has emphasized the deliberate stimulation of cognitive aspects more than the stimulation of behavioral aspects (Thomas et al., 1993). Infrequent, heterogeneous and causally ambiguous events, such as strategic innovation initiatives, could require more deliberate learning efforts just because they place higher cognitive demands (Zollo and Singh, 2004; Zollo and Winter, 2002).

Our study also contributes to the dynamic resource-based view (Teece et al., 1997). We follow the conceptualization of absorptive capacity as a dynamic capability (Narasimhan et al., 2006; Volberda et al., 2010) and distinguish specific aspects in the absorptive capacity-dimensions that are crucial to strategic innovation capacity. In this way, the abstract concept of dynamic capabilities is made more tangible and action-oriented (Wang and Ahmed, 2007) and the specific micro-foundations of capabilities are exemplified (Ethiraj et al., 2005; Ray et al., 2004). Our results disclose valuable second-order learning mechanisms that firms may establish to develop dynamic capabilities (Eisenhardt and Martin, 2000; Zollo and Winter, 2002) and illustrate the value of intentional managerial efforts in dynamic capability creation (Danneels, 2008). The interview data suggest that the learning mechanisms stimulate specific goals, but do not specify in detail how these goals should be reached. This implies that the stimulated processes for recognition, assimilation and exploitation stay open to constant change (D’Adderio, 2008; Pentland and Rueter, 1994). For instance, even though cross-functional discussions about the market may take the form of fixed appointments, their formula often changes (e.g., by inviting external people). The mechanisms’ semi-structured form provides evidence for Danneels’s (2002) argument that second-order competences may mitigate the effects of path dependencies, a prerequisite for enabling processes of “experimentation and effectuation and leadership” for change in business models (Chesbrough, 2010).

Finally, our findings attempt to enhance both the theoretical development and the managerial relevance of growing research on strategic and business model innovation (Baden-Fuller and Morgan, 2010; Markides, 2006). The aspects that deliberate learning mechanisms foster add to insights on strategic innovation creation (Leifer et al., 2001). Our findings on exploitation corroborate the theoretical distinction between the internal and external facets of frame-breaking innovation (Baden-Fuller, 1995) and mirror the viewpoint that for competitive advantage, it is
not rareness of resources in terms of resource type that matters, but rareness in resource function-
ality (Peteraf and Bergen, 2003; Zander and Zander, 2005).

Managerial relevance
Even though it takes time to develop deliberate learning mechanisms (Barkema and Schijven, 2008),
they are expected to provide managers with handles to stimulate strategic innovation capacity on
a still shorter term than can be done by the creation of generally cited enablers such as an innovative
organizational culture (e.g., Danneels, 2008; Markides, 1999). This is particularly important given
that strategic innovation can be very remunerative in terms of growth and profits (Kim and
Mauborgne, 1999; Larsen et al., 2002).

Our results suggest that if firms want to gain full effects of these mechanisms, it might be impor-
tant to establish all three categories of learning mechanisms. The considerable and direct effect of
deliberate learning mechanisms for assimilation shows that firms should critically reflect on their
prevalent assumptions about the market, customers and the marketing approach. We hope this
finding might also inspire firms in their knowledge management designs, and will restrain them
from becoming “information-rich, but interpretation-poor systems” (Prahalad and Bettis,
1995: 6). Tsai and Shih (2004) for example demonstrated that firms can enhance their marketing
capabilities by the application of “marketing knowledge management” and 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: where does the information enter the organization,
how is it distributed and how can it be retrieved?

In addition to the overall effects of the three categories of deliberate learning mechanisms the
formative specification of the learning mechanisms also makes a very concrete translation into
managerial interventions possible. Moreover, the results of the importance-performance matrix
(see Figure 3) provide valuable information on the relative impact of the specific learning mech-
anisms on strategic innovation, and consequently on business returns as well (Calantone et al.,
2002). This implication is essential as all functional disciplines within a firm are held increasingly
financially accountable for their strategic decisions (Seggie et al., 2007). In response to this trend
Streukens et al. (2011) proposed a mathematical framework allowing managers to explicitly
tradeoff the revenues and costs associated with strategic decisions in order to make optimal
(marketing) investment decisions. In terms of the Streukens et al. (2011) Return on Marketing
model this study’s empirical results constitute essential building blocks for the model’s revenue
function.

