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Strategic Learning: A Route to Competitive Advantage?

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Julkaisun nimike
Strateginen oppiminen: Tie yrityksen kilpailuetuun?

Tiivistelmä

Emergenttiin strategianäkemykseen ja strategian, yrittäjyyden ja organisaation oppimisen kirjallisuuden teoreettisiin käsitteisiin rakentuen, tämä väitöskirja pyrkii empiirisesti edistämään mainittua kirjallisuutta vastaamalla seuraavaan kysymykseen: Mikä rooli strategisella oppimisella on yrityksen menestymiselle? Tätä kysymystä käsitellään viidessä toisiinsa nitoutuvassa artikkelissa, joissa strategisen oppimisen ilmiötä tarkastellaan suomalaisista IT-alan yrityksistä kerätyn määrällisen aineiston valossa.

Keskittymällä strategisen oppimisen määrittelyyn ja sitä tarkastelevan mittariston rakentamiseen ja validointiin, väitöskirjan ensimmäinen artikkeli tarjoaa sekä strategiatutkijoille että yritysjohdolle työkalun strategisen oppimisen arviointiin ja johtamiseen. Toinen artikkeli laajentaa ambidekstrisyyden kirjallisuutta tutkimalla empiirisesti strategisen oppimisen merkitystä yrityksen eksploraatio ja eksploitaatio strategioille. Kolmas artikkeli haastaa johtamis- ja yrittäjyyskirjallisuudessa valloillaan olevia lineaarisuuden oletuksia osoittaen, että organisaation muutosjäykkyyteen liittyvät tilannetekijät vaikuttavat strategisen uudistumisen prosessiin. Neljäs artikkeli esittää, että strategisella oppimisella on tärkeä rooli yrityksissä, jotka tukeutuvat strategiseen suunnitteluun. Viides artikkeli tarjoaa käytännön näkemyksiä strategisesta oppimisesta esitellen parhaita käytäntöjä lupaavien suomalaisten ohjelmistoalan yritysten keskuudessa.

Tulokset osoittavat, että strategista oppimiskyvykkyyttä organisaatioissaan rakentamaan ja hyödyntämään kykenevät yritykset menestyvät parhaiten. On olemassa useita tekijöitä, kuten muutosjäykkyyteen liittyvä yrityksen ikä ja koko sekä strategisen oppimiskyvykkyyden rajoittuneisuus, jotka yrityksen johdon täytyy ottaa huomioon saavuttaakseen parhaimman hyödyn strategisen tason organisaation oppimisesta. Väitöskirja edistää tieteellistä keskustelua tutkimalla empiirisesti onnistuneeseen strategiseen oppimiseen kytköksissä olevia reunaehtoja ja tilannetekijöitä, jotka määrittävät strategisen oppimisen merkitystä yritysten menestystekijänä.

Asiasanat
Strategia, strateginen oppiminen, dynaamiset kyvykkyydet, organisaation oppiminen, emergentti, eksploraatio, exploitaatio, yrittäjämäinen orientaatio, suorituskyky, IT-ala

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Abstract

Building on the emergent view of strategy identification and on theoretical concepts from strategy, entrepreneurship and organizational learning literatures, this dissertation empirically seeks to contribute to this arena by answering the following research question: What is the role of strategic learning in firm success? This question is addressed in five interconnected articles whose conceptual development is supported by statistical analysis based on data collected from Finnish software firms.

In the first article, the conceptualization of strategic learning along with a validated scale provides both strategy researchers and organizational leaders with a valuable tool to evaluate and manage strategic learning. The second article extends the ambidexterity literature by empirically examining the importance of strategic learning for firms' exploration and exploitation strategies. The third article challenges the assumptions of linearity inherent in the majority of management and entrepreneurship studies by showing that contingency factors related to inertia influence the strategic renewal process. The fourth article suggests that strategic learning has an important moderating role in organizations that rely on strategic planning. In order to provide practical insights, the fifth article sheds light on the best practices among some promising Finnish software companies.

The results indicate that those software companies able to build and leverage strategic learning capabilities in their organizations are those that subsequently perform best. There are, however, many factors such as inertial forces related to age and size and the limited nature of strategic learning capabilities that need to be carefully considered and managed in order to maximize the benefits from such higher-order learning. This dissertation hopes to advance scholarly conversations by examining and empirically testing the boundary conditions and contingencies relating to successful strategic learning that is recognized as a vital component of firms' success.

Keywords
Strategy, strategic learning, dynamic capabilities, organizational learning, emergent, exploration, exploitation, entrepreneurial orientation, performance, IT industry

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Before enrolling on the PhD program at the University of Vaasa I was (and still am) an entrepreneur. When I started in the program, I thought that I could never love doing research as much as I love entrepreneurship because these two are in every way so different. However, soon after starting the project I realized that the passion I feel towards research is like that I feel towards entrepreneurship. The key role what emotions play in both of these journeys, the unforgettable experiences (both ups and downs) that have defined me as a person, the freedom and responsibility that comes along, the opportunity to develop my abilities and to understand myself, and the opportunity to grow and establish myself as a person, intertwines in these processes in an unique way. I feel extremely privileged that I have been given the opportunity to explore both of these worlds at a relatively young age. A successful reconciliation of these two processes and especially the completion of one step in the academic world—the finishing of my PhD—would have never been possible without the help, trust and support from many people and organizations. Therefore and before all, I would like to thank from the bottom of my heart all of those who have helped me in any way during my PhD journey.

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Vaasa, March 15, 2014

Charlotta Sirén

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Abbreviations

ACAP	Absorptive capacity
CFA	Confirmatory factor analysis
CR	Composite reliability
DC	Dynamic capabilities
EFA	Exploratory factor analysis
EO	Entrepreneurial orientation
ICT	Information and communications technology
IT	Information technology
KM	Knowledge management
OLS	Ordinary least squares (regression)
NACE	European classification of economic activities
PLS	Partial least squares (modeling)
RBV	Resource-based view (of the firm)
SME	Small and medium sized enterprise
TOL	Toimialaluokitus (Standard Industrial Classification used in Finland)

PART II: ARTICLES

This dissertation is based on five appended papers that are:

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1 INTRODUCTION

1.1 Background

Life is about learning—it is an inbuilt component of human activities. It is this very insight that has inspired contemporary organizational scholars to explore organizational learning. As in any organic-system, learning is vital to the growth and development of an organization. Defined as a regular shift in an organization's behavior or knowledge informed by prior action (Argote 1999; Bingham & Davis 2012; Cyert & March 1963; Levitt & March 1988; Miner, Bassoff & Moorman 2001), research suggests that organizational learning is a central means by which firms generate innovations, adapt to environments, take advantage of emergent market opportunities, and create competitive advantage (Argote 1999; Bingham & Davis 2012). Consequently, organizational learning is of fundamental interest in organizational theory (e.g., Cyert & March 1963; Simon 1963) and researchers from different literature streams have contributed to the discussion on it. Essentially, organizational learning is a dynamic process that can take various forms depending on the context of its realization.

In the past decade, organizational learning has emerged as an important subfield in strategy research, particularly in domains such as strategic alliances and joint ventures. Gradually, its value is being acknowledged also in other domains such as in strategy planning and strategy process literatures. Indeed, it is increasingly recognized that successful strategies are not produced in well-written and forecasted strategic plans, but instead strategy is much a result of emergent forces that are not anticipated in the plan (Mintzberg 1978, 1987, 1994a, 1994d; Mintzberg & Waters 1985; Wolf & Floyd forthcoming). In fact, several strategy scholars building on what Mintzberg calls "the learning school approach" see strategy process as an ongoing social learning process where strategy is born and continuously shaped according to the changing environmental and organizational demands (Burgelman 1991; Mintzberg & Waters 1985; Titus, Covin, & Slevin 2011). The term used in reference to these learning behaviors and processes that enable the long-run adaptive capability of firms is strategic learning (Mintzberg & Waters 1985).

Integrating strategy and organizational learning literatures and guided by knowledge-based view (KBV) and dynamic capability perspective (DC) Kuwada (1998: 719) defines strategic learning as an "intraorganizational ecological process, integrating various levels of learning in organizations and including processes of both strategic knowledge creation and strategic knowledge distillation".

Strategic learning is as a firm's second-order dynamic capability consisting of subprocesses for strategic knowledge creation, dissemination, interpretation and implementation. Through strategic learning firms internalize strategic knowledge in a way that improves their competitive positions (Thomas, Sussman & Henderson 2001). Defined in this way strategic learning is argued to be a related but separate concept from traditional manifestations of organizational learning (e.g., Anderson, Covin & Slevin 2009; Kuwada 1998; Thomas et al. 2001; Voronov & Yorks 2005). Compared to traditional idea of organizational learning - seen as "something deployed in service of existing strategies" (Voronov 2008: 196) (i.e., the firm learns skills and competencies that are needed to realize its intended strategy) - strategic learning takes another stance by reformulating and creating new strategies. Taken together, strategic learning is considered a specific type of organizational learning that concerns an organization's ability to derive knowledge from strategic actions and subsequently leverage that knowledge to adjust the firm's strategy (Anderson et al. 2009). The distinctive definition of strategic learning involves three key components: 1) it enables the firm to change its strategy and improve its competitive position; 2) it forms a strategic-level knowledge application process; and 3) the strategic knowledge for the process is gained from strategic behaviors.

This type of learning capability is particularly important in the light of intensified global competition, the accelerated pace of change, and novelty that poses problems and makes serious demands of firms' strategies. Strategic challenges are accentuated in dynamic environments such as the IT industry where the future is hard to predict as the unexpected events cannot be modeled in advance, change cannot always be identified or sometimes a new pattern is distinguished too late (Doz & Kosonen 2010; Brown & Eisenhardt 1997). High-velocity change results in a constant need for organizations to transform their strategies far more rapidly, more frequently and more radically than previously. To respond to these challenges companies are increasingly using strategic learning as a tool to rethink the nature of their business and strategic postures in response to acquisition and utilization of real-time knowledge from the environments and the feedback on their past efforts (Leavy 1998; Mueller, Titus, Covin & Slevin 2012). Several scholars argue that strategic learning is central to the survival and renewal of organizations (e.g., Kuwada 1998; Mintzberg & Waters 1985; Thomas et al. 2001). Consequently, the strategic learning concept has increasingly been applied in recent studies (e.g., Anderson et al. 2009; Covin, Green & Slevin 2006; Green, Covin & Slevin 2008; Mueller et al. 2012) and can therefore be considered a concept that has already established its own position among the related learning constructs.

1.2 Research gaps

Although the strategy research has begun to recognize the importance of strategic learning for strategic renewal (e.g., Crossan & Berdrow 2003; Crossan, Lane & White 1999), as yet relatively "few strategy researchers have taken an interest in organizational learning" (Crossan, Maurer & White 2011: 449). Consequently, the literature calls for studies connecting these two streams and closing the gap between these disciplines. In addition, the current literature suffers several shortcomings. First, according to Crossan and Berdrow (2003) the conceptualization of organizational learning with regards to its relationship to strategy is too narrow, and most of the studies use learning in a more general sense, rather than as a rich theoretical construct to unpack learning processes (Crossan et al. 2011). In fact, prior research on strategic learning has mainly concentrated on studying trial-and-error learning and in particular learning from strategic mistakes (Anderson et al. 2009; Covin et al. 2006; Green et al. 2008; Mueller et al. 2012). These arguments suggest that strategic learning occurs when organizations change their subsequent behavior in response to prior strategic mistakes. While strategic failures can provide valuable new knowledge that can help an organization to understand what strategic changes are needed (Edmonson 2011), the concept of strategic learning can take many forms and draws not only on strategic failures but on broader arrays of knowledge with strategic value (Covin et al. 2006; Crossan & Berdrow 2003).

Considering the performance benefits of strategic learning it is important to understand how organizations can also strategically learn from other sources of knowledge and minimize the expensive strategic missteps. This argument is supported by Pandza and Thorpe (2009) who conclude that experiential learning (i.e., learning by trial-and-error), creative search and strategic sense-making are complementary and together best serve to offer an explanation for how knowledge is created at a firm level. Although some studies acknowledge (e.g., Kuwada 1998; Thomas et al. 2001) the importance of novel knowledge that is not determined by learning from failures but crated through active learning from outcomes, creativity, and exploration, this form of strategic learning is little studied. In addition, the link between strategic learning, dynamic capabilities, absorptive capacity, and knowledge management is not well established (Crossan et al. 2011; Vera, Crossan & Apaydin 2011). Thus, there is an opportunity to investigate the relationships between these concepts and to tie them more closely to the domain of strategic management. Moreover as organizational learning is still in the process of developing into a new theory (Crossan et al. 2011) a more complete understanding of strategic learning could also help in accumulating the knowledge into a more comprehensive understanding of organizational learning phenomena.

Second, the existing literature lacks empirical research applying organizational learning models to strategic renewal (Crossan & Berdrow 2003). Although the literature has some validated measures for single-loop or lower-level organizational learning (Argyris & Schön 1978, 1996), the prior studies on strategic learning, representing double-loop or higher-level learning, have been mostly conceptual and case based. The few quantitative studies, although important pioneers in the field, have mostly relied on the measure of strategic learning from mistakes (e.g., Anderson et al. 2009; Covin et al. 2006; Green et al. 2008; Mueller et al. 2012). The reasons for the lack of empirical studies are many. First, the extant literature regarding the constituent subprocesses of organizational learning in general (Crossan et al. 1999; Flores, Zheng, Rau & Thomas 2012; Huber 1991; Walsh & Ungson 1991) and specifically strategic learning (Kuwada 1998; Thomas et al. 2001) are diverse and the opinions of the dimensions vary. In other words, no consensus on strategic learning has yet emerged. In this regard, the 4I (intuiting, interpreting, integrating, and institutionalizing) organizational learning framework developed by Crossan et al. (1999); the information-processing view of organizational learning (Huber 1991), and the strategic learning models developed by Kuwada (1998) and Thomas et al. (2001) provide excellent starting points for developing the construct beyond just learning from strategic mistakes. Second, the empirical investigations of strategic learning have been hindered by the lack of psychometrically sound measurement items and scales that could capture the multidimensionality of the phenomena. Thus, the literature calls for measures that advance understanding through empirically examining the critical dimensions underlying strategic learning (Easterby-Smith, Crossan & Nicolini 2000; Voronov 2008).

Third, partly relating to the previous issues and something that can be considered one of the main limitations in the literature is the lack of studies empirically examining the role of strategic learning for firms' success and the main antecedents, effects, as well as potential contingency factors that affect these learning processes. In this regard, Crossan and Berdrow (2003: 1087) argue that the prior organizational learning literature suffers from the ignorance of exploration and exploitation what they outline as the "main undercurrent of strategic renewal" (see also March 1991). Strategic renewal requires that firms break from their current paths and shift from exploitation to exploration but also that they institutionalize and exploit the lessons learned (Crossan & Berdrow 2003). Recently, the concepts of exploration and exploitation have been linked to strategic entrepreneurship literature that integrates entrepreneurship and strategic management to study explorative (i.e., entrepreneurial or opportunity-seeking) and exploitative (i.e., advantage-seeking or strategic) behaviors in developing and taking actions designed to create wealth (Hitt, Ireland, Sirmon & Trahms 2011; Hitt, Ireland, Camp & Sexton

2001; Ireland, Hitt & Sirmon 2003). However, although learning is central to strategic entrepreneurship because it increases the understanding of the tensions of exploration and exploitation (Kyrgidou & Hughes 2009), the organizational learning construct seems to be absent in the current model of strategic entrepreneurship. Consequently, there is a need to empirically study the link between strategic learning and exploration and exploitation.

A more active part of the field is that applying strategic learning to entrepreneurial orientation (EO) (e.g., Anderson et al. 2009; Covin et al. 2006; Green et al. 2008; Mueller et al. 2012). Entrepreneurial orientation is defined as a strategic posture that favors entrepreneurial activities reflected in risk-taking, innovation and proactiveness (Covin & Slevin 1989; Lumpkin & Dess 1996). In general, it is proposed that by employing EO firms could better support strategic learning as these activities produce new knowledge and strategic initiatives that promote subsequent learning at the strategic level (e.g., Anderson et al. 2009). Moreover, authors including Green et al. (2008) have indicated that the corrective mechanisms acquired from learning are important in order to make adjustments based on EO. Although, these arguments suggest that increasing EO would lead to an increase in strategic learning, the inertia theory (Hannan & Freeman 1984; Kelly & Amburgey 1991; Leonard-Barton 1992) emphasizes that organizational resistance to change is a significant factor affecting strategic renewal. As inertia is tied to increases in firm age and size (Hannan & Freeman 1984) it can be expected that the relationship between EO and strategic learning and strategic learning and performance is very different depending on the life cycle of the firm. It is surprising that although inertia theory is well rooted in management literature its application to EO and strategic learning literature is almost nonexistent (see Wales, Monsen & McKelvie 2011 for an exception). Thus, in order to better understand the relationship between EO and strategic learning a more sophisticated analysis of this relationship is needed that also takes into account the contextual factors of firm age and size.

What is even more surprising is that although Mintzberg and Waters (1985) highlight that strategy formation in real life is a combination of emergent and planned strategies, the current strategy literature provides fragmented empirical evidence of the benefits of this balanced approach. Although strategic planning is one of the most dominant and widely used strategy tools in business (Rigby 2001; Rigby & Bilodeau 2011; Wolf & Floyd forthcoming) the role of strategic learning in the implementation of strategic plans is yet to be explored. Taking one step further, scholars have not conducted research to see whether learning capabilities are infinite or limited in their usage. By adopting a more realistic perspective research

could benefit from identifying counterproductive consequences of stretching learning capabilities and the causes for those limits (Argyris 1996; 2003).

Last, the capability of the companies operating in the all-important sectors of the economy to renew themselves is a key factor in national competitive advantage and growth. The Finnish IT industry portrayed in this dissertation is an important driver of growth in the economy. EuroStat estimates that the software industry grew by 5% in 2010 and 8% in 2011, while Finland's general GDP growth in 2010 was 3.1% and in 2011 2.9%. Moreover, the positive impact of the IT industry is argued to extend well beyond the boundaries of the industry itself. Consequently, it is particularly important to understand the driving forces of growth and profitability in that industry. In addition, the focus of research on strategic learning to date has been mostly on larger firms and has not addressed specific issues encountered by small and medium-sized firms (SMEs) or startups. However, this may give a biased picture especially in Finland where 99.4% of companies are SMEs, as they are typically more resource constrained, have less organizational slack, but are more flexible than larger firms in their learning behaviors (Bierly & Daly 2007). Consequently, researchers (e.g., Zahra, Sapienza & Davidsson 2006) have called for studies on the learning capabilities of SMEs.

In light of these gaps, this dissertation aims to integrate three important streams of literature—strategy, organizational learning, and entrepreneurship—to test an initial empirical framework of strategic learning that accommodates the main insights from different literatures and examines the role of strategic learning in firm success. Along the way, this dissertation aims makes several contributions. First, the dissertation contributes to organizational learning and strategy literatures by developing a strategic learning measurement tool to empirically study the strategy formation processes of Finnish IT companies. Second, the dissertation contributes strategic entrepreneurship literature by empirically examining the role of strategic learning in the successful capitalization of exploration and exploitation strategies. Third, the dissertation extends the prior literature on EO and strategic learning by empirically analyzing the effects of inertia on these relationships. Fourth, the dissertation intends to contribute to a better understanding of mixed strategy models that include both strategic planning and emergent strategies. In sum, this dissertation hopes to lay foundations for future work building on the notion that in today's competitive environments winning strategies are formed as a result of complex processes including the essential capability to learn strategically.

1.3 Research questions and study objectives

The primary objective of this dissertation was to address the following main research question:

What is the role of strategic learning in firm success?

This main research question is approached by way of five more specific questions addressed in each of the articles:

Q1. *What are the components reflecting strategic learning and how can it be measured? (Article 1)*

Q2. *Does strategic learning mediate the relationships between exploration strategy, exploitation strategy, and a firm's profit performance? Does a firm's exploitation strategy moderate the exploration-strategic learning relationship? (Article 2)*

Q3. *What is the relationship between EO, strategic learning, and firm performance and how does firm age and size affect these relationships? (Article 3)*

Q4. *How does strategic planning and strategic learning interact to generate profit performance? (Article 4)*

Q5. *What are the success factors related to strategic learning practices necessary for survival and prosperity in the IT industry? (Article 5)*

To achieve the defined research objective and to address the research questions, a framework (see Figure 1) that integrates the antecedents, moderators, and performance outcomes of strategic learning is tested in the appended articles. Although this framework will not be tested as a whole, different aspects of the proposed relationships will be examined in the appended papers. The motive for this conceptual framework is to illustrate the overall conceptual arguments and the interconnectedness of the constructs. The numbers in the figure below refer to the articles.

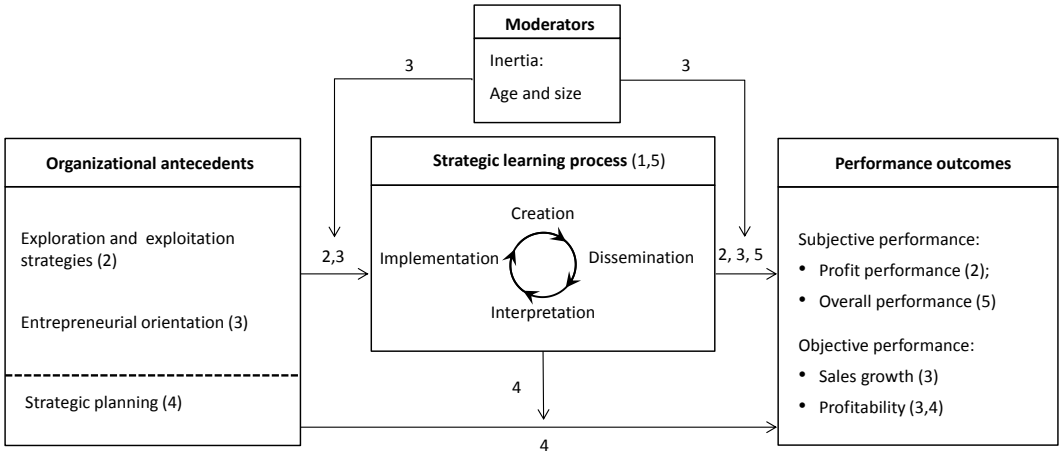

Figure 1. A framework integrating the tested antecedents, moderators, and performance outcomes of strategic learning

As shown in Figure 1, the aim of the studies forming this dissertation was to provide an overall understanding of the strategic learning concept and examine its role in the success of Finnish software companies. The framework is by no means complete in terms of organizational antecedents and moderators or the roles of strategic learning in organizational success, but it does provide an initial understanding of some of the critical factors that can be linked to strategic learning. The first sub-question (*Q1)* addressed in Article 1 seeks to identify the process and mechanisms of strategic learning and build a measurement tool that can be used in the subsequent studies to measure it. By applying the measure developed in Article 1, the second sub-question (*Q2)* addressed in Article 2 investigates the role of strategic learning in converting the fundamental components of strategic entrepreneurship, the exploration and exploitation strategies, into profit performance. By doing so, the article highlights the important role learning plays in disseminating and transferring new knowledge throughout the organization. The third sub-question (*Q3)* addressed in Article 3 delves more deeply into the entrepreneurship literature. Building on the findings from Article 2 that explorative activities, closely related to entrepreneurial behaviors promote strategic learning and by using the measure developed in Article 1, Article 3 challenges the linearity assumptions inherent in the majority of management studies; showing that contingency factors related to inertia influence processes that aim to promote strategic renewal. The fourth sub-question (*Q4*) suggests that strategic learning has an important moderating role in organizations that rely on strategic planning. This fourth article further extends the notions raised in Articles 2 and 3 by evidencing that strategic learning capabilities are limited in their use. The fifth sub-question (*Q5)* differs from the other questions in its practical nature. The fifth paper aims

to shed light on best practices among some promising, yet fairly young and small Finnish IT companies. By providing practical insights into the nature of strategic learning this last article provides a practice-oriented ending to the dissertation by closing the circle started by the measurement development article.

1.4 Structure of the dissertation

This dissertation is structured in two parts. The first part of the study consists of this introductory chapter followed by chapters on theoretical background, methodology and data, summaries of the dissertation articles, discussion, and conclusions. The purpose of this first section is to provide a conceptual background of strategic learning against which to reflect the individual dissertation essays. Part two consists of the five dissertation articles. Article 1 is sole authored. Article 2 is co-authored by Sirén, Kohtamäki and Kuckertz and Articles 4 and 5 are co-authored by Sirén and Kohtamäki. Article 3 is co-authored by Sirén, Hakala and Wincent. Sirén is the lead author in all of the articles and has had the main responsibility for data collection, analysis, writing, and composing the articles, and for managing the review processes.

2 THEORETICAL BACKGROUND OF STRATEGIC LEARNING

This chapter provides an overview of the main concepts and theories relevant to strategic learning. The chapter begins by organizing and reviewing literature on strategic learning across three theoretical perspectives: emergent strategies, dynamic capabilities and the knowledge-based view. The chapter continues by positioning the strategic learning concept against other related concepts in the field of strategic management and organizational learning such as absorptive capacity; explorative learning, single-loop, double-loop and deuteron learning; and finally knowledge management capabilities.

2.1 Strategic learning rooted in emergent strategies

The literature on strategy formation can be classified into two schools of thought based on their underlying understanding of the nature of strategy: the planning school (Ansoff 1991, 1994) and the learning school (emergent view) (Mintzberg 1991, 1994a, 1994b). A purely planned strategy involves an explicitly articulated intention about the future, commonality of intentions among actors, and the exact execution of intensions as planned (Mintzberg & Waters 1985; Titus et al. 2011). A purely emergent strategy, in contrast, is an ongoing social learning process where strategy is born and shaped by actions initiated by actors without any formal plan or intention to do so (Burgelman 1991; Mintzberg & Waters 1985; Titus et al. 2011).

The idea of emergent strategy originates from the extensive work of Mintzberg (1978, 1987, 1994a, 1994b, 1994c, 1994d) and his co-authors (e.g., Mintzberg, Ahlstrand & Lampel 1998; Mintzberg & McHugh 1985; Mintzberg & Waters 1982, 1985; Mintzberg, Brunet & Waters 1986, among others) and their critique of the traditional planning school of strategy. Mintzberg´s (1994b) work on the shortcomings or fallacies of traditional strategic planning has been so influential that it can be considered to have led to a reorientation of strategy research and launched a new era in strategic management (Wolf & Floyd forthcoming). According to Mintzberg (1994d) the three main fallacies of traditional strategic planning are the fallacy of predetermination; the fallacy of detachment; and the formalization fallacy. The first weakness of the traditional strategic planning models relates to the "predict-and-prepare" approach of coping with the future (Mintzberg 1994d: 34). The main assumption behind traditional strategic planning is that plans can be created by analyzing and forecasting the future and that the postulated strategic situations are supposed to hold true even as the planning and

execution processes proceed. However, especially in fast changing industries, this is often not the case as opportunities emerge quickly and knowledge rapidly becomes obsolete. This suggests that the most viable strategies might not be products of detailed planning and execution but a process that captures the dynamic nature of strategy. Building on this idea, Mintzberg and Waters (1985) delineate between different types of strategy: emergent strategy, intended strategy, deliberate strategy, realized strategy and unrealized strategy, and argue that only a handful (10–30 percent) of intended strategies (i.e., planned strategies) materialize as realized strategies (i.e., the actual strategy that is implemented) (Figure 2.). Following this logic, the majority of intended strategies are unsuccessful and result in unrealized strategies. Consequently, the primary determinant of realized strategy is something that is not planned but emerges "at any time and at any place in the organization, typically through processes of informal learning more than ones of formal planning" (Mintzberg 1994b: 16). The conceptualization of strategy formulation as an emergent process allows an emphasis on strategic learning and makes it possible to give leeway for the organization's ability to experiment (Kuwada 1998; Lowe & Jones 2004; Mintzberg & Waters 1985). In the emergent strategy formation process, feedback loops, both negative and positive, play an important role. As shown in the Figure 2 the feedback from the realized strategies that have mostly emergent qualities, feed information back to the formulation of intended strategies and finally change the deliberate strategies of organizations. Thus, Mintzberg and Waters (1985) emphasize that it is through emergent strategies that the managers and others in the organization change their strategic intentions.

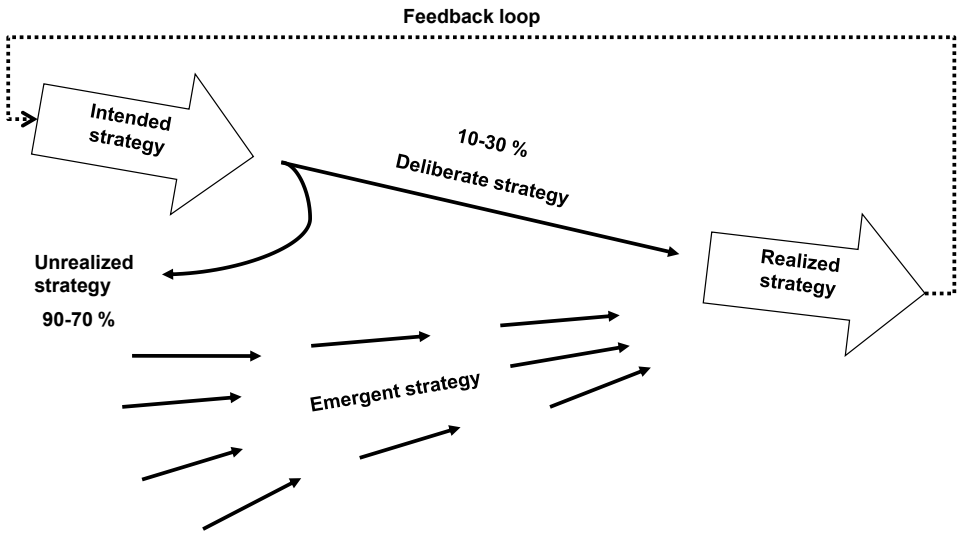

Figure 2. Strategy formation in dynamic environments (adapted from Mintzberg & Waters 1985: 271)

The second fallacy relates to the planning school's inclination to detach strategic planning from its execution. The danger here is that the separation of strategic thinking from strategic doing precludes the notion of learning from prior strategic activities. By enabling organizational members who have information current and detailed enough to shape strategies helps management to acquire insights and knowledge from customers, suppliers or competitors that would otherwise be unattainable. The learning approach sees the process of strategy formation as interactive; strategies only become what they are through social interaction, enactment, and reinterpretation. In other words, a strategy only becomes meaningful through the process of its acceptance and modification within the organization and acceptance cannot be enabled without organizational members being involved actively in the process (Lowe & Jones 2004). It is also important to note that emergence is not the result of the process of interactions but that it takes place during the process of interacting (Schindehutte & Morris 2009). In other words, strategy in dynamic environments is formed in a continual process of interaction rather than being characterized by separate planning and execution phases.

The third fallacy, the formalization fallacy, criticizes the notion found in traditional planning that formal systems are superior to human systems in terms of information processing and decision-making and that strategy formation processes could be formalized. The emergent strategy perspective sees that although larger amounts of data can be processed through formal systems effectively, traditional planning ignores the role of learning as formal systems cannot internalize, comprehend or systematize information in the same creative way as people can (Mintzberg 1994d). Consequently, the dynamic needs of strategy-making including creativity and constant change that would be better accomplished informally deteriorate when the process is formalized.

In sum, the conceptualization of the strategy formulation as an emergent and evolving process allows an emphasis on strategic learning and enables researchers to give space to the organization's ability to experiment. However, this is not to say that strategic planning is of no use to organizations. Instead, as Mintzberg and Waters (1985: 271) state "strategy formation walks on two feet, one deliberate, the other emergent". Following this insight, in this dissertation the effective strategic management in dynamic environments is seen as a balance between planning that enables direction to realize intentions and emergence that enables strategic learning and responding to unfolding patterns in the industry. Building on this dual approach article 4 examines the interplay between planning and emergence in more detail.

2.2 Strategic learning as a dynamic capability

To effectively compete in a hypercompetitive global environment, organizations are required to almost constantly make modifications to their strategies (Danneels 2011) which often includes reorganizing organizational resources (Floyd & Lane 2000). Strategic management scholars have focused on the dynamic capabilities view to explain this ability by organizations to modify their internal resources to match the external environment. The dynamic capabilities view (Eisenhardt & Martin, 2000; Helfat 1997; Helfat & Peteraf 2003; Teece, Pisano & Shuen 1997) that is regarded as rooted in and an extension of the resource-based (RBV) and knowledge-based (KBV) views, emphasizes the dynamic and temporal approach to the reconfiguration of resources (Helfat & Peteraf 2003, 2009), while the RBV and KBV primarily addresses a firm's existing resources and their causal and hierarchical effects (Schindehutte & Morris 2009). Researchers criticize both the RBV and KBV, arguing that resources, tangible or intangible, alone do not constitute a sustainable competitive advantage, but that it is the actual application and usage of the resources that are more important. The high-technology industry epitomizes the requirement for dynamic capabilities, as the industry requires rapid application development and agile software development tailored for customers in the differing global markets (McFarland 2008) and organization strategies need to include integrating complex, knowledge intensive products (Kumar, van Fenema & Von Glinow 2009).

In this dissertation, *dynamic capabilities are seen as activities embedded in processes.* The literature suggests at least two ways to treat dynamic capabilities. The first is to treat the concept as an element at the highest level of the capability hierarchy (e.g., Wang & Ahmed 2007), and the second approach views dynamic capability as an element embedded in processes (e.g., Mills, Platts & Bourne 2003; Sanchez & Heene 1997). Following the idea of dual activity (Abell 1993; Sanchez & Heene 1997), in this dissertation dynamic capabilities are seen as being competence leveraging and competence building. The former refers to coordinated deployments of resources without qualitative changes in resources used, and the latter to action taken to acquire or develop new resources or activities. The dynamic capability of a firm is treated as an organizational characteristic embedded in activities or processes in the strategic learning framework. These capability-building activities, (as the Eisenhardt and Martin, 2000 definition appears to stress) are very close to organizational learning dynamics with both an incremental (single-loop learning or continuous improvement) and a radical nature (double-loop learning or strategic change). Thus, while prior studies suggest that learning plays a significant role in the creation and development of dynamic capabilities (e.g., Eisenhardt & Martin 2000; Zollo & Winter 2002), learning is also

considered a dynamic capability in itself, rather than an antecedent of it (Ambrosini, Bowman & Collier 2009). For example, Teece, Pisano and Shuen (1997), argued that dynamic capabilities comprise four main processes, of which learning is one (the others being reconfiguration, leveraging, and integration).

Furthermore, competence building may take place at different levels of the capability hierarchy. Collis (1994) proposed that there might be distinct levels of dynamic capabilities, labeling the highest category 'higher-order capabilities' and arguing that to the extent that learning mechanisms are systematic, they can be regarded as higher-order dynamic capabilities. The first-order capabilities are those which reflect an ability to perform the basic functional activities of the firm (e.g., plant layout, distribution logistics, and marketing campaigns), and a second category of capabilities, those dealing with the dynamic improvement to the activities of the firm (Collis 1994; Vera et al. 2011). Ambrosini et al. (2009: S13) note that "higher-order dynamic capabilities can be related to double-loop and second-order change as they are transformational in nature": an observation important to the link with strategic learning.

Against the background of the ideas of dual activity and that dynamic capability can function at different levels (e.g., operational dynamic capabilities, strategic dynamic capabilities), the dimensions of strategic learning are linked as components of higher-level specific dynamic capability called strategic learning. In other words, while some other dynamic capabilities arise from learning, strategic learning is also itself a dynamic capability, functioning on the strategic level of the firm (i.e., a dynamic capability guiding the changes in strategy). Thus, following on these arguments in this dissertation strategic learning is categorized as a higher-order dynamic capability that can provide competitive advantage to an organization (Ambrosini et al. 2009; Collis 1994; Winter 2003). Next, the discussion will be extended from dynamic capabilities to the analysis of how strategic learning relates to other learning concepts.

2.3 Strategic learning and the relationship to other related concepts

Strategic learning is defined in this dissertation as an organization's dynamic capability, consisting of intraorganizational processes for the creation, dissemination, interpretation, and implementation of strategic knowledge. These subprosesses are explicated in Article 1. As the strategic learning concept builds on the information-processing view of organizational learning (Huber 1991) and the dynamic capability perspective in developing the concept, it is not unexpected that

the conceptualization shares similarities with other learning and knowledge related concepts. This is particularly the case when we consider the argument of Vera et al. (2011: 169) that "organizational learning processes are the core elements behind the concepts of KM [knowledge management], DC [dynamic capabilities], and ACAP [absorptive capacity]". However, as with all relatively new concepts the precise definition of the phenomena under study and the delineation of its relationship between other relating constructs is important and clearly warrants attention. However, due to space constraints in the Article 1, more detailed analysis of how strategic learning relates to other learning concepts was missing. Therefore this chapter is devoted to discuss the concept of strategic learning in the light of other related concepts that are important in increasing the understanding of the concept.

2.3.1 Strategic learning and absorptive capacity

In general, prior research has recognized the similarity of the organizational learning (OL) and absorptive capacity (ACAP) concepts and has argued that they have borrowed from each other in the past (Lane, Koka & Pathak 2006). However, as Lane et al. (2006: 848) highlight, 'it is surprising that relatively few studies have examined in depth the nature of these relationships'. Thus, the exact relationships between the different dimensions of absorptive capacity (i.e., to acquire, assimilate and utilize external R&D-related knowledge) and strategic learning (internal knowledge processes of the creation, dissemination, interpretation and implementation of strategic knowledge) remain relatively unexplored.

The concept of absorptive capacity was originally introduced by Cohen and Levinthal (1990) and refers to the ability to recognize, assimilate and apply new external R&D-related knowledge. In fact, most prior studies use R&D intensity (defined as R&D expenditure divided by sales) as a proxy for absorptive capacity (e.g., Meeus, Oerlemans & Hage 2001; Mowery, Oxley & Silverman 1996; Rothaermel & Alexandre 2009; Tsai 2001; see also Godfrey & Hill 1995 for a discussion) and only a handful of studies have recognized that absorptive capacity is a multidimensional construct and measured it as such (Flatten, Engelen & Brettel 2011). In contrast, the concept of strategic learning draws not only on one specific type of knowledge but on broader arrays of knowledge with strategic value.

The conceptualization of absorptive capacity as a dynamic capability described by Zahra and George (2002) and its subsequent modification by Todorova and Durisin (2007), which represents a departure from the traditional capability view of ACAP (Cohen & Levinthal 1990), brings the concept of ACAP closer to strategic learning. The study by Zahra and George (2002) reckon that ACAP is a

multidimensional construct and propose that it consists of: knowledge acquisition, assimilation, transformation and exploitation. However, they focus on knowledge gained particularly outside the firm boundaries by concentrating on the extent the firm is capable of assimilate and replicate new knowledge gained from external sources. This external focus on knowledge acquisition is common to ACAP studies. In fact, according to Wang and Ahmed (2007) absorptive capacity with few exceptions has been considered as a dyad-level construct and has limited applicability at the firm level. Consequently, ACAP is mostly used to measure inter-organizational knowledge transfer (Lane, Salk & Lyles 2001: Mowery et al. 1996; Wang & Ahmed 2007), whereas strategic learning is "an intraorganizational ecological process, integrating various levels of learning in organizations and including processes of both strategic knowledge creation and strategic knowledge distillation" (Kuwada 1998: 719). Thus, ACAP and strategic learning clearly operate in different contexts. However, several researchers (e.g., Vera et al. 2011) argue that ACAP is a subset of organizational learning because it focuses on the value and assimilation of one specific type of learning: learning from external sources. According to Vera et al., (2011) ACAP is also part of organizational learning because the different dimensions of ACAP are learning processes (e.g., evaluating, assimilating, and applying external knowledge).

Building on these notions from the prior literature, the present work considers that although absorptive capacity can be distinguished from strategic learning, the line between the two is unavoidably indistinct and in practice both of these capabilities can be used to create competitive advantage, despite originating from different knowledge sources. Following on this reasoning, it is concluded within the articles (particularly in Articles 2 and 3) that the strategic learning concept captures the main dimensions of absorptive capacity and it helps to advance our general understanding of the strategic learning construct.

2.3.2 Strategic learning and explorative learning

Explorative learning emphasizes learning by generating variation (McGrath 2001). Strategic renewal requires that firms need to break from their current paths and shift from exploitative learning to explorative learning as innovation strategies often require firms to scan more remote environmental areas to find new market opportunities (Berghman, Matthyssens & Vandenbempt 2013; Crossan & Berdrow 2003). In this work, in the operationalization of strategic learning the first dimension "strategic knowledge creation" builds on the measurement of explorative learning developed by Atuahene-Gima and Murray (2007). Researchers (e.g., Kuwada 1998; Thomas et al. 2001) who have studied the nature of strategic

learning in-depth, also illustrate that creativity and exploration are among the most fundamental characteristics of the strategic learning concept that illustrates a move from learning-as-discovery to learning-as-foreshadowing (Hirshleifer 1971) and learning-as-strategizing (Kuwada 1998). Therefore, in this work, explorative learning is seen as one of the fundamental dimensions of strategic learning; however, strategic learning is a broader concept also incorporating the distribution, sense-making and organizational memory processes of learning.

2.3.3 Strategic learning, single-loop, double-loop learning and deuteron learning

To position strategic learning in relation to single-loop, double-loop and deuteron loop learning we need to delve a little more deeply into the cognitive processes of organizational learning. Adopting the terminology of Fiol and Lyles (1985), Kuwada (1998: 723) states that "Strategic learning is a type of higher-level or second-order learning in organizations". This form of learning corresponds to what Argyris and Schön (1978, 1996) call double-loop learning. In essence, double-loop learning permits an organization to modify its implicit norms, practices, and objectives. As entrepreneurial behaviors are likely to alter the beliefs and assumptions of the organization, it is therefore suggested that EO and strategic entrepreneurship initiate double-loop learning approaches in particular, such as, strategic learning (Anderson et al. 2009; Sun & Anderson 2010). In contrast, single-loop learning remains within the accepted routines and occurs when a mismatch between intended and obtained outcomes is detected and corrected without changing the underlying routines that guide the behaviors (Argyris 2003; Argyris & Schön 1978).

Furthermore, this study assumes that in order for an organization to become better in their strategic learning practices the managers need to develop what Argyris and Schön (1978, 1996) call 'deutero-learning' (equivalent to triple-loop learning), that is, reflective routines that assist in learning about improving the learning system itself. In other words, managers should encourage organizational members to reflect on the learning process and to invoke a 'stop-and-think' policy to improve the quality of problem solving and learning (Visser 2007). Through these reflective learning activities, organizations may find solutions helping them to become better at strategic learning. According to Argyris (2003) deutero-learning can occur in the context of both single-loop and double-loop learning when the learning is taken to a meta-level where reflection is made. Argyris (2003) also noted that the knowledge and skills required to produce double-loop learning are significantly more complicated than those required for deutero-learning on single-

loop issues. Thus, following on his logic the most demanding form of organizational learning is deutero-learning on double-loop issues. It can therefore be expected that deuteron learning on strategic learning issues is fairly rare in organizations.

2.3.4 Strategic learning and knowledge management

Scholars coming from different research traditions have viewed organizational learning through different lenses, reflecting their different backgrounds, resulting in related concepts such as knowledge management (KM). Consequently, there are various ways to conceptualize the relationship between KM and organizational learning. Researchers including Easterby-Smith and Lyles (2003) and Vera et al. (2011) argue that the basic difference between organizational learning and KM is that KM's main focus is on understanding the nature of knowledge as an asset or a stock, whereas organizational learning primarily emphasizes the processes through which knowledge changes or flows. In other words, a distinction can be made between studying the content of learning (KM) and the processes of learning (organizational learning). Vera et al., (2011: 162) state further that in KM the "discussion is focused on trying to understand what knowledge is, on defining knowledge typologies, and contrasting explicit and tacit knowledge and the technical and social mechanisms to support them". However, although a distinction can be made between KM (the content view) and organizational learning (the process view), these two concepts have moved closer to one another, especially as KM literature has started to emphasize the dynamic nature of knowledge (instead of a static view). This change has led researchers to switch from purely managing knowledge assets to studying knowledge-associated processes (e.g., Alegre, Sengupta & Lapiedra 2013; Gold, Malhotra & Segars 2001). Thus, in line with Vera et al. (2011) this dissertation agrees that there is a great opportunity to unify the fields and therefore some of the articles (e.g., Article 2 and 3) have linked strategic learning with KM literature.

In general, the measurement instrument in Article 1 and that used in subsequent articles is built upon the established strategic learning literature in the field of both EO (Anderson et al. 2009; Covin et al. 2006; Green et al. 2008; Mueller et al. 2012) and strategic management at large (Kuwada 1998; Mintzberg & Waters 1985; Thomas et al. 2001), and differs from the prior measurements of KM capabilities (Gold et al. 2001; Tanriverdi 2005) or KM dynamic capability (Alegre et al. 2013). The main difference between the suggested measure for strategic learning and the measure for KM practice and KM dynamic capability suggested by Alegre et al. (2013: 457) is that the measure for KM dynamic capability "focuses

primarily on the creation of knowledge" and closer examination of the measures indicates that they concentrate primarily on competences to learn ("external learning competence" and "internal learning competence"). As it is understand in this dissertation, competency is the ability of an individual to do a task properly and an example item from the internal learning acquisition scale is "Degree of academic qualification of employees in the R&D function". Although competences are seen as highly important to strategic learning, the strategic learning measure concentrates more on the process perspective of learning, as shown by an example item from Article 1 being, "We prefer to collect market information before determining strategic needs to ensure experimentation." In addition, as the study by Alegre et al. (2013) was conducted among biotechnology firms and the questions were addressed to the R&D managers, the items naturally reflect the importance of technological and R&D-related knowledge and relate to learning competences that aim to serve R&D and innovation functions. The measurements for strategic learning used in this dissertation were addressed to CEOs and instead of technology related knowledge, aimed to capture a broader, top management view of strategic information such as market and customer information.

Furthermore, the study by Tanriverdi (2005) enriches our understanding of the role of cross-unit knowledge management capability in multi business firms operating in multiple product markets. The concept concentrates especially on three different knowledge resources: product, customer and managerial knowledge that are manifested through four knowledge processes: creation of related knowledge; transfer of related knowledge; integration of related knowledge; and leveraging of related knowledge. Owing to its focus on cross-unit knowledge management capability and the emphasis especially on knowledge relatedness between the functions, the viewpoint is different from the learning process perspective in rather small software companies as captured by the measure for strategic learning used in this dissertation.

To conclude, as Thomas et al. (2001) argue, KM is closely linked with the strategic learning perspective. Nevertheless, the measurement instrument developed in this dissertation is built upon the established strategic learning literature, and differs from the prior measurements of 'knowledge management capabilities' (Tanriverdi 2005) or KM dynamic capability (Alegre et al. 2013) in the ways described above and hence, the measures can be differentiated from each other.

3 METHODOLOGY

This chapter outlines the research methodology used in this study. In the following sections, the research strategy, details of measurement variables, research design and empirical domain, data collection and analysis, and validity and reliability of the study are presented.

3.1 Research strategy and underlying philosophical assumptions

All theories of organizations are based upon a scientific philosophy (Burrell & Morgan 1979). Extending this notion to the individual level means that whenever research is carried out, a researcher makes either explicit or implicit assumptions concerning the nature of the world or, in other words, how the world is (ontology) and the way it can be researched or how we come to know it (epistemology) (Burrell & Morgan 1979; Easton 2002). *Ontological* assumptions concern the essence of a phenomenon and refer to questions such as the existence of reality without an individual's consciousness of it, and whether reality is a given in the world or the product of one's mind. *Epistemological* assumptions, on the other hand, are assumptions about the grounds of knowledge and refer to questions such as how knowledge is acquired and the truth found? As these assumptions fundamentally affect knowledge gained from and the importance of research results, Rosenberg (1995: 4) stated that "being clear about a discipline's philosophy is essential because at the frontiers of the disciplines, it is the philosophy of science that guides inquiry." Thus, the ontological and epistemological assumptions guiding this work are explicated in the following section.

Burrell and Morgan's (1979) framework for social science is one of the most widely known and accepted representations of different philosophical paradigms. In their 2x2 framework, they classify the different paradigms according to a subjective-objective dimension that concerns assumptions about the nature of science and a regulation-radical change dimension that concerns assumptions about the nature of society. These dimensions represent four different paradigms: radical humanist, radical structuralist, interpretive, and functionalist. Radical humanist and interpretative are subjective paradigms that view the world as a product of individual cognition or, in other words, see the world as a product of one's mind. The radical structuralist and functionalist paradigms, in contrast, view the world objectively and see reality as a given. The functionalist paradigm is the most often applied paradigm in management research and organizational learning (Örtenblad 2003). By assuming that the world consists of relationships, processes, and struc-

tures that can be understood through hypothesis testing, researchers devoted to this paradigm use quantitative measures and approaches to study the world. As the purpose of the appended articles was to test hypothesized relationships based on a large sample of data, the assumptions guiding this dissertation can be best associated with Burrell and Morgan's (1979) functionalist paradigm. However, Burrell and Morgan's framework has been criticized for its incommensurability regarding the four paradigms (Crossan et al. 2011), meaning that they are seen as mutually exclusive and contradictory and therefore a synthesis between the paradigms is not possible. These restrictions pose problems to researchers studying organizational learning as, according to Crossan et al. (2011), organizational learning subprocesses operate within and across the four paradigms and therefore cannot be looked at only from one particular paradigm. As a result, a meta-theory that, in addition to its own set of assumptions, accommodates other theoretical lenses and therefore has the potential to encompass different ontological and epistemological assumptions, best serves the development of the organizational learning field (Campbell 1990; Crossan et al. 2011). Therefore, alternative epistemological assumptions such as those of Burrell and Morgan's can best serve the development of the organizational learning field.

Evolutionary epistemology (Campbell 1974; Weick 1979) is the approach that fulfills the above requirement and best captures the underlying assumptions in this study. This view has also been applied by several strategy scholars (e.g., Aldrich 1999; Bradley, Aldrich, Shepherd & Wiklund 2011; Burgelman 1991) to study strategy-making and learning. Building on the ideas of Charles Darwin´s evolution theory, the basic assumption in this paradigm is that knowledge can be explained and understood in terms of natural processes (i.e., the evolutionary process of variation-selection-retention) and is explicable from a scientific perspective, rather than being viewed as something "mysterious" that can be accessed only through complex philosophical methods (Christensen & Hooker 1999: S237). What follows from this assumption is that all knowledge can be seen as based on already approved perceptions that have been emerged in the course of human evolution during adaptation to the world. In other words, human knowledge is a result of evolution, which explains why our structures of perception are so similar. Evolutionary epistemology assumes that reality exists outside of human meaning and incorrect hypotheses are corrected and rejected by evolution. Thus, "what we know is the result of a variation-selection-retention process" (Crossan et al. 2011: 456). In addition, knowledge is not just a product of evolution, but operates according to the principals of selection (Christensen & Hooker 1999). Following this logic, evolution can also be seen as a factor that constrains our knowledge. For example, our knowledge is restricted by the instruments by which it is gained, such as linguistic abilities, our brains, and our senses, that are

shaped by evolutionary processes (Ruse 1990). This assumption aligns particularly well with the ideas in Articles 3 and 4 in which path dependency and inertial forces that are rooted in evolutionary assumptions (Hannan & Freeman 1984; Nelson & Winter 1982, 2002), including individuals' bounded rationality, are discussed. In addition, the evolutionary processes of variation, selection, and retention can also be used to explain single-loop, double-loop, and deutero organizational learning processes, which can be traced back to Bateson's (1972) work on "ecology of the mind". According to Crossan, Maurer, and White, (2013), the type of organizational learning taking place at an organization will depend on the nature of the selection processes. If the organization has a strong emphasis on a particular selection method, this will lead to single-loop learning. When existing selection methods are questioned and alternatives are considered, double-loop learning is attained. In order for triple-loop learning (or deuteron learning) to occur, organizational members must be aware of the entire learning system and the types of selection and learning in place. Last, the evolutionary approach to knowledge that views truth and reality objectively aligns well with the hypothesis testing approach adopted in this dissertation.

3.2 Research design

The design of this research is based on five directly related studies focusing on strategic learning within the same industry. The Finnish software sector, which forms a crucial part of the IT industry, was selected as the target industry for this study. In general, with its fast innovation and short product lifecycles, the IT industry serves as an excellent platform for researchers to quickly identify relationships, issues, and approaches that will span the entire economy in the future (Mendelson & Whang 2000). In particular, scholars have identified the need for learning in the IT industry due to its high rate of change (Bingham & Davis 2012). Knowledge creation and application are seen as especially important in high-tech sectors (Autio, Sapienza & Almeida 2000; Covin, Slevin & Covin 1990b; Eisenhardt & Schoonhoven 1990). In an industry in which knowledge changes quickly, it is important to understand how the acquisition and internalization of new knowledge influences firms' internal knowledge and learning (Matusik & Heeley 2005). Furthermore, the dynamic setting increases the number and range of opportunities to learn, making learning a more used practice that, in more stable industries, is rare. The software industry was particularly attractive for this study because knowledge is seen as an important value-adding resource for firms, since their business is much more knowledge intensive than, for example, that of a computer component manufacturer. Software firms will both actively seek to capitalize on learning opportunities and be more conscious about

knowledge sharing benefits derived from different sources (Autio et al. 2000). Thus, the software industry provides an excellent focused research domain to study learning.

In addition to the learning and knowledge arguments, focusing exclusively on a single industry allowed controlling for any unobserved heterogeneity across industrial sectors. This is important as Powell (1996) observed that industry factors can explain as much as 20% of overall performance variance. Dess, Ireland, and Hitt (1990) also noted that despite their limitations, single industry studies avoid the problem of varying effects from separate industries and thus have many virtues. As three of the articles in this dissertation aim to test the performance effect of strategic learning, it was important to rule out any industry effects that might have an effect on the performance relationship.

Furthermore, Finland was an attractive country for this study because of the growing importance of software companies in the Finnish economy. In addition, the software industry in Finland is concentrated around one main industry classification, which makes the sampling frame representative and easily manageable. Firm-level financial data is publicly available in Finland and is detailed and comparable. In Finland, the contact data for the surveyed companies was easily accessed, accurate and complete, which further justified the selection of the country. Lastly, Finland was a logical choice due to the researcher's in depth knowledge of the context and the culture, which made communication with the companies easier and more reliable.

Data collection took place in 2009, a year widely characterized by the global economic downturn. This global financial crisis posed challenges to Finnish software companies, but, in general, the software industry was less affected by the recession than other industries in the country. In fact, on a global scale, the Finnish software market did relatively well in 2009 and sustained positive growth (Rönkkö, Ylitalo, Peltonen, Parkkila, Valtakoski, Koivisto, Alanen & Mutanen 2010). The timing of the data collection was particularly interesting for studying strategic learning as it has been proposed to play a more important role in dynamic and uncertain business environments than in more stable contexts (Mintzberg & Lampel 1999; Volberda 1996). Furthermore, two of the articles (3 and 4) utilized longitudinal performance measures that cover the time period 2008 to 2010. In 2010, initial signs of the recession's end had begun to appear and, generally, profitability figures were on approximately the 2008 pre-recession level after a temporary dip in 2009 (Rönkkö, Peltonen & Pärnänen 2011). Thus, although conditions during the time period when the data was collected were atypical, it can be concluded that the recession did not hit the software sector as hard as other indus-

tries and, therefore, the timing does not restrict the generalizability of the results beyond economic slowdowns.

The sampling frame included only software companies with five or more employees. Very small companies were excluded from the study because they were considered to be too small to exhibit an organizational form where learning could be considered an organizational level phenomenon. Three of the articles (3, 4 and 5) in this dissertation use data from small and medium-sized enterprises (SMEs). The definitional criteria of an SME (less than 500 employees) is based on the U.S. government's classification of SMEs and was chosen because of the wide use of this classification, especially in organizational learning and entrepreneurial orientation research (e.g., Kreiser, Marino, Dickson & Weaver 2010). This will enable future studies to better compare the results of this study to previous studies. Furthermore, these two articles concentrate on SMEs especially because there is a greater transparency of learning in smaller and often younger firms because their small size simplifies the observation of learning processes (Bingham & Davis 2012). The two articles relied explicitly on SME data because of such firms' growing importance for the Finnish economy in the face of the rapid decline of Nokia's business (Rönkkö & Peltonen 2012).

Although the quantitative definition of SMEs is widely established, OECD Structural Business Statistics experts among others (Hauser 2005: 12) criticize this approach and advise that the quantitative definition "should only be used as a measure to approximate their [SME´s] number, since qualitative criteria are problematic to be observed by statistics." Because this dissertation is based on a quantitative approach, the conventional SME definition based on size classification best served its aims. However, it should be acknowledged that from the practical point of view there should not be much difference in the characteristics of a company if it has 505 or 495 employees. To be sure that the use of the cut-off value of 500 employees did not exclude any companies that were close to this value and hence qualitatively more similar, the researcher carefully analyzed the companies that were excluded. The researcher was able to confirm that the companies excluded from the dataset in papers 3, 4, and 5 are definitely large companies in the Finnish software sector and thus different from SMEs.

3.3 General characteristics of the Finnish software industry

The IT industry is portrayed as the "crown jewel of the modern economy" (Mendelson & Whang 2000: i). The global IT sector is one of the most dynamic,

fast-paced, and innovative industries and its impacts run well beyond industry boundaries. The software industry is often cited as the core of high-technology industries and some researchers estimate that it is the industry in which hyper-competition is the most pronounced (Lee, Venkatraman, Tanriverdi & Iyer 2010). In general, the software industry is characterized by high-velocity innovation, technological change, and turbulence in revenues, market shares, and profits of firms (Brown & Eisenhardt 1997; Lee et al. 2010).

The software industry in Finland is relatively young, with many of its most mature companies incorporated in the late 1980s and early 1990s (Rönkkö, Eloranta, Mustaniemi, Mutanen & Kontio 2007; Väyrynen 2009). Despite its youth, it has been one of the focus areas in Finnish innovation policy and has been envisioned as a potential source for national competitive advantage. The growth figures of the industry are promising. ICT has been an important growth driver in the Finnish economy, with EuroStat estimating that the Finnish software and IT services industry grew by 5% in 2010 and 8% in 2011, while Finland's general GDP growth was 3.1% in 2010 and 2.9% in 2011. Overall, the competitiveness of the Finnish IT industry can be characterized as excellent. Finland ranked number two behind the United States in a 2011 IT industry competitiveness index study (Business Software Alliance 2011). The domestic market for IT services in Finland is rather small, which is one of the reasons why Finnish software firms are entering international markets at increasing numbers and relatively younger ages than previously (Rönkkö & Peltonen 2012). This reflects the global trend of the increasing internationalization of IT sectors worldwide (Almeida & Bloodgood 1996; Autio, et al. 2000). In general, the age and size of firms operating in the software industry varies highly. Measured in terms on size, the industry is dominated by small and medium-sized companies. On the other hand, in terms of sales volume, large companies dominate the sector. The software industry in Finland is also characterized by both domestic and international mergers and acquisitions. During the period 2005–2009, the software industry saw 644 acquisitions (Rönkkö et al. 2011).

Although the software industry in Finland is geographically very homogenous, such that 86 % of companies with a revenue exceeding 3 million euros are located in the region of the capital (Lassila, Jokinen, Nylund, Huurinainen, Maula & Kontio 2006), companies differ in their business models, target customer segments, and level of technological development, for example. One of the fastest growing clusters that has attracted a lot of international attention (especially because of the pioneering developer of the *Angry Birds* game, Rovio) is Finland´s gaming industry (Raivio, Lunabba, Ryynänen, Timonen, Antikainen & Lanér 2012). Because of the variation inherent in the software industry, Articles 1, 3, and 4 applied var-

ious control variables (e.g., number of patents, resource slack) to account for this variance (see the data analysis in 3.6 for the use of control variables). To explore in-depth learning in the Finnish gaming industry, Article 5 provides illustrative examples from successful game companies to shed light on practices and strategies employed in this promising branch.

3.4 Empirical data collection

To test the hypotheses posited in the articles, web-based data collection was conducted between June and August of 2009. The data collection started with the identification of a suitable sample group. Following previous studies (Rönkkö et al. 2010; Väyrynen 2009), companies belonging to the TOL 2008 industrial classification class 62 (equal to NACE codes) of 'Computer programming, consultancy and related activities' were defined as software businesses. It is noteworthy that Nokia was not included in the sample because it is classified under the electronics industry. A dataset from a public database including all software companies that employ five or more employees was derived from this class and produced a final sample of 1161 Finnish software companies.

The unit of analysis for this study was the firm. Organizational learning, EO, as well as exploration and exploitation of a business, are typically investigated through polling its senior management (Covin & Slevin 1989; Kreiser et al. 2010; Rauch, Wiklund, Lumpkin & Frese 2009; Jerez-Gómez, Cespedes-Lorente & Valle-Cabrera 2005). This study was also based on the key respondent approach, with managing directors as the key respondents. Although the key respondent approach has its limitations, it allows researchers to gather data from a large number of firms and is therefore a widely used technique (Flores et al. 2012). Based on the characteristics of the sample that will be described later in this chapter, it is reasonable to expect that the CEOs were able to provide relevant and accurate responses to the research questions about strategy and learning processes occurring in their organizations (for a more in-depth discussion see also Huber & Power 1985).

To confirm that the potential respondent firms were actually operating in the software sector and to verify the CEOs' e-mail addresses, the researcher visited all of the companies' webpages. During the data collection process, two e-mail reminders were sent to CEOs who had not yet responded. To boost the response rate, the researcher called the CEOs of the non–respondent companies and requested they complete the survey. A total of 210 responses were received, representing a response rate of 18%. This response rate can be considered satisfactory,

as research has shown that a response rate as low as 10–12% is typical for web-based questionnaires that target key respondents (MacDougall & Robinson 1990; Sieger, Zellweger & Aquino 2013). Only fully completed questionnaires were used for analysis, resulting in a final sample of 206 usable responses.

Analysis for nonresponse bias was conducted by checking for irregularities in basic firm attributes between firms that had replied and those who did not using data from a secondary database. A t-test was completed by comparing age, revenue, and profit. The analysis revealed that the only small but statistically significant ($p < 0.05$) difference between the sample and the general population was firm age. This difference is marginal in practice and can be expected when the sample size is large. The respondent companies' average age was approximately 11.7 years (median 9 years), whereas the age of non-respondent companies was slightly larger (13.7 years) (median 11 years). The existence of nonresponse bias was also checked using Armstrong and Overton's (1977) extrapolation method, which assumes that non-respondents are similar to late respondents. By splitting the sample into early and late respondent groups, we compared the sample means for each of the study variables across groups. The t-tests revealed no significant differences between groups. Nevertheless, on the basis of the combined results of these two tests, it must be acknowledged that the companies in the dataset are slightly (2 years) younger on average than companies in the Finnish software sector. However, as the mean company age for both groups was over 10 years it can be concluded that the companies in both groups have passed well beyond the most critical years for the survival of the organization and therefore the difference is smaller than for example between groups of companies that are on average 2-years old and 4-years old.

In addition to traditional non-response analysis, Rogelberg, Conway, Sederburg, Spitzmüller, Aziz and Knight (2003) suggest that non-respondents can be divided into two specific classes: active non-respondents (those who decide specifically not to respond to a survey) and passive non-respondents (those who "forgot" to complete the survey) [4]. However, this dissertation is not able to empirically test the difference, yet Rogelberg et al. (2003) also suggest that for the satisfaction type variable (the main answering format in this dissertation), non-response bias does not appear to be a substantive concern. More recently Rogelberg and Stanton (2007) showed that respondents who are more interested in the surveyed topic may be more likely to respond to the survey than those who are not and thus the

[4] The author would like to thank the pre-examiner, Professor Matthias Fink, for pointing out this important line of inquiry.

survey result may be inflated. They suggested that researchers should include a few items that examine respondents' interest in the particular topic in order to investigate whether the relationship between responses to the items that captures the interest and responses to the actual survey topic differs. In this dissertation, respondents were asked whether they would be interested in joining a possible follow-up case study by use of a dummy variable "yes" (n=95) and "no" (n=107). For the purpose of this post-hoc analysis, it is assumed that those expressing interest in the possible follow-up study were more interested in the topic. The *t*-tests revealed no significant differences between group means in satisfaction with performance but a statistically significant difference in strategic learning ($p < 0.01$) and EO ($p < 0.05$). The results aligned with those of Rogelberg and Stanton (2007) in that those respondents who were not interested in the possible follow-up case study were less satisfied with strategic learning (3.89) and EO (3.30) than those who were more interested in the topic (3.70 for strategic learning and 3.53 for EO). It is possible to compensate for this inflation by using interest level as a control variable, however, this procedure is seldom used in the field and unfortunately the researcher was not aware of this procedure at the time the models in the appended articles were tested. However, the researcher would encourage future research to utilize this procedure.

As in most studies, the possibility of non-response bias cannot be completely excluded. However, it is very unlikely that any such bias would adversely affect the results of this study due to the substantial efforts made to mitigate it. The researcher devoted a lot of time and financial resources to efforts to mitigate the bias in the data collection phase (e.g., the researcher called every software company that fulfilled the sampling criteria, objective indicators were collected for all of the companies constituting the software sector etc.) and several post-hoc analyses were made that showed that non-response bias was not a substantive concern. However, in a situation where the time and financial constraints were not as scarce as in a dissertation project, there could be more emphasis on using multiple data collection methods and channels to reach respondents.

3.5 Measures and operationalization

The variables measured in this study are based on established scales from literature, with the exception of the strategic learning variables that were developed for this study. Finding a standardized scale to measure strategic learning was problematic for two reasons. First, the literature lacks a clear definition of what strategic learning represents and how it should be operationalized. Second, only a few studies have explored factors related to strategic learning using a quantitative ap-

proach. To meet this challenge, a measure for strategic leaning was developed using a collection of variables from established scales and modifying them to capture the strategic nature of learning. All the constructs used in the appended papers were translated to Finnish using a back-translation procedure from English to Finnish, and then from Finnish to English (Brislin 1980). The main constructs were measured on scales with 5-point Likert descriptors ranging from 'fully disagree' to 'fully agree'. The main scales are reviewed here for further clarification of measurement related issues. Detailed descriptions of each scale can be found in the appended papers.

Strategic learning and its development process is described in detail in Article 1. Because Articles 3, 4, and 5 concentrate on researching strategic learning in SMEs, the learning scale used differs somewhat from the measure used in Articles 1 and 2 that also included large companies in the analysis. During the review process it was decided that Article 2 should concentrate on the intra-organizational perspective of strategic learning, namely the dissemination, interpretation, and implementation processes. As a robustness check, the model was also tested by using the four dimensions of strategic learning, but because the results remained largely unchanged, the researcher decided to concentrate on the more parsimonious model and the three dimensions of strategic learning that had been identified as the most critical in strategic entrepreneurship literature. Limitations on space determined that this choice was not reported in the article text, but it was discussed during the review process.

Due to length limits, the appended articles do not provide a discussion on the nature of strategic learning as a multidimensional construct or its operationalization as a reflective measure. According to Law, Wong, and Mobley (1998), the discussion concerning multidimensional constructs and the various ways in which a multidimensional construct can relate to its dimensions is important for the definition of the research question, theoretical parsimony, and the constructs' relationships with other constructs. Therefore, the focus in this remaining section is on a general discussion concerning strategic learning as a multidimensional construct and the way in which it relates to its dimensions.

As defined by Law and Wong (1999: 144), a multidimensional construct has more than one dimension, and these dimensions are usually moderately correlated and are an imperfect representation of the latent construct of interest. Furthermore, the dimensions are grouped under the same multidimensional construct as each dimension represents some portion of the overall latent construct. In contrast to a set of interrelated unidimensional constructs of strategic knowledge creation, distribution, interpretation, and implementation, Articles 1-4 followed previous

studies and chose to conceptualize these dimensions under an overall abstraction of strategic learning (e.g., Jerez-Gómez et al. 2005; Tippins & Sohi 2003; Yang, Watkins & Marsick 2004). The reason for this decision was twofold. First, although it is acknowledged that the analysis of the relationships between specific dimensions of strategic learning with different antecedents and effects may enrich the understanding of the construct, treating dimensions separately precludes any general conclusions about relationships at the construct level (Law et al. 1998). Because, for example in Article 1, research on the mechanisms that mediate the relationships between exploration, exploitation, and performance has only recently been evoked (e.g., Simsek, Heavey, Veiga & Souder 2009), at this stage of the strategic learning and strategic entrepreneurship literature, it is theoretically more contributive to use the overall abstraction of strategic learning as a presentation of the dimensions. It is also hoped that by introducing this more general model, avenues for further research can be opened that could perhaps analyze the different sub-dimensions of strategic learning independently in more simplified theoretical models than those tested in the appended articles. However, it is good to acknowledge that in terms of the research model tested in Articles 2, 3, and 4, the hypothesized impact of strategic learning requires the co-existence of all the dimensions.

Second, a strong theoretical basis on which to define strategic learning as the latent factor underlying the different dimensions guided this choice. The previous studies from which the measures for strategic learning were adapted (e.g., Jerez-Gómez et al*.* 2005; Tippins & Sohi 2003) treated learning as a higher-order construct and, instead of individual dimensions, used a second-order construct for their analysis. For example, the main finding of the measurement building paper of Jerez-Gómez et al*.* (2005) was that "learning is a latent multidimensional construct because its full significance lies beneath the various dimensions that go towards its makeup." A good example of an approach similar to this dissertation is described by Tippins and Sohi (2003). The aim of the article was to test whether organizational learning mediates the relationship between IT competency and firm performance. The authors argued that organizational learning is a higher-order construct that is manifested through five first-order dimensions. In a similar approach to the one adopted in the appended articles, the authors chose to test the model using the overall abstractions of IT competency and organizational learning. The previous studies partially confirm that strategic learning constructs can be modeled using the approach chosen in the present study.

Previous studies (e.g., Law et al. 1998; Wong, Law & Huang 2008) have emphasized that whenever a multidimensional construct is part of a conceptual framework, researchers should specify the relationships between the overall construct

and its dimensions. Higher-order measurement models differ according to the presumed direction of causality between the latent construct and its measures. In formative measurement models, the latent construct is modeled as being produced by its measures whereas in reflective measurement models, the latent construct is modeled as producing its measures. Fornell and Bookstein (1982: 292) summarized that reflective measurement models assume that "underlying factors . . . give rise to something that is observed", while formative measurement models employ "explanatory combinations of indicators" as the basis for creating the latent construct (see also Covin & Wales 2012). The decision between the reflective versus the formative measurement perspective should be theory driven (e.g., Diamantopoulos & Siguaw 2006). In other words, the specification of the nature and direction of the relationship between constructs and measures should be based on previous theory.

After a comprehensive literature review and a systematic measurement development process conducted before data collection, the decision was made to model strategic learning as a latent model. Previous studies in which a measure for strategic learning was developed have also adopted the construct as a reflective measure (e.g., Jerez-Gómez et al. 2005; Tippins & Sohi 2003; Yang et al. 2004). In addition, the measure of strategic learning capability of Anderson et al. (2009) is a recent example of a latent construct measured by a reflective model (Covin & Wales 2012). According to Law et al. (1998), a multidimensional construct represents a latent model (reflective measure) if a higher-level construct underlies each dimension. In the case of strategic learning, it is manifested through the dissemination, interpretation, and implementation of strategic-level knowledge. Therefore, only common variance shared by all dimensions is considered as true variance of the construct (Law et al. 1998). Wilcox, Howell, and Breivik (2008) also support this theoretical choice, as they argued that "in the context of theory testing, formative measurement should not be considered an equally good alternative to the reflective measurement model."

Exploration and exploitation strategies were captured by the scale developed by Lubatkin, Simsek, Ling and Veiga (2006). The authors extended He and Wong's (2004) original eight-item exploration and exploitation measure into a 14-item measure to better capture the nature of these strategies. Using the terminology of Burgelman (1991, 2002), exploitation strategies were referred to as strategic activities that are within the scope of an organization's current strategy and exploration strategies as strategic activities that emerge outside of scope of a firm's current strategies. This measure sees exploration and exploitation as two distinct strategic activities and is therefore different from the measure developed by Jansen, van den Boch and Volberda (2006) that measures radical and incremental innova-

tions and from the measure developed by Gibson and Birkinshaw (2004) that measures contextual ambidexterity that "arises from features of its organizational context'' (Gibson & Birkinshaw 2004: 209) and concentrates on the characteristics of management systems instead of firm strategies. Consequently, and because the main motivation of the data collection was to study strategic-level issues, Lubatkin et al.'s (2006) measure was a logical choice for this research.

Entrepreneurial orientation (EO) was measured by the heavily-utilized EO measure (Rauch et al. 2009) developed and validated by Covin and Slevin (1989). This nine-item scale assesses each of the three EO components proposed by Miller (1983)—innovativeness, risk-taking, and proactiveness—but treats EO as a latent, umbrella construct of a firm's overall entrepreneurial activities (Cao, Simsek & Jansen forthcoming). It is beneficial to acknowledge that there is a another school of thought, usually following the EO scale developed by Lumpkin and Dess (1996), that argues it is more interesting to investigate the dimensions.

Prior studies using the Covin and Slevin (1989) EO scale have reported that EO dimensions are of equal importance in explaining performance and therefore support the use of an aggregate EO construct in studies explaining performance (Rauch et al. 2009). Additionally, for reasons of parsimony, EO dimensions are often grouped under the same multidimensional construct (see e.g., Keh, Nguyen & Ng 2007; Real, Roldán & Leal forthcoming) and subsequently used as a composite scale in statistical analysis, as each dimension represents some portion of the overall latent construct. As a result, while the research questions focused on the overall EO–strategic learning effects on performance, EO was proposed to have three underlying dimensions. Since the three subscales are manifestations of EO, we followed previous studies and used the average score of the dimensions instead of individual subscales (for a detailed discussion informing this choice, see Covin et al. 2006; Covin & Wales 2012; Keh et al. 2007; Slevin & Terjesen 2011).

The original Covin and Slevin (1989) EO scale utilized bipolar measures (consisting of opposite statements); however, in this study, we followed the standard set in more recent EO studies (e.g., Wang 2008; Su, Xie & Li 2011) and used the EO scale as a unipolar measure. In general, the scaling of EO is a methodological issue that has not received much attention in literature. However, in the context of the theory of planned behavior, Ajzen (1991: 193) noted that "from a measurement perspective either type of scoring could be applied with equal justification."

The ***strategic planning*** measure used in Article 4 was originally developed by Bailey, Johnson, and Daniels (2000), validated in a prior study of 5,332 respondents, represents one of the six dimensions of their organizational strategy devel-

opment measure. This eight-item scale measures the degree to which available options are evaluated; detailed implementation plans are formulated; the environment is systematically analyzed; and monitoring and control procedures are used to achieve strategic objectives. This measure was subsequently validated and modified by Collier, Fishwick and Floyd (2004), who dropped one item from the original scale ("We make strategic decisions based on a systematic analysis of our business environment") resulting in the seven-item strategic planning scale used in this study. However, in the present study, due to the cross loadings, one further item was removed ("We evaluate potential strategic options against explicit strategic objectives"), resulting into a final measure of six items.

Environmental dynamism was used as a control variable in Articles 2, 3, and 4. Additionally, in Article 2, dynamism was used as a marker variable to control for common method bias. The environmental dynamism construct was measured using a slightly modified version of Miller and Friesen's (1982) five-item dynamism scale. The altered response format (unipolar format instead of the original bipolar format) was adopted from Green et al. (2008) and has also been used by other researchers such as Anderson et al. (2009). Higher scores reflect environments that are dynamic whereas lower scores reflect more stable environments. After scale purification, the final scale consisted of three items measuring the difficulty of forecasting product demand, customer needs and wants, and the general level of instability in the industry resulting, for example, from economic forces.

In addition to dynamism, Articles 2 and 3 utilized an ***environmental hostility*** measure to control for the environment's effects on the hypothesized relationships. Controlling for hostility was seen as important in these two articles as it can be expected that in a very hostile environment, firms' profitability levels are lower than in a more benign environment, and this would be reflected in the objective profit and loss measures that these two articles utilized. The hostility scale was originally developed by Khandwalla (1977). In line with the dynamism measure, a slightly modified (unipolar instead of bipolar) scale validated by Green et al. (2008) was used to measure the level of hostility. The four items measure the levels of competitive intensity, customer loyalty, profit margins, and the possibility of price wars in the industry. The higher the score, the more hostile the environment. In both cases (hostility and dynamism), the respondents' ratings on the items belonging to the scale were averaged to arrive at a single environmental dynamism or hostility index for each firm.

Firm performance is measured in Articles 2 and 5 by self-reported performance measures. A subjective measure of performance was chosen over objective data for several reasons. First, in 2010 when Article 2 was primarily written, objective

financial information for the data collection year (2009) was available for only half of the companies. Thus, because the significant amount of missing information would have weakened the results, the decision was made to use self-reported measures. SMEs, from which most of the data were collected, are often very reluctant to provide "hard" financial data (e.g., Covin, Prescott & Slevin 1990a). It was therefore felt that that more complete financial information could be obtained with a subjective measure that did not directly ask respondents to report their financial figures but instead to measure their satisfaction with performance. Furthermore, several studies (e.g., Dess & Robinson 1984; Venkatraman & Ramanujam 1987) have found that perceptual and objectively determined measures are highly correlated. Indeed, the correlation between subjective and objective measures has been shown to be between 0.4 and 0.6 (Wall, Michie, Patterson, Wood, Sheehan, Clegg & West 2004), with correlations as high as 0.81 achieved by more specific subjective constructs (Guthrie 2001; Richard, Devinney, Yip & Johnson 2009). Thus, it is commonly agreed that it is appropriate to use subjective measures where objective data are unavailable.

Article 2 employed the self-reported profit performance measure first developed by Gupta and Govindarajan (1984) and later validated and modified by Covin et al. (1990a). Respondents were asked to rate both their satisfaction against specific financial performance criteria and the importance of the measure for their firm's performance. The criteria included six items: cash flow, return on shareholders' equity, gross profit margin, net profit from operations, profit to sales ratio, and return on investments, which together represent a firm´s profit performance. To determine the weighted average performance score for each company, importance and satisfaction scores were multiplied. A statistically significant correlation between weighted profit performance scores and return on investment in 2007 was found in the validation analysis, indicating that the subjective performance measure used was reliable. In Article 5, firm performance was measured by four items capturing the CEO´s satisfaction with a firm´s overall performance by the measure developed by Gibson and Birkinshaw (2004).

Despite the relative strengths of subjective performance in SME research, several studies highlight the benefits of and need for objective performance indicators (e.g., Stam & Elfring 2008; Wiklund & Shepherd 2005). Indeed, Dess and Robinson (1984: 270) conclude that "where accurate objective measures of performance (particularly economic) are available, their use is strongly supported and encouraged". The reason is that financial performance measures do not suffer from social desirability bias and by utilizing objective performance measures instead of self-reported measures of performance, researchers can avoid common method bias. In addition, the use of unified financial performance measures, such as sales

growth, improves the comparability of research results between studies. Furthermore, much of the body of work recommending using subjective measures of performance stems from the various institutional environments where reliable and comparable objective measures are not available. In Finland, financial performance data is publicly available for private firms and the information is reliable. In general, the tax planning opportunities available to Finnish SMEs are very limited, which also improves the reliability of financial indicators. From a more practical viewpoint, financial management in SMEs plays a critical role in their success and survival (e.g., Collis & Jarvis 2002) and using financial measures that are in the interest of the SME management and that they are familiar with, increases the utility and practicality of the research findings. In light of the above arguments, it seems safe to state that Articles 3 and 4 utilized objective performance data.

During 2011 and 2012, when Articles 3 and 4 were written, objective performance data for the companies involved became available from the Orbis database. This database contains comprehensive information on companies' financial data worldwide in a standardized format. Article 3 subscribes to the view that firm performance is multidimensional in nature (Combs, Crook & Shook 2005), and it is therefore advantageous to integrate different dimensions of performance in empirical studies, especially when researching EO (Lumpkin & Dess 1996; Wiklund & Shepherd 2005). Therefore, to capture different aspects of SME performance, both profit and growth measures were used as dependent variables in Article 3. Profitability was measured by profit or loss before tax in 2010, in thousands of Euros. Growth was measured using sales growth as the absolute increase in turnover between 2008 and 2010. According to Ling, Simsek, Lubatkin, & Veiga (2008) sales growth is a very reliable measure of SME performance, particularly because privately held firms have no tax-based incentive to minimize reported sales. Following Lane et al. (2001), past performance was included as a control variable in the tested models (see also Audia, Locke & Smith 2000; Lant 1992; Miller & Chen 1994). For the profitability model, profit or loss before tax in 2008 was used as a measure of past performance. For the growth model, absolute difference in sales growth 2007–2008 was used as a measure of past performance. In addition, studies that examine direct learning such as a firm's learning from its own experiences (Schwab 2007) and, in particular, trial-and-error learning (Baum & Dahlin 2007; Greve 2003; Tsang 2002; Van de Ven & Polley 1992), have suggested that learning occurs after performance feedback. These arguments would suggest that learning occurs when organizations change their subsequent behavior in response to prior performance outcomes. To test whether past performance has an impact on learning, the two past performance variables (past profitability and past sales growth) were included as control variables in the tested strategic learn-

ing models. Article 4 concentrated on explaining firm profitability using a measure of profit or loss before tax in 2010. Article 4 also controlled for past profitability using profit or loss in 2008.

To conclude, given the unique strengths and weaknesses of objective and subjective performance measures, the present study, by employing both types of measures, is able to draw more valid and comprehensive conclusions about the performance effects of strategic learning than if only one approach had been adopted.

3.6 Data analysis

Data analysis is presented more in detail in each article. An overview of the analysis is presented in the following section and summarized in Table 1. Articles 1 and 2 are based on data (n=206) that included also the largest IT services companies. It is estimated that the 10 largest IT service companies account for roughly one-third of the revenue for the entire sector (Rönkkö & Peltonen 2012). Because of their importance to the Finnish economy and software industry at large, the two articles examined strategic learning among all sizes of software companies, including also the largest firms in the sector. To account for any size related effects, Article 2 used firm size as a control variable in the tested models. Due to the nature of Article 1, the tested measurement model did not include control variables.

Articles 3, 4, and 5 concentrate on data from 182 SMEs. The role of software SMEs in Finland has become particularly important after the decline of Nokia, as they have, for example, hired former Nokia and subcontractor employees that recently entered the job market (Rönkkö & Peltonen 2012). This focus allowed more detailed conclusions to be drawn for this specific context, specifically, the question of whether resource-scarce SMEs can benefit from strategic planning, EO, and strategic learning to be addressed. This also allowed the influence of possible confounding factors present in large organizations to be minimized. The definitional criteria of SMEs (less than 500 employees) is based on the U.S. government's classification of SMEs and was chosen because of the wide use of this classification in prior EO and learning research (e.g., Kreiser et al. 2010), thus enabling future studies to better compare the results of this study to those previously completed.

3.6.1 Analysis methods

Following Hinkin´s (1995) scale development procedure, Article 1 employed both explorative factor analysis (EFA) and confirmatory factor analysis (CFA) as the main analysis methods to construct and validate measures of strategic learning. The aim of these analyses was to examine the stability of the factor structure and provide information to facilitate the refinement of the new measure. The exploratory factor analysis was conducted using SPSS software and principal axis factoring. Because the different strategic learning dimensions were expected to correlate with each other, the Promax rotation method was chosen because its use is recommended when factors are assumed to correlate. The use of the oblique rotation method is advised, especially in the social sciences since behavior rarely functions independently, as it theoretically produces more accurate and more reproducible solutions (Thurston 1947). Confirmatory factor analysis was conducted with LISREL 8.80. Fit analysis was conducted using the Maximum Likelihood estimation. Considering that the items are non-normally distributed, all the analyses were also conducted using the Robust Maximum Likelihood technique developed by Satorra and Bentler (1988). However, following the recommendation of Curran, West, and Finch (1996), the Maximum Likelihood estimation was applied as a default method to determine whether similar results were obtained in the current study.

Article 2 employs a non-parametric approach to structural equation modeling, namely partial least squares (PLS) analysis (Chin, 1998). The PLS technique has enjoyed increasing popularity as a key multivariate analysis method in various research disciplines including strategic management (Hair, Ringle & Sarstedt 2013; Hulland 1999). PLS was chosen instead of the more traditional covariance-based SEM methods for three reasons. First, PLS is advantageous when sample sizes are small, providing more robust estimations and statistical power (Reinartz, Haenlein & Henseler 2009). Second, PLS allows the modeling of latent variables and simultaneous assessment of both measurement and structural models (Chin 1998). Third, it is considered one of the most suitable techniques when hypothesis testing is exploratory in nature rather than confirmatory (Hair, Sarstedt, Ringle & Mena 2012). The PLS path modeling analyses were performed using SmartPLS 2.0 software (Ringle, Wende & Will 2005), with a path weighting scheme.

Hierarchical ordinary least squares (OLS) regression was chosen for data analysis in Articles 3 and 4. The main reason for choosing OLS regression was the expectation of non-linearity in the studied relationships. Unlike regression, that has established methods for handling non-linear relationships, structural equation modeling has no established tool for handling non-linear relationships (Gefen,

Straub & Boudreau 2000). Researchers have increasingly promoted the use of confidence intervals as the preferred inferential statistical method (e.g., Cashen & Geiger 2004; Nickerson 2000), especially when interpreting interaction and non-linear terms. As noted by Brambor, Clark, and Golder (2006: 74) "it is perfectly possible for the marginal effect of X on Y to be significant for the substantively relevant values of the modifying variable Z even if the coefficient on the interaction term is insignificant." This suggests that interaction coefficients and the coefficients of the variables constituting the interaction (direct effects) cannot be interpreted as such when the interacting variables are continuous and do not include zero in the permissible range as is the case with non-linear and interaction terms applied in Articles 3 and 4. Following Brambor et al.'s (2006) advice, Articles 3 and 4 computed the marginal effect of the explanatory variable at various values of the moderator(s) and plotted them in figures at selected values to illustrate the interactions to provide further evidence on the study findings. In the figures in Articles 3 and 4, the confidence interval area signals 95% certainty for the line and can be used to determine when the marginal effect is significant. Simply put, when the confidence interval area is entirely on one side of the horizontal zero line, we can say with 95% confidence that the true value of the parameter is in our confidence interval and thus that the interaction effect is significant and positive (or negative, depending on the direction of the line). The analyses were performed using Stata 12 software.

Article 5 applies non-hierarchical *k*-means cluster analysis to identify and compare groups of companies with different strategic learning levels. *K*-means cluster analysis minimizes the variance within each cluster while maximizing between group variance (Punj & Stewart 1983). The non-hierarchical clustering method was chosen as it allows observations to switch cluster membership and is less sensitive to outliers than hierarchical methods (Ketchen & Shook 1996; Punj & Stewart 1983). To determine whether the identified strategic learning clusters vary in terms of performance, one-way ANOVA was conducted. Tukey´s post hoc analysis was used to test which clusters statistically significantly differ from each other in terms of performance. The analyses were performed using SPSS version 20.

Table 1. Research characteristics and methodologies used in the articles

Article	Main method of analysis	Program	Data used	Time frame	Data source	Constructs	Controls
Article 1	Confirmatory factor analysis (CFA), Exploratory factor analysis (EFA)	LISREL 8.80	All firms (n=206)	2009	Questionnaire	Strategic learning and its dimensions (creation, distribution, interpretation, and implementation)	n.a.
Article 2	Partial Least Squares (PLS)	SmartPLS 2.0	All firms (n=206)	2009	Questionnaire, secondary database	IV = Exploration and exploitation strategies Mediator = Strategic learning DV = Profit performance	Environmental dynamism, firm age[1], firm size[1], slack resources[1]
Article 3	Ordinary least squares regression (OLS)	Stata12	SMEs (n=182)	2007-2010	Questionnaire, secondary database	IV/DV=EO/Strategic learning Moderators=Firm age[1] and size[1] DV= Profitability[1] and sales growth[1]	Environmental dynamism and hostility, firm age[1], firm size[1], slack resources[1], number of patents[1], past profitability[1], past sales growth[1]
Article 4	Ordinary least squares regression (OLS)	Stata12	SMEs (n=182)	2008-2010	Questionnaire, secondary database	IV = Strategic planning Moderator = Strategic learning DV = Profit performance[1]	Environmental dynamism and hostility, firm age[1], firm size[1], slack resources[1], number of patents[1], past profitability[1]
Article 5	Cluster analysis, ANOVA	SPSS 20	SMEs (n=182); interviews; archival data	2009	Questionnaire, secondary sources, interviews	Strategic learning divided into two theoretical dimensions of exploratory and exploitative learning and CEOs´ satisfaction with performance	n.a.

[1]From Orbis secondary database; IV=independent variable; DV=dependent variable

3.6 Quality assessments: reliability and validity

Among the key concerns about construct measurement are reliability (consistency) and validity (accuracy). Reliability is a prerequisite for validity (Nunnally 1967) and is concerned with the repeatability of a study's findings. However, although a research instrument might be repeatable and internally consistent and, therefore, reliable; the instrument itself may not be valid. Therefore, researchers should always establish the validity of the measures used. Validity refers to the extent to which a scale or set of measures accurately represents the concept of interest (Hair, Black, Babin & Anderson 2010) or, in other words, whether the measurements are actually measuring what they are intended to measure. Four forms of validity are often distinguished and are particularly important for this study: construct validity, content validity, external validity, and statistical validity (e.g., Nunnally 1967; Schriesheim, Powers, Scandura, Gardiner & Lankau 1993). In the next section, a discussion on method quality related to both reliability and validity is provided.

3.6.1 Reliability

According to Nunnally (1967: 206), reliability is "the extent to which [measurements] are repeatable and that any random influence which tends to make measurements different from occasion to occasion is a source of measurement error." In quantitative research, reliability most often refers to the stability of the measures used in the study, or their internal consistency. Internal consistency is the degree to which multiple items measure the same theoretical construct, or degree of interrelatedness (Cortina 1993). The most widely used estimator of test and scale reliability in the social sciences is the Cronbach's coefficient alpha (or Cronbach's alpha) (Cortina 1993; Peterson & Kim 2013). Analysis of Cronbach's alpha values was used in Articles 1–4.

According to the meta-analysis by Peterson (1994), the acceptable alpha value limit set by prior studies ranges from 0.95 to 0.5. The original suggestion by Nunnally (1967) is that the satisfactory level of reliability is dependent on how the measure is used. According to Lance, Butts, and Michels (2006), Nunally's reliability values have often been interpreted incorrectly[5]. One reason for this could be that between the different editions of his book Psychometric Theory, Nunally changed his recommendations from 0.5–0.6 to the recommended level of 0.7 (Peterson, 1994). Furthermore, in his 1987 edition, Nunally suggested that reliability values of 0.7 or higher are sufficient when the research is at an early stage, but that in basic research a reliability value of 0.8 may not suffice. As the developed strategic learning measure is new and hence explorative, lower alpha values are considered acceptable in this dissertation. In the appended Articles 1 and 4, all the alpha values exceeded 0.7, so demonstrating an appropriate level of reliability. In Article 2, creativity-focused exploration (α: 0.64) and internally focused exploitation (α: 0.69) had recorded values lower than 0.7. However, these dimensions were part of exploration or exploitation constructs that recorded satisfactory composite reliability (CR) values, indicating that these constructs were reliable. The similar conclusion can be drawn in relation to Article 3, where the 3-item risk-taking dimension of EO has an alpha of 0.63, but analysis of the 9-item EO construct as a whole reveals that the reliability is satisfactory (α: 0.83). Together these findings suggest that alpha values might be sensitive to the number of items constituting the scale.

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[5] The author would like to thank the pre-examiner, Professor Erno Tornikoski, for challenging the author´s interpretation of alpha values and for pointing out the informative study by Lance et al. (2006).

Cronbach's alpha has been criticized as being a lower bound, hence underestimating true reliability (Peterson & Kim 2013). Thus, a popular alternative to Cronbach's alpha is composite reliability, which is usually calculated in conjunction with structural equation modeling. The advantage of CR is that it allows construct loadings or weights to vary, whereas the loadings or weights for coefficient alpha are assumed to be equal (Peterson & Kim 2013). In addition, Cronbach's alpha is sensitive to the number of items in a scale. As increasing the number of items in a scale will increase reliability values, researchers must place more stringent requirements for scales with a large number of items (Hair et al. 2010). Thus, to provide additional evidence of measurement reliability, Articles 2 and 4 reported CR values for the measurements used. CR further confirmed the measurement reliability as the values exceeded the recommended threshold of 0.6 (Bagozzi & Yi 1988). This finding is in line with the recent study by Peterson and Kim (2013) which showed that CR and Cronbach's alpha values have only a marginal difference and that the difference was relatively inconsequential for practical applications. Thus, it can be concluded that Cronbach's alpha by itself was a sufficient measure for reliability in Articles 1 and 3.

3.6.2 Validity

Construct validity is defined broadly as the extent to which operationalization measures the theoretical concept under investigation (e.g., Bagozzi, Yi & Phillips 1991; Cook & Campbell 1979). Construct validity was established in the appended articles by first ensuring that all constructs were sufficiently grounded in theory. This was done, for example, by using well-established scales from literature that have already been validated and carefully adapting them to fit the study context. As the construct of strategic learning, in its current format, had not been operationalized in previous studies, methodology logic used by Hinkin (1995) and DeVellis (2003) was closely followed when constructing the measure (for a detailed description see Article 1 and Chapter 4.1). Furthermore, to ensure ***face validity***, a non-statistical type of validity based on subjective assessment of measurement and its ability to cover the concept it aims to measure, a panel of ten expert judges assessed the correspondence between items (strategic learning, exploration, and exploitation) and their concepts through ratings. These procedures were also used to establish the ***content validity*** of the study, the degree of correspondence between the items selected, to constitute the scale and its conceptual definition (Hair et al. 2010).

Construct validity was further addressed against its two sub-criteria of ***convergent*** and ***discriminant validity***. Convergent validity exists when a significant correla-

tion is obtained among the variables that form part of the construct being studied. In the appended articles, convergent validity was established as significant correlations were detected among the subscales that were intended to measure the latent construct to which they were assigned (for an example see Article 1). According to Bagozzi et al. (1991), factor analysis is a powerful method for addressing construct validity. Therefore, both exploratory (Article 1, 2, and 4) and confirmatory factor analyses (Article 1 and 4) were used to ensure that all items loaded on their intended factor and that the loadings were statistically significant. These analyses indicated both convergent and discriminant validity of the measuring instruments. In addition, Article 2 reported average variance extracted (AVE) value, which indicates how much variation in an item is explained by latent factors. This test indicated sufficient convergent validity of the measures. Discriminant validity, on the other hand, implies that the scale measures a single fundamental construct, as opposed to multiple constructs (Jerez-Gómez et al. 2005). In the appended articles, the correlations among different measures were relatively low, demonstrating that the scales are sufficiently different from each other. Furthermore, Article 2 applied a more rigorous test of convergent validity by comparing AVE values for any two constructs with the square of the correlation estimate between these two constructs. This test showed that the variance-extracted estimate was greater than the squared correlation estimate for all the studied measures, thus providing additional evidence of discriminant validity. Last, Articles 3 and 4 considered the problem of multicollinearity in regression analysis, which is closely related to the issue of discriminant validity. The ideal situation is that the independent variables are highly correlated with the dependent variable, but with little correlation among themselves (Hair et al. 2010). Multicollinearity was identified by examining the correlation between independent variables (which should be less than 0.9) and calculating the variance inflation factors for the different regression models. Both of these analysis confirmed that multicollinearity did not affect the regression results.

External validity refers to the generalizability of the results of a study to more general populations. This type of validity can be assessed by evaluating whether the sample population represents the entire population, and also whether the sampling method is acceptable. As this study was conducted solely among Finnish software companies, the generalizability of the findings is restricted to this domain. However, the sample can be assumed to be generalizable to the entire population of Finnish software companies as the study did not find major irregularities between respondent and non-respondent firms (except a marginal difference in firm age). As generalizability depends largely on the sample size in relation to the population, the generalizability of this study was enhanced by calling and motivating non-respondent CEOs to answer the survey.

Statistical conclusion validity aims to answer the question of "was the original statistical inference correct?" (Maxwell & Delaney 2004). In other words, did the researcher reach the correct conclusion about whether or not the relationship exists or about the magnitude of the relationship? Statistical conclusion validity relates to two types of errors: type I and type II errors. A type I error results from a situation in which a researcher concludes that a relationship exists between the study variables, when in fact there is no relationship (a tendency to be overly optimistic) and a type II error results from a situation in which a researcher concludes that there is no relationship, when one exists (a tendency to be overly cautious). In many cases, type I and II errors are caused by small sample sizes and resultant low statistical power (Cohen 1988). Different statistical tests require different sample sizes; for example, a sample size of 200 is considered fair for factor analysis (Comrey & Lee 1992), whereas a sample of 50 can be adequate for correlation and regression analysis (Van Voorhis & Morgan 2007). Thus, in this dissertation, the sample sizes of 206 and 182 can be considered adequate for achieving statistical power for the tests conducted. Low power can also result from high variability caused by the diversity of cases under study (Maxwell & Delaney 2004). To control for high variability caused by individual differences, several control variables were introduced to increase statistical validity. In addition, to improve the validity of the findings, many of the attached papers (see especially Articles 3 and 4) included several robustness checks, where the research model is compared to alternative competing models. To avoid type I and II errors, in addition to the conventional comparison of R^2 increase, a method usually utilized in management studies, but increasingly argued to be inadequate and even misleading by statisticians (see Brambor et al. 2006), Articles 3 and 4 provided additional evidence on the significance of the findings by interpreting the significant marginal effects.

In addition, common method variance (i.e., variance that originates from the measurement method rather than from the actual phenomena of interest) is a potential problem, especially when independent and dependent variables are collected within the same survey, causing type I and type II errors (Podsakoff, MacKenzie, Lee & Podsakoff 2003). To detect whether common method variance affected the true relationships among constructs by artificially inflating item-level relationships, several post hoc tests were conducted. According to Podsakoff et al. (2003), different tests can be used to a) detect the extent of common method variance and b) control its effect on the results. First, the most commonly used test for detecting common method variance, namely Harman's one-factor test, was conducted for the two different samples used in the articles (the results of these tests are reported in the attached Articles 1–4). Second, a confirmatory factor analysis was conducted to analyze whether the model fit improves when the complexity of

the research model increases (Iverson & Maguire 2000; Korsgaard & Roberson 1995; McFarlin & Sweeney 1992). Third, a marker variable approach was used in Article 2 to control for the possible effects of common method variance on the results (e.g., Richardson, Simmering & Sturman 2009; Williams, Hartman & Cavazotte 2010; Ylitalo 2009). A marker variable is theoretically unrelated to substantive variables in a study and its expected correlation with these substantive variables is ideally 0 (Williams et al. 2010). In Article 2, environmental dynamism was chosen as a marker variable as it had the lowest correlation with the other studied variables. Together, these tests confirmed that any impact of common method variance was minimal and did not create bias in the final results. In addition, in Articles 3 and 4, the presence of common method variance was minimized by collecting data for dependent variables and for most of the control variables from the secondary database, Orbis. In sum, it can be concluded the data used had enough power to produce significant conclusions and the responses are free from bias, providing evidence of statistical conclusion validity.

4 ARTICLE SUMMARIES

The main body of the dissertation consists of five articles, each of which addresses the strategic learning in Finnish software companies from a different perspective. A summary of each essay is presented below to provide a short introduction to the main literature, data, findings and contributions of the essays to the overall dissertation. After each of the summaries, an Illustration of the focus of the paper is provided. The complete articles are provided in Part II of the dissertation.

4.1 Unmasking the capability of strategic learning: a validation study

Paper 1, "Unmasking the capability of strategic learning: a validation study", delineates a framework and measurement tool for assessing strategic learning. Although the understanding of strategic-level learning has attracted increased attention from organizational learning and strategic management scholars, the literature lacks a comprehensive tool to assess higher-level organizational learning. To address this gap, the aim of the first article is to develop a measurement tool for strategic learning. A central tenet of this paper is its aim to identify the distinct subprocesses that make up the strategic learning construct and to generate scale items that can be used to measure the level of strategic learning in an organization. Applying multiple methods to recognize and validate the different subprocesses of strategic learning enables a deeper insight into the multidimensional nature of this construct to be obtained.

The measurement tool was developed by utilizing a systematic measurement tool development process outlined by Hinkin (1995) and complemented by DeVellis (2003) to ensure validity and reliability. The process applied in this study is described in Figure 3 (adapted from Yi 2009). The first stage was to conduct a review of the literature to create theoretical definitions of strategic learning and its subprocesses. The theoretical framework for strategic learning builds on Huber's (1991) information-processing view of organizational learning (Huber 1991) and on two complementary strategic learning models by Kuwada (1998) and Thomas et al (2001). Second, guided by the theoretical definitions and framework, a set of items to capture each subprocess was collected from previously published studies that appeared to offer suitable indicators for assessing the different subprocesses of strategic learning. These items when needed were modified to better reflect the strategic nature of the learning. At the end of this step, a battery of 24 prospective scale items was developed. Two approaches were utilized to establish whether the instrument created measured the phenomenon of interest (i.e., to establish content

validity): the item-sorting process suggested by Hinkin (1995), that is very similar to Schriesheim et al.'s (1993) Q-sort method; and the judge panel method for calculating the content validity ratio of each item in the instrument (Lawshe 1975; Polit, Beck & Owen 2007). Based on the feedback from the judging panel, we refined some of the items, but none of them warranted removal. Third, to establish construct validity in the fourth stage, survey data from 206 Finnish software companies were collected. Fourth, after the data collection the resulting scale was purified by conducting exploratory factor analysis, and that necessitated the removal of five items. To verify the factor structure suggested by exploratory factor analysis, confirmatory factor analysis was conducted. The final strategic learning scale comprises 19 items and the data confirms that strategic learning is manifested through the subprocesses of strategic knowledge creation, distribution, interpretation, and implementation. In general, the results demonstrate the satisfactory reliability and validity of the developed measurement model, thus enabling its use in further studies.

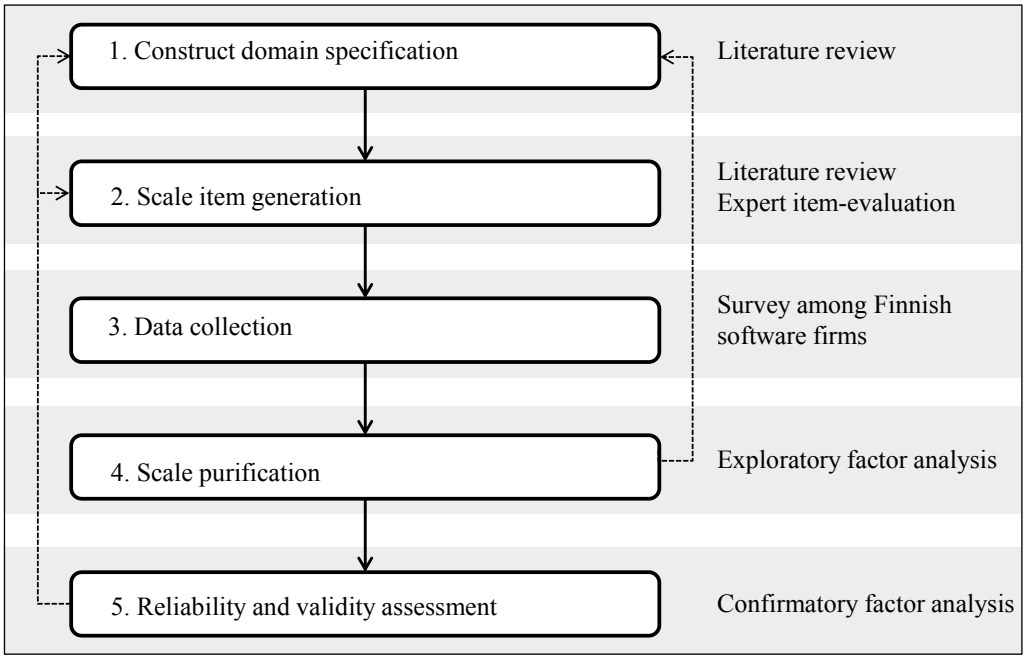

Figure 3. Procedures for developing a measure of strategic learning (adapted from Yi 2009)

The developed measurement tool increases our understanding of the emergent nature of strategy-making in dynamic business environments by highlighting the important role of learning processes in successful strategy formation. The use of systematic and thorough methodological techniques to develop an instrument to test, measure, and validate those subprocesses of learning that constitute a com-

mon body of knowledge in this area suggests that the developed instrument could prove to be a valuable tool for future research in this area. In addition, managers can use the developed tool to identify potential areas for improvement, highlighting organizational development efforts to enhance collective strategic learning. Paper 1 serves as a starting point for the subsequent four articles by providing a solid ground for the use of strategic learning measure in empirical models researching its antecedents and effects.

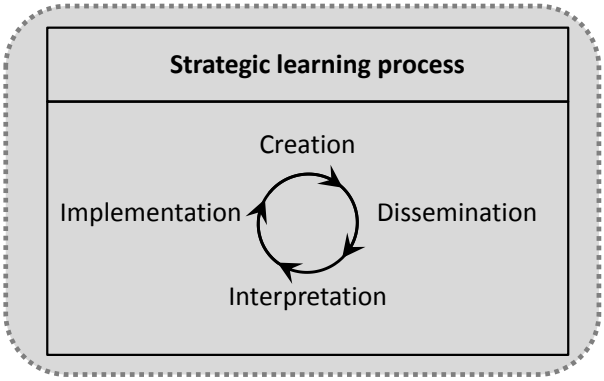

Figure 4. Illustration of the focus in Paper 1

4.2 Exploration, exploitation, performance and the mediating role of strategic learning: escaping the exploitation trap

Paper 2, "Exploration, exploitation, performance and the mediating role of strategic learning: escaping the exploitation trap", focused on whether strategic learning mediates the performance effects of strategic entrepreneurship, that is, exploration and exploitation strategies. Organizational ambidexterity literature (e.g., Gibson & Birkinshaw 2004; He & Wong 2004; O'Reilly & Tushman 2008) debates the performance effects of the balanced application of entrepreneurial behaviors of exploration and exploitation. The aim of this second study was to contribute to the ambidexterity literature by introducing strategic learning as a mediating factor that enables firms to capture and apply strategic knowledge gained from both exploration and exploitation strategies. By doing this, this study aims to shed light on the question raised by Bierly and Daly (2007: 511) "Are there particular human resource practices and organizational processes that not only facilitate exploration and exploitation, but also help provide synergistic benefits?" The core argument in the second article is that strategic learning allows a firm to evaluate, distribute, and integrate both exploratory and exploitative knowledge in such

a way that connects the organizational units and the entire organization can use and act on new knowledge to achieve common organizational goals.

Findings from a study of 206 Finnish software firms provide general support for this argument and its associated hypotheses. The partial least squares (PLS) analysis confirms that the relationships between exploration strategy and profit performance, as well as between exploitation strategy and profit performance, are fully mediated by strategic learning. Although organizational ambidexterity increasingly features in the scholarly literature and present studies suggest different strategies to balance exploration and exploitation, the literature offers relatively little on how to allocate resources between these two behaviors. To address this gap, this article tests the interaction of exploration and exploitation strategies with respect to their influence on strategic learning. The findings confirm this hypothesis by indicating that exploitation negatively moderates the relationship between exploration and strategic learning. This finding calls for managers to make careful strategic decisions on the activities on which they focus. By building on the measurement developed in Article 1, this second article contributes to the overall research framework by introducing exploration and exploitation as antecedents to strategic learning and suggesting that it has an important mediating role in organizations. Furthermore, this study paves the way for paper 3 by providing initial evidence that an explorative strategy that can be linked to entrepreneurial orientation needs learning to deliver its full potential.

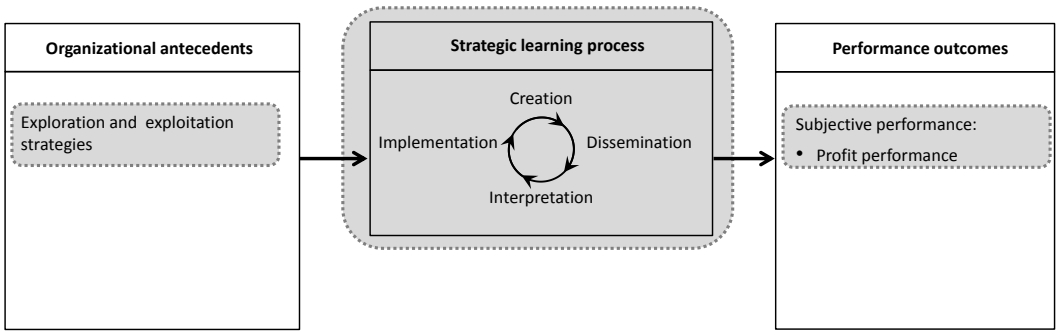

Figure 5. Illustration of the focus in Paper 2

4.3 Fighting inertia: Benefits of entrepreneurial orientation and strategic learning for large and mature firms

Paper 3, "Fighting Inertia: Benefits of Entrepreneurial Orientation and Strategic Learning for Large and Mature Firms", investigated the relationships between EO and strategic learning and strategic learning and performance and suggested that firm age and size moderates both of these relationships. Several recent EO studies have connected EO to strategic learning (e.g., Anderson et al. 2009; Covin et al. 2006; Green et al.; Mueller et al. 2012) but have offered mixed evidence on the relationship between these two concepts. For example, concentrating on learning from strategic mistakes in US manufacturing industry, Anderson et al., (2009) found that EO is an important antecedent of strategic learning. However, the effect they found was weaker than they anticipated. Using the same dataset, Covin et al., (2006) and Mueller et al., (2012) suggested that strategic learning moderates the relationship between entrepreneurial behaviors and performance but contrary to their hypotheses they found that the moderation was negative. Taken together, these mixed findings indicate that there are potential boundary conditions and contingencies under which EO can influence higher-level learning and subsequently, company performance.

Building on this notion, Paper 3 ties into a set of inertia arguments discussed in the EO literature (e.g., Wales et al. 2011) suggesting that while inertia brought by firm age and size as such may be useful in securing business-as-usual operations it is problematic in situations where organizational change is required and radically new competencies need to be learned. Following on this argument, it is first suggested that inertia leads larger and more established software companies to require higher levels of entrepreneurial orientation in order to overcome what are termed *learning thresholds*. Those prevent companies from engaging in the strategic learning central to improving performance. The argument behind this hypothesis is that beyond a certain threshold, the inertial forces give way to strategic learning and strategic changes can take place. This hypothesis is tested by examining whether the relationship between EO and strategic learning for larger and more established companies is more non-linear than for smaller and younger companies. The paper goes on to establish that it is particularly large and more established companies that benefit from strategic-level learning in terms of profitability and growth as they face market and competitive pressure to renew their strategies (Huff, Huff & Thomas 1992).

The results confirmed that larger and more established firms in the software sector exhibit a more curvilinear relationship between EO and SL but once the inertia

is defeated they benefit more from strategic learning processes than their younger and smaller counterparts. More specifically, the relationship in large and more established firms between EO and strategic learning is quadratic rather than linear. The findings outline how the structural and resource rigidities in larger and established organizations can be reduced by the strategic learning effects created when key organizational decision-makers strive for innovativeness, risk-taking and proactivity. The results also confirm that there are significant moderation effects on performance arising from the relationships between strategic learning and age and strategic learning and size both in terms of growth and profit when measured objectively. In other words, larger and more established companies benefit more from strategic learning than their smaller and younger counterparts. While somewhat negative effects in younger companies were also found, the results challenge some of the orthodox views that revolve around the premise that learning is always good. New small entrants are more likely find that investing in strategic learning processes could be a waste of resources, as they should be launching with market offerings and a strategy that is current and valid for the marketplace. If they are not, they are obvious candidates for early failure.

The main contribution of the paper is that it elaborates upon a previously unexploited inertia-based framework for understanding the EO-learning relationship, and illustrates how larger and established companies could improve performance. Understanding the renewal mechanism applied by established firms is obviously very important for the success of a business once it has progressed beyond its start-up phases. The paper is unique in revealing the relationship between EO and strategic learning to be non-linear and subsequently testing that relationship. The results offer an interesting slant on the current wisdom and hence could inspire researchers interested in EO and strategic learning. Furthermore, this study contributes to EO and learning literatures both of which are not over endowed with longitudinal studies applying objective pre- and post-performance data in their models, informed by a unique dataset of Finnish IT companies covering the three-year period 2007–2010. On a different note, the model anticipated not finding a direct relationship between EO and objective performance when both were measured in terms of profit and growth. Hence, the study could also be contributive owing to this alternative approach offered to the growing group of EO researchers interested in alternative models of EO where performance is not influenced directly (see Wiklund and Shepherd, 2011). In addition, the strategic learning construct is novel and therefore could prove attractive to numerous researchers for use in further EO studies.

As part of the overarching research model in this dissertation, Article 3 deepens our understanding of strategic learning based on Article 1 and 2 and also paves

the way to Article 4 by suggesting that such learning capabilities might be a victim of inertial forces and therefore firm age and size are important factors when learning is concerned. Furthermore, this article is an important extension to Article 2 as it provides evidence of the performance effects of strategic learning on objective performance indicators including both profitability and sales growth measures.

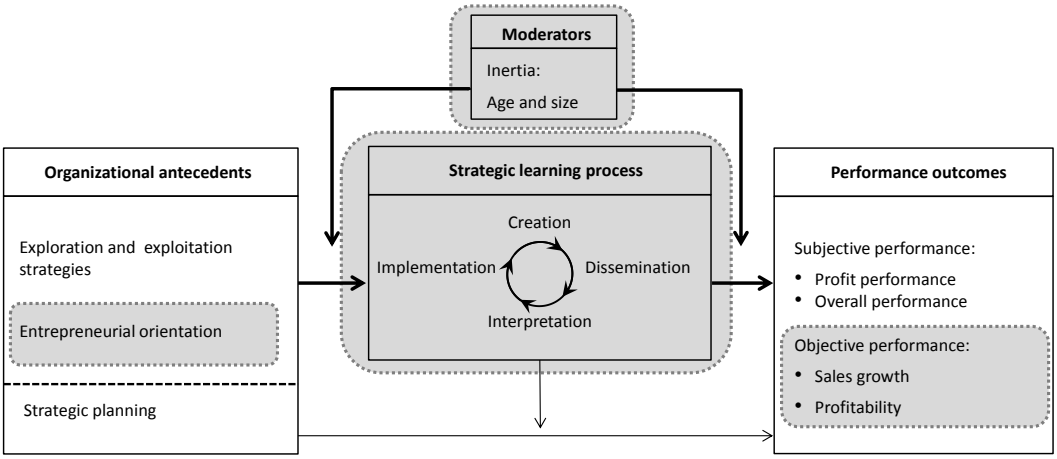

Figure 6. Illustration of the focus in Paper 3

4.4 Stretching strategic learning to the limit: The interaction between strategic planning and learning

Paper 4 "Stretching strategic learning to the limit: The Interaction between strategic planning and learning", explores the relationship between formal strategic planning and strategic learning and the performance outcomes of their interaction. One of the emerging issues in strategic process literature is the debate concerning the performance effects of the mixed strategy models (e.g., Andersen 2004; Hart & Banbury 1994) that underline the interplay between formal strategic planning (Ansoff 1991; Ansoff 1994) and adaptive strategy-making (Mintzberg & Waters 1985). The aim of the fourth article was to contribute to the strategic planning literature by introducing strategic learning as a moderating factor that enables firms to implement and capitalize on planned strategies and improve their profit performance. The role of strategy implementation has largely been overlooked in prior research, and strategy process research has hardly seen any application of the dynamic capability concept (Hutzschenreuter & Kleindienst 2006). Strategic learning can thus help to close the gap between strategic planning and firm performance. The study further advances the dynamic capability perspective by theo-

rizing that the limited nature of strategic learning capabilities constrain the capability of a firm's personnel to adapt to changing strategic circumstances and implement new strategies. The study discusses information-processing limits and cognitive biases as factors underlying the limited nature of dynamic capabilities.

Hierarchical regression analysis was utilized to examine the whether strategic learning has a non-linear moderating effect on the strategic planning–performance relationship as observed within 182 Finnish software firms. Findings indicate that strategic learning has an inverted U-shaped moderating effect on the strategy–performance relationship, confirming the hypothesis. This article concludes with a discussion on the characteristics of dynamic capabilities and the restrictions in their use in the planning process. Considering the overall research framework in Figure 7, this article provides a thorough analysis and empirical evidence of the limited nature of strategic learning capabilities that was hinted at in Articles 2 and 3. The article contributes to the overall research framework by providing insights about the more complex relationships involved in strategic learning and the potential moderating effect it has in the formal planning process. This article also confirms Mintzberg and Waters's (1985) notion that winning strategies are viable combinations of emergent and planned strategies. Consequently, the article also highlights the role of strategic learning in organizations that rely on strategic planning.

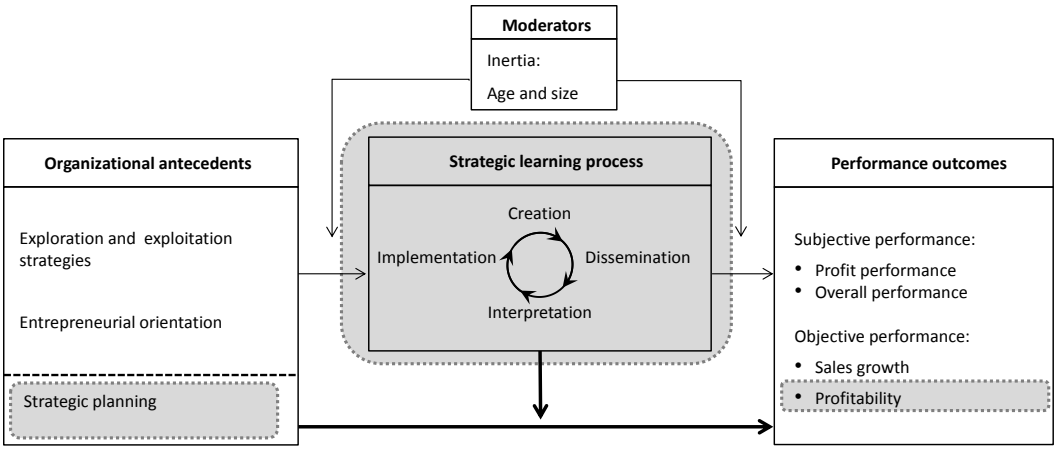

Figure 7. Illustration of the focus in Paper 4

4.5 Strategic learning for agile maneuvering in high technology SMEs

Paper 5 "Strategic Learning for Agile Maneuvering in High Technology SMEs" is the last paper of the research project and differs from the other papers in its managerial approach. The aim of the paper was to apply the strategic learning model in an SME context and to elicit the practices that Finnish software SMEs use to facilitate successful strategic learning. The paper was written for inclusion in a book intended for SME managers and practitioners that investigates strategic management in small and medium-sized enterprises. The motivation was to contribute to the limited research on SME learning (e.g., Zahra et al. 2006) but also to provide SME management with practical suggestions of ways to manage strategic learning in SMEs.

Starting with a cluster analysis, the study results showed that Finnish software SMEs can be divided into three clusters according to the level of strategic learning and that these three clusters differ in terms of the CEO's satisfaction with the firm's performance. The first cluster in which the strategic learning level is high and the CEO is satisfied with the overall performance of the firm is logically labeled "strategic learners". Those companies belonging to the middle cluster (i.e., moderate strategic leaning and performance) are called "incrementalists". The last cluster captures firms with low learning and performance levels referred to as "trapped", indicating that these firms are struggling to build a learning organization and benefit from its outcomes.

In order to elicit the practices used by software SMEs to foster learning, the study explores four innovative and promising Finnish software startups. The best practices are collected from various sources including newspaper articles, company webpages, academic articles and interviews with the entrepreneurs. The paper concludes by summarizing the practices under five main suggestion heads that SME leaders might consider when aiming to facilitate strategic learning. The first best practice element relates to how the work is organized in the firm. The case examples showed that organizing work around small and autonomous entrepreneurial teams fosters many of the subprocesses of strategic learning simultaneously. For strategic knowledge creation, the explorative search for new ideas and knowledge with strategic value can be promoted by encouraging employees to explore beyond their current work tasks although this could involve risk-taking. For many software SMEs operating with scant resources, effective trial-and-error learning is a prerequisite of survival. Management of such firms should therefore build an open atmosphere where the lessons learned from failures can be openly discussed. A participative leadership style and organic organization structure were

also found to be factors facilitating strategic learning in software firms. Having a shared purpose and leading by establishing simple guidelines helped the example firms to achieve agility and a culture of openness and learning.

By applying the managerial approach, this practice-oriented paper sheds light on the strategic learning practices that the other four papers were not able to capture owing to their research-oriented focus. Thus, this paper, although only a very general presentation of management practices aimed at creating strategic learning, adds a deeper and more practical understanding of the key phenomena to the dissertation.

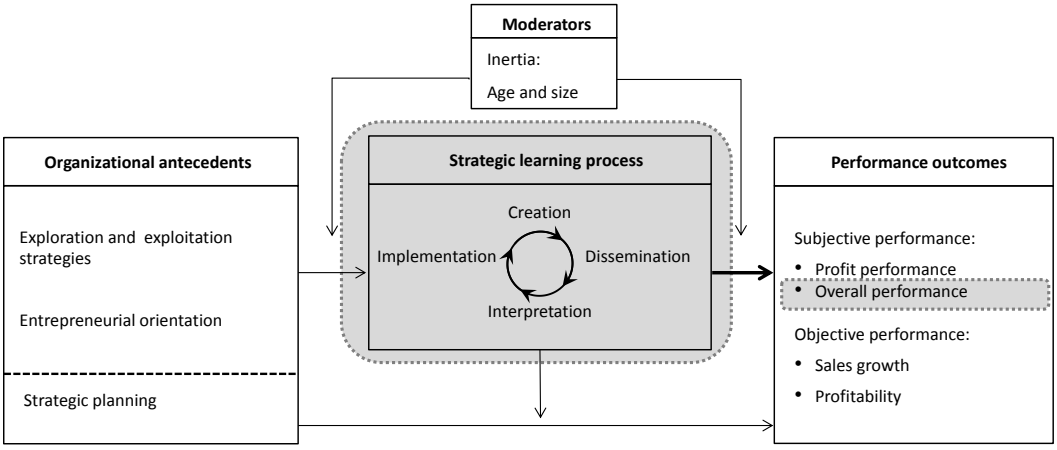

Figure 8. Illustration of the focus in Paper 5

5 DISCUSSION AND CONCLUSIONS

This chapter presents the overall conclusions and contributions based on the results from the five articles that constitute this dissertation. Alongside the key practical implications, limitations and suggestions for future research are introduced.

5.1 Theoretical contribution

The aim of this dissertation is to make a contribution to the current understanding of strategic learning as a source of competitive advantage by answering the following main research question: What is the role of strategic learning in a firm's success? This question is approached from different perspectives in five articles which each make distinct contributions and have their own research questions.

The first article seeks to answer the question: What are the components reflecting strategic learning and how can strategic learning be measured? This research question is motivated by the prevailing lack of clarity around the strategic learning concept. The prior literature also lacked a multidimensional measurement tool that could be used to assess such higher-order learning. The main contribution of this article is the identification of the four interrelated sub-processes of strategic learning. These are knowledge creation, dissemination, interpretation and implementation. Obtaining this kind of clarity on the sub-processes is critical for understanding and defining the concept of strategic learning. Compared to previous studies that have often concentrated on strategic learning from mistakes (e.g., Anderson et al. 2009; Covin et al. 2006; Green et al. 2008; Mueller et al. 2012), this study opens up the concept to other broader sources of knowledge. The second contribution is the development and validation of an instrument to measure these four distinct sub-processes of strategic learning. The developed strategic learning instrument was built on the body of knowledge in organizational learning and strategy and has undergone rigorous methodological validation. Consequently, it provides a tool that can be used to evaluate and manage strategic learning in both research and practice. The results of Article 1 have important methodological implications as well. By applying the methods such as content validity index (Polit et al. 2007) and the item-sorting process (Hinkin 1995) that are well established in other fields but rarely used in organizational learning and management studies, the study highlights the usefulness of these methods in the rigorous measurement development process. This article is important to the dissertation because it paves the way for the four subsequent studies that utilize the developed

measure to shed light on the role of strategic learning for firm performance. The paper is published in The Learning Organization.

The second article builds on two important research questions: 1.) Does strategic learning mediate the relationships between exploration strategy, exploitation strategy, and a firm's profit performance? and, 2.) Does a firm's exploitation strategy moderate the exploration-strategic learning relationship? The empirical findings of this study confirmed that in order to gain performance benefits from exploration and exploitation strategies firms need to learn strategically. Strategic learning functions as a knowledge integration mechanism that enables the entire organization to benefit and use exploratory knowledge that is often produced in more specialized tasks. In addition, the present study shows that the strategic learning process spreads and integrates exploitative knowledge in and between organizational sub-units increasing its usefulness and value. The results also revealed that exploitation moderates the relationship between exploration strategy and strategic learning. This result provides interesting initial evidence of the limits of a firm's learning capabilities. It also reminds us that although both exploration and exploitation strategies are necessary in organizations, they must be carefully managed, because too high a level of exploitation can exhaust a firm's capability to learn from explorative behaviors.

Together these results have important implications especially for strategic entrepreneurship literature (e.g., Hitt et al. 2001; Ireland et al. 2003). The study enhances the current model of strategic entrepreneurship by revealing that strategic learning is an essential part of strategic entrepreneurship and therefore should be firmly integrated into the strategic entrepreneurship domain. The strategic-level learning concept used in the study could potentially be utilized in future attempts to refine and strengthen the strategic entrepreneurship perspective. Furthermore, the basic ambidexterity theorem, the need for simultaneous opportunity-seeking and advantage-seeking behaviors and their inherent complementarity, has received relatively little critical attention. In fact, Schindehutte and Morris (2009: 243) state that this assumption "under-emphasizes the potential trade-offs between the two in a dynamic environment". By examining the moderation effect of exploitation on the exploration–strategic learning relationship, this study empirically shows that exploration and exploitation strategies support each other to a certain extent. However, when applied to a very high degree, exploitation starts to diminish the effect of exploration on strategic learning. This finding extends the current discussion on the complementarity of these two strategies as it confirms the existence of what are here termed "exploitation traps". An exploitation trap—a situation in which a high level of exploitation starts to diminish the value of learning from exploration—signals that developing strategic learning in ambidex-

trous organizations demands careful management, and that such organizations would benefit from emphasizing exploration a little more than exploitation in their strategic behavior. Thus, the study is among the first that actually details the optimum level of exploration and exploitation. The paper is published in the Strategic Entrepreneurship Journal.

The third article contributes to the entrepreneurship and organizational learning literatures by answering the following questions: What is the relationship between EO, strategic learning, and firm performance and how does firm age and size affect those relationships? This study was motivated by the notions that the capability of organizations to be innovative and change their core features in response to changing environmental conditions decreases as core rigidities and inertia increase. These develop when firms grow larger and age (Hannan & Freeman 1984; Leonard-Barton 1992; Wales et al. 2011). The first contribution of this article stems from the empirical finding that the relationship between EO and strategic learning is more curvilinear for larger and more established companies than for smaller and younger ones. This finding challenges the linearity assumption inherent in most studies linking EO to learning (e.g., Anderson et al. 2009; Wang 2008). By demonstrating the context-specific inflection points beyond which EO starts to affect strategic learning, the study provides explanations for why the level of EO needs to be high in established companies targeting strategic change and subsequent performance. In summary, the more general implication for EO and learning literature is that these phenomena involving the component of strategic change are more complex than had been assumed previously. This finding makes a value-added contribution to the EO literature because it accounts for a wide range of inconsistent and apparently paradoxical findings in the EO-learning literature.

The second main finding of this study contributes to the strategic learning literature by evidencing that the performance benefits of strategic learning depend on the maturity of the firm. Larger and older companies benefit from incorporating strategic learning in their organizations whereas strategic renewal might even be harmful for younger and smaller companies. This result helps to reveal undiscovered aspects of strategic learning and offers a more critical view of organizational learning; one that is more mindful of the potential of learning for different types of companies. In closing, the results indicate that the organizational context in which EO and learning takes place affects the potential benefits of these processes. Thus, the study responds directly to Crossan and Berdrow's (2003: 1104) invitation that "Future research may be able to identify different patterns of organizational learning and the contexts in which they are most effective." At the time of

writing, the paper is in its third review round for the British Journal of Management.

The fourth article addresses the question: How does strategic planning and strategic learning interact to generate profit performance? By shedding light on the interplay between learning and planning the study positions itself at the heart of Mintzberg´s argument that successful strategies are a combination of emergent and planned strategies. The study first provides evidence in support of this notion by revealing that strategic learning positively moderates the relationship between strategic planning and performance. This finding contributes to the strategic planning literature by establishing that the dichotomous debate surrounding planning and more emergent views of strategy formation is not relevant, and advocating that attention should instead be directed toward their coexistence. The second finding reveals interesting characteristics of this relationship as it reveals that the interaction is, in fact, non-linear; meaning that in high levels of planning the moderating effect of strategic learning becomes negative. This finding indicates that learning capabilities might be limited when stretched. Leavy (1998: 464) warns that "there is a danger that the high level of interest in the notion of learning in the strategy field will lead to an uncritical perspective that all learning is virtuous". This study contributes to the organizational learning literature by expanding on the insufficiency of firms' learning capabilities. Taken together, the main implication is the notion that increased planning and learning efforts correspond to more desirable outcomes up to a point, but after that inflection point, more planning does not lead to additional value for strategic learning and may actually produce less desirable results. This result together with the results from Article 2 and Article 3 provides evidence that the prevailing theoretical perspective that learning is a rather straightforward phenomena and always virtuous is somewhat misleading, as strategic learning might have unanticipated or even undesired outcomes especially owing to its limited nature. To this end, it is hoped that the somewhat counterintuitive hypotheses that take into account the more complicated nature of learning, will pave the way for a more critical perspective on organizational learning. At the time of writing, the article is in the publishing process.

The last article of this dissertation (Article 5) has implications especially for management practice. The research question: What are the success factors related to strategic learning practices necessary for survival and prosperity in the IT industry?, aims to analyze best practices that can be used to develop strategic learning. The software industry in Finland has recently evidenced the growth of many new promising software companies. These firms have interesting organizational characteristics and best practices that funnel them toward strategic learning. By intro-

ducing some of these practices, the article contributes to the practice-based theorizing on knowing and learning in organizations by taking the research closer to the point at which action is generated in routine organizational life and knowledge comes to life. This paper will be published in a book entitled, "Strategic Management in Small and Medium Enterprises: Theory and Practice".

In addition to the implications of the individual articles, the dissertation as a whole provides insights into the scholarly exploration of strategic learning. The primary theoretical implication of this dissertation is the acknowledgement of the important role strategic learning plays in the success of organizations. The research illustrates that strategic learning plays a central role in converting explorative and entrepreneurial behaviors into successful organizational action. Strategic learning can be understood as an enabling mechanism through which the strategic knowledge generated by entrepreneurial behaviors disseminates through the organization and reaches strategic decision makers empowered to act on that knowledge. In addition to its mediating role, strategic learning has an important moderating role particularly in organizations that rely on formal strategic planning. A second theoretical implication of this work is that there are theoretical and empirical grounds to view strategic learning as a limited resource with restricted applicability. As such, by viewing strategic learning from a critical perspective this dissertation establishes that strategic learning should not be thought of as a homogeneously productive process across all organizations, but instead different contingency factors should always be considered.

5.2 Implications for practice

As Article 5 is designed specifically to serve the management of IT companies in their efforts to build strategic learning in their organizations, the implications for management practice discussed here briefly provide some additional insights concerning the facilitation of strategic learning. The managerial implications are constructed in the light of three components: the learner (individual, group, and organization), the learning process, and the context.

The results of this dissertation suggest that the top management of IT companies would benefit from perceiving strategy as a social learning process. That emergent view of strategy enables an organization to frequently create new strategies and shape old ones according to the changing environmental and organizational demands, so facilitating firm performance, and long-term survival. The strategic learning perspective considers strategy making to take place in social interactions among and between all organizational levels (e.g., individual, group, and organi-

zation), rather than being the exclusive preserve of senior management. From the perspective of individual learners, strategic learning demands all individuals develop the ability to think strategically. That ability will be reflected in qualities such as identification of opportunities; creative thinking; alternative creation; challenging assumptions; being open to receive new information; judgmental quality; and the ability to compromise. Many of these qualities can be affected though organizational culture but concrete practices such as job rotations, special projects or challenging assignments targeted to stimulate innovation capacity, organization wide strategy workshops, and working with outside experts may help to develop the ability of individuals and teams to contribute to organizational-level strategic learning.

Furthermore, according to Burgelman (1998) the internal entrepreneurs in organizational learning, individuals who promote change by recognizing and capitalizing on opportunities, act as the driving force in perceiving and apprehending new opportunities based on capabilities that are not yet recognized as distinct to the firm. For top management this means that they should recognize these key individuals in the organization and support their behavior and particularly be alert and open to strategic initiatives that emerge from the organization, as these initiatives may reveal unrealized aspects of organizational capabilities and associated opportunities. In addition, middle managers are argued to have a knowledge access advantage linked to the drivers of emergent processes of change and adaptation (Nonaka 1994; Tippmann, Mangematin & Scott 2013). This advantage makes middle managers important agents for the bottom-up development of organizational capabilities. Thus, to foster strategic learning, top management should recognize the important role of key individuals and learners in the success of the whole learning process. Taken together, although top management's commitment and perception of strategy as a learning process is fundamental, the nature of strategic learning as a social process highlights the need for management to engage with teams and departments and equip all individuals with sufficient ability, motivation, and resources to contribute to the strategic learning process.

From the learning process perspective, the results in the appended articles imply that managers who invest in developing processes of strategic knowledge creation, dissemination, interpretation and implementation maximize strategic learning. Thus, for management practice, the conception of the four learning subprocesses identified as constituting strategic learning provides an important tool to build, develop, and understand strategic learning capabilities. To initiate strategic learning, senior management should first realize that their firm needs new knowledge input. Then they must open their companies to external knowledge sources such as customers, suppliers and advisors (Oswald & Macpherson 2006).

The problematic aspect arises when a firm's existing strategy focuses its knowledge efforts on the prior knowledge of the firm that is a function of individual existing mental models and therefore is likely to affect to the assessment of the value of new external knowledge (Lane et al. 2006). In order to learn strategically top management needs to direct the knowledge search beyond the existing knowledge domains in order to seek novel information that advances experimentation and innovation. Because social relationships matter to knowledge creation and development (Argote, McEvily & Reagans 2003), managers should consciously build teams and departments that are able to combine knowledge in a novel way. In fact, according to March (1991) the long-term interaction and socialization that often results when interpersonal interactions take on stable patterns over time can lead to collective myopia. To this end, top management may consider building heterogeneous teams that contain multiple diverse perspectives by recruiting members from different units and then regularly re-organizing those teams.

Ensuring knowledge access for the purpose of knowledge dissemination has been something commonly emphasized in the literature. To facilitate strategic knowledge dissemination, top management should structure their organization's knowledge access mechanism to supply individuals with channels and a context that enables them to access organizational knowledge located in different places in the organization. Because strategic knowledge includes tacit components that have to be converted to explicit knowledge before it can have a wider effect in an organization, the knowledge dissemination actions that are widely socialized and which overcome knowledge distribution challenges, allowing to explore, articulate and create new linkages between different bodies of previously disconnected knowledge are extremely important (Tippmann et al. 2013). In IT companies in particular, in addition to conventional knowledge sharing practices such as weekly meetings, training and development, etcetera, new forms of leveraging knowledge flows such as communities of practice are proving promising platforms for facilitating strategic learning. Communities of practice such as open software communities are "self-forming, emergent groups that cut across business units, geographical dispersion and functional boundaries to connect individuals sharing common disciplinary interests or tasks" (Cabrera & Cabrera 2005: 725; see also Lengnick-Hall & Lengnick-Hall 2003). A community of practice can exist entirely within organizational boundaries or even thrive with members from different companies. Senior management can foster these social networks by legitimizing them by giving them tools and resources to share knowledge more effectively and encourage people to participate in such networks inside and outside their organizations. However, in those communities of practice that span firm

boundaries, strategic knowledge should also be protected from the risk of knowledge-spillover to competitors.

Because strategic knowledge is new and often conflicting, one of the key issues in a successful strategic learning process is the ability of individuals to provide meaningful interpretations for patterns of ambiguous information (Thomas, Clark & Gioia 1993). Often this requires that the current ways of making sense of and understanding information must be altered and new ways of interpreting the world developed. A powerful source for the development of new mental models, and one that top management still rarely utilizes, is failure. A failure is an influential event that can, if used as a source of learning, change the outdated knowledge interpretation processes in the organization and create new patterns of understanding (e.g., Cannon & Edmondson 2001; Cannon & Edmondson 2005). Failures create value if management devotes sufficient resources and design processes, and creates incentives that encourage analysis of the causes and consequences of such failures. To promote knowledge interpretation, multiple perspectives need to be brought together and the leader must create an atmosphere where people feel safe to identify and reveal failures and offer diverse opinions on the future. In addition, facilitating constructive criticism and promoting the creation of alternative explanations are important aspects of the successful interpretation of information. Finally, in order to benefit from new strategic knowledge, senior management needs to ensure that it is implemented rapidly and thoroughly enough to retain its value to the organization even in the face of a constantly changing market situation. In general, new strategic initiatives will be implemented far faster when the individual presenting the idea has some power and influence in the organization (Crossan & Berdrow 2003). One possible way to ensure that promising strategic initiatives will be implemented is to create paths of least resistance where initiatives quickly gain support. This could be for example some specific department or team in the organization that has been recognized as open to new emergent ideas. Such "fast tracks" could be used to test the viability of new strategic initiatives.

As demonstrated in Article 3, the organizational context in which learning takes place affects the strategic learning process. Most established organizations encounter difficulties in overcoming inertial forces and developing their existing capabilities in response to environmental changes. To increase responsiveness and the ability to change at the organizational level, leadership attitudes that encourage novel insights, differing opinions, and the acquisition and use of a new information support strategic learning. Over time these attitudes become part of the firm's operating culture, fostering a knowledge-sharing climate and the creation of a learning organization (Senge 1990). In addition to the organizational context

and culture, the environment surrounding the firm affects strategic learning too. In fact, organizations operating in dynamic industries might have little choice in the timing of their strategic decisions, as they are often forced to change their strategies quickly in response to a major environmental change. Therefore, environmental change is an important factor in determining the periods during which organizational change is efficient and those periods when stability is more beneficial. Thus, managers may need to evaluate the optimal timing for strategic learning.

5.3 Limitations and future research suggestions

No research is perfect, and like all studies, this dissertation has limitations that suggest opportunities for future research. While each of the appended articles discuss the limitations and future research opportunities unique to the particular article, this section focuses on the more general limitations of the dissertation and discusses some potential research directions.

First, although the questionnaire data collected from single informants (CEOs) from multiple IT firms permitted the gathering of data from a large sample of firms, it has limited the ability to take into account the different levels (individual, group, and organizational levels) at which learning may occur. While several recent organizational learning studies call for multilevel thinking (e.g., Crossan et al. 2011; Flores et al. 2012), the study by Di Milia and Birdi (2010) is one of the few empirical studies to test the multilevel link between learning at different levels and organizational performance. Their study shows that organizations engaging in learning practices at one level are more likely to engage in practices at another level. Although their study is a promising start, many questions that could be answered by applying data from multiple informants, nested within operating units and levels, across multiple organizations still remain unanswered (Flores et al. 2012). For example, future studies could investigate how the heterogeneity of learning across individuals, teams and units affects learning and performance at the organizational level.

An interesting viewpoint here could be March's (1991) argument that an organization can learn only from individuals (or departments and teams) whose knowledge deviates from the organizational knowledge. However, organizational members come to develop very similar mental models, a similar knowledge reservoir, and problem solving ideas as they frequently exchange information. Consequently, as knowledge dissemination gets too high and every organization member has essentially the same set of knowledge, it may induce group thinking,

reduce exploration and innovations, and eventually undermine the link between organizational learning and performance (March 1991). This suggests that in order to fully benefit from learning at different levels some level of variation in organizational members' knowledge structure is needed to allow greater exploration of possible alternatives and greater balance in the development of specialized competences (March 1991). In addition to the individual-, group-, and firm-level aspects, future studies would benefit from investigating the industry-level determinants of strategic learning (e.g., networks, strategic alliances, communities of practice etc.) (Hitt, Beamish, Jackson & Mathieu 2007). Another potentially valuable area of research is that investigating strategic learning in team-based organizations and especially in the virtual organizations that are characteristic of the IT industry.

Second, although two of the appended articles (Articles 3 and 4) had a time lag between the independent variables collected in the survey and the dependent performance variables obtained from the secondary database, the cross-sectional survey design limits the demonstration of causality in this dissertation. Owing to this limitation, the data fail to capture the possibly dynamic interplay between each of the strategic learning subprocesses and the development of dynamic capabilities over time, for example (Helfat & Peteraf 2009). Future longitudinal research could make a valuable contribution by examining how strategic learning changes within a firm as part of a dynamic state change. Future studies could also attempt to study how much time is needed to complete the whole strategic learning process; how to speed up the process; the role played in this process by prior knowledge and experience; and why some promising strategic initiatives die at the very beginning of the knowledge application process, while others are accepted and implemented even in their early phases. Observing the moderation effect of firm size and age on the strategic learning–performance relationship also raises an important question warranting further inquiry: How does the emphasis on and the role of strategic learning change over time and during transitions between firm development states?

Third, although the timing of the study provides an interesting context in which to study strategic learning, it has to be acknowledged that the questionnaire data was collected in the middle of the financial crisis in 2009. Economic recession might impose different requirements on organizations than they encounter in more stable times. Therefore, the nature of the software products as long-term investments, the extraordinary economic situation, and the risk awareness associated with it, could have affected the results. This might particularly explain some of the unexpected results in Article 3 where strategic learning actually caused negative effects in young companies. It is possible that survival through the economic

crisis during the data collection year may have been more dependent on financial muscle, swiftly implementing redundancy programs, and safeguarding the core of the company, than on any entrepreneurial focus on growth innovation and new product development. The environmental dynamism created in a market where everyone was trying to sell, but no-one was buying due to financial constraints, may be different from the dynamism of the fast growing, competitive and innovative environment that software businesses had typically operated in previous to the financial crisis, and therefore strategic learning and prior experience from the previous market disruptions may be of greater importance than usual. Therefore, the study results should be considered in the light of the exceptional market conditions at the time. Future studies adopting a longitudinal approach could for instance investigate whether the firms that are able to learn strategically are those very firms that best survive both economic downturns and upswings.

Several studies have established that in addition to economic conditions, the availability of public subsidies for innovation activities, is a crucial determinant of the innovation process (e.g., Klomp & Van Leeuwen 2001). The Finnish Funding Agency for Technology and Innovation (Tekes) that is the main public funding organization for research and development (R&D) in Finland, has many programs in the software sector to foster the capabilities and innovation activities of software companies. During the period of data collection for the current dissertation, two main Tekes programs targeting the software industry were operating, VAMOS (2005–2010) that aimed to enhance business with mobile solutions and Verso (2006–2010) that supported the wider software industry. Those two projects are generally accepted to have produced very positive effects (for a detailed discussion see Raivio et al. 2012). However, a recent study by Hashi and Stojčić (2013) raises concerns over the role of state funding in supporting innovation. Their findings indicate that although state subsidies encourage spending on innovation, they do not necessarily lead to additional innovation output. This finding challenges the general assumption that firms that have access to subsidies are more productive and perform better, and therefore challenges the role of existing national and EU subsidies. Although these results are generalizable to many EU countries, it is worth mentioning that Finland was not included in the study and thus no direct conclusions can be drawn. Access to Tekes funding in Finland is highly competitive and as it covers only a small portion of the overall R&D expenditure in a given company, it is very hard to see that this type of funding would actually direct software firms' strategies in a dysfunctional direction. However, the role of state funding in the development of breakthrough strategies in the Finnish software sector could be a contributive research topic for future research.

Fourth, this dissertation concentrated on examining a single, high-tech industry in Finland. Although this approach led to more detailed conclusions in this specific context, the global and innovative nature of the software industry may limit the generalizability of the results beyond the context. Mintzberg and Waters (1985: 271) emphasize that strategic learning is more beneficial in dynamic environments, and when the environment can be largely understood and predicted, it might be beneficial even to "suspend strategic learning for a time". Thus, future research could concentrate on comparative research that covers multiple industries to discover how particular industry conditions influence strategic learning and other studied constructs, especially in relation to exploration and exploitation strategies, EO and strategic planning. It would be particularly interesting to compare industries that differ in their life cycles, technological intensity, or institutional context. In addition, the study by Kibler, Kautonen and Fink (forthcoming) directs attention toward the important issue of the social legitimacy of entrepreneurship and the regional differences in Finland concerning the desirability and appropriateness of entrepreneurship in a region. However, as Finnish software companies are concentrated in the region of the capital, it was beyond the capability of this dissertation to account for regional differences in the studied phenomena.

Fifth, it is hoped that this dissertation stimulates further research on the various types of strategic learning outcomes in entrepreneurial firms and in the strategic management context more generally. In addition to performance, future studies could shed light on outcome variables such as competitive capability, organizational survival, commitment to strategy, strategic legitimacy, strategic thinking, innovations, competitive speed and agility, and customer acquisition, among others. In addition, future research topics might consider alternative organizational moderators such as organizational culture, resource endowment, and the developmental stage of a firm that might affect the relationship between strategic learning and its antecedents and also the relationship between strategic learning and performance. Moreover, this dissertation should encourage future studies to empirically explore and test leadership-based antecedents of strategic learning as leadership attitudes regarding risk-taking and learning from failures are important to the development of strategic learning capability (Casey & Goldman 2010), yet are rarely studied.

Sixth, paper 3 has an interesting point to raise that was not discussed in the article due to the limitations on the length of the paper. While the EO–SL relationship clearly becomes quadratic with the increase in size and age, the illustrated almost U-shaped curve hints that large firms with very low level of EO could also have developed effective strategic learning mechanisms. The current theoretical frame

has little to offer in terms of explaining this, but it may be that the low level of EO allows organizations to invest critical resources in other, potentially more cost effective areas that enhance strategic learning. The substantial up-front costs associated with EO (Kreiser et al. 2013) indicate that firms experience negative returns from EO when moving from low to moderate levels of EO before the actual benefits begin to outweigh the resources invested. Strategic learning also competes for limited organizational resources (e.g., time, financial and/or human capital etc.) and the reduction in a firm's resources, before EO pays off, may lead to cuts in resources dedicated to learning activities. Consequently, shifting from a low to a moderate level of EO may actually result in a reduction in the firm's strategic learning capability. As the costs of introducing EO to the firm will hit smaller units with fewer resources harder, they may find it difficult initially to instigate SL. Longitudinal case studies that look into the transformation from conservative to entrepreneurial could be important for detecting the theoretical mechanisms involved as current theory offers little guidance.

Last, most of the prior organizational learning literature predominantly describes organizational learning in positive and rather uncritical terms (Örtenblad 2003). This dissertation attempted to take a step further by analyzing the possibilities of learning traps and the limited nature of learning capabilities. These arguments are in line with the criticism of organizational learning highlighting that learning might not always be good (Hawkins 1994). Örtenblad (2003) provides an extreme example: individuals and organizations may learn things such as developing nuclear weapons that can be harmful for them and society at large. This example raises another interesting viewpoint: learning is inherently contextual and its goodness or badness is very much dependent on the social practices it occasions. Furthermore, organizational learning scholars seldom discuss how power, politics, and control affect organizational learning (Crossan et al. 2011; Easterby-Smith et al. 2000; Voronov & Yorks 2005). Thus, questions such as who (individual, team or department) dominates the learning process and whose learning initiatives will be prioritized open interesting avenues for future studies. On the other hand, researchers (e.g., Crossan et al. 2011) have also suggested that power and politics might not necessarily be factors constraining learning but they might have some inbuilt qualities that could also facilitate learning. Taken together, the critical perspective on organizational learning holds great promise for the future.

5.4 Conclusions

Developing the ability to learn strategically is one of the most needed but least understood areas of strategic management. Strategy scholars have just begun to recognize a possible connection with the organizational learning literature that can help understand the sources of a firm's competitive advantage in a dynamic environment. Using theoretical concepts from strategy, entrepreneurship and organizational learning literatures and empirical findings from these fields, this dissertation proposed an empirical model of strategic learning that is consistent with the emergent view of strategy identification (Mintzberg & Waters 1985). The conceptualization of strategic learning as a higher-order dynamic capability, with its four constituent subprocesses of strategic knowledge creation, dissemination, interpretation and implementation and a validated scale for each, provides both strategy researchers and organizational leaders a valuable tool with which to evaluate and manage strategic learning. Furthermore, this dissertation extends the knowledge frontier by positing and empirically examining the importance of strategic learning for firms' competitive advantage. Based on the results from the appended articles those software companies able to build and leverage strategic learning capabilities in their organizations are those that perform the best. Yet, there are many factors such as inertial forces and the limited nature of such learning capabilities that need to be carefully managed in order to maximize the benefits from strategic learning. In closing, this dissertation hopes to stir scholarly conversations on examining the boundary conditions and contingencies relating to the successful strategic learning that is recognized as a vital component of an entrepreneurial firms' success.

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UNMASKING THE CAPABILITY OF STRATEGIC