Disregarding investment costs for a moment, as data are not available and investment costs for
the different mechanisms are company- and industry-specific, the several concrete marketing in-
vestment implications stemming from our empirical results can be presented in Figure 4. To set
actionable priorities we took the median performance (i.e., 50) and importance (i.e., 0.10) scores
(see Figure 3) as arbitrary cut-offs to enable a good comparison among the different mechanisms,
leading to four categories (i.e., quadrants). Assuming equal investment costs, mechanisms in the
top and bottom right quadrants of Figure 4 provide the highest pay-offs. Especially the lower-
right quadrant contains priority levers that highly affect strategic innovation capacity and that
also leave much room much for improvement. The upper-right-hand quadrant contains effective
mechanisms but with a smaller potential improvement. There, firms are suggested to take foremost
very good care of their current mechanisms, and to reinforce their existing advantage. The left-hand
quadrants are of lesser importance, although it should be noted that all mechanisms there do still
produce significant improvements in strategic innovation capacity as well.

The results overall imply that firms should emphasize developing a more modern, proactive mar-
et orientation for exploration ends (e.g., Yannopoulos et al., 2012). Firms need to think about
changes in their broader business environment and may extend their market research towards other
industries and non-customer needs. New value propositions can be discovered by linking this in-
formation to the firm’s competencies. Close relationships with existing, and in particular innovative
customers, seem to pay off as well (Tuominen et al., 2004). These findings may point to a new,
extended role for account managers and all “people in the field” (such as service engineers) as “market and idea antennas”. In addition, it seems highly valuable to frequently and critically discuss and share assumptions about all aspects of the marketing approach (e.g., distribution). Finally, the importance of changing organizational structures suggests how the learning mechanisms should be anchored within the entire organization. These results may therefore not only question the value of separate business development departments for strategic innovation, they furthermore evidence Harris’ (2000) paradox that developing and external orientation (i.e., new and superior customer value) chiefly rests on internal, organizational characteristics.

Limitations and directions for future research
Firstly, our findings do not enable us to pronounce any normative judgments on the appropriateness of strategic innovation as the strategic route to pursue. The question of being better or being different than competitors is foremost a cost-benefit trade-off (Winter, 2003; Zott, 2003) and depends on the organizations’ core competences and on the industry’s evolution and dynamism (Floyd and Lane, 2000; Markides, 2000). Future research on the economic and financial consequences of strategic innovation (Mizik and Jacobson, 2003; Prietula and Watson, 2000) is hence required. Also, we focus on self-reported portfolios of strategic innovation initiatives which do not necessarily guarantee success in commercializing the portfolio of strategic innovation initiatives on the market. The integration of more detailed (financial) output variables could shed light on the interaction of experience accumulation and deliberate learning (Kale and Singh, 2007).

Secondly, the influence of additional moderators needs further studying. As with every study there is always a trade-off between internal and external validity. Given the variety of firm sizes and industries in our sample unobserved heterogeneity is a critical issue to address in future research. A FIMIX-PLS analysis could be run to formally address whether unobserved characteristics may have an impact on the structural model parameter estimates (Ringle et al., 2010) and thus, whether significant moderator effects exist. Of course, both internal factors (such as the existence of an innovative culture (e.g., Hurley and Hult, 1998)) and external factors (such as the degree of collaboration with customers (e.g., Slater and Narver, 2000)) might impact on the effectiveness of the learning mechanisms. As such, we invite fellow researcher to identify potential moderators in future research.

Finally, the cross-sectional character of our study did not reveal detailed process insights. Although not the focus of this study, qualitative results and statistical analyses (e.g., mediation tests) suggested important interrelationships among the three categories of learning mechanisms.

Figure 4. Managerial implications
In-depth longitudinal process research on the creation of strategic innovation initiatives is required to study the existence of real causality among the learning mechanisms, or among the underlying absorptive capacity dimensions. Such studies could shed light on the (non-)linearity of the absorptive capacity process (Lane et al., 2006, Todorova and Durisin, 2007), and on the existence of potential positive or negative feedback effects caused by expectation formation (Van den Bosch et al., 2003), broader assimilation structures (Hargadon and Fanelli, 2002) or over-search effects (Ahuja and Lampert, 2001). In contrast to our focus on “flow” variables (learning mechanisms), the inclusion of additional effects of “stocks” of existing recognition, assimilation, exploitation capabilities could reveal the precise direction of causality. Such additional analyses could provide more validated explanations of mediation effects.

Appendix

Measures of all variables

Control variables

- **Position in supply chain**: Indicated on a 10-point scale with 1: raw materials supplier, and 10, end customer
- **Business unit (firm) type**: Type of product or services mainly offered. Product firms are categorized into 7 different product categories (e.g., machine components, semi-manufactures) and service firms into 6 service categories (e.g., wholesale, dealership).
- **Business unit (firm) size**: Number of FTEs in business unit (firm)

Deliberate learning mechanisms for recognition

| R01 | We use mechanisms that stimulate us to focus our market research more on future customer needs than on current customer needs. |
| R02 | We use mechanisms that stimulate us to detect fundamental changes in our industry (e.g., technology, competitors, regulation). |
| R03 | We use mechanisms that stimulate us to study the likely effect that changes in our business environment will have on our customers. |
| R04 | We use 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). |
| R05 | We use mechanisms that stimulate us to reveal trends in the behavior of our customers throughout the different experience stages of our product/service. |
| R06 | We use 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. |
| R07 | We use mechanisms that stimulate us to frequently collect and evaluate general macro-economic information (e.g., interest rate, exchange rate, GDP, industry growth rate, inflation). |
| R08 | We use mechanisms that stimulate us to maintain contacts with officials of government regulatory bodies (e.g., Ministry of Economic affairs, Chambers of Commerce) in order to collect and evaluate pertinent information. |
| R09 | We use mechanisms that stimulate us to consult innovative customers for new, interesting business ideas. |
| R10 | We use mechanisms that stimulate us to focus our market research on other industries as well. |
| R11 | We use mechanisms that stimulate us to retrieve information about the needs of the end customer. |
| R12 | We use mechanisms that stimulate us to gain a well-founded insight into the reasons why our non-customers aren’t our customers. |
Deliberate learning mechanisms for assimilation

A01 We do not use any mechanisms that stimulate us to share our critical reflections about our customers/ market with each other (reversely coded).
A02 We use mechanisms that stimulate us to frequently discuss the assumptions that we have about our customers.
A03 We use mechanisms that stimulate us to frequently discuss the assumptions that we have about our market(s).
A04 We use mechanisms that stimulate us to keep alive past critical reflections about our customers/market.
A05 We use mechanisms that stimulate us to frequently discuss the assumptions that we have about all aspects of our market(ing) approach.
A06 We use mechanisms that stimulate us to systematically file our critical reflections about customers/market (e.g., in a data base, on the intranet).

Deliberate learning mechanisms for exploitation

E01 We use mechanisms that stimulate us to adapt the organizational structure to better cater the needs of a (planned) new offering.
E02 We use mechanisms that stimulate us to replace our skills (competencies) to better cater the needs of a (planned) new offering.
E03 We do not use any mechanisms that stimulate us to prevent chaos in view of a (planned) new offering (reversely coded).
E04 We use mechanisms that stimulate us to support new projects, even if they possibly may take away from sales of existing products/services.
E05 We do not use any mechanisms that stimulate us to adapt our procedures to better cater the needs of a (planned) new offering (reversely coded)
E06 We use mechanisms that stimulate us to change our ways of working to better cater the needs of a (planned) new offering.

Strategic innovation capacity

In order to create new and substantially superior customer value, we take, in comparison to our competitors:

S01 … 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.
S02 … more initiatives to collaborate in an untraditional way (i.e., unusual in our industry) with parties outside our supply chain.
S03 … more initiatives to change the traditional roles and relationships in our industry.
S04 … more initiatives to change our business model.
S05 … more initiatives to create a market approach that is unusual in our industry.
S06 … more initiatives to break the traditional power relationships among the different parties in the supply chain.
S07 … fewer initiatives to deviate from the traditional rules of the game (reversely coded).

References


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 Learning mechanisms for stimulating strategic innovation capacity


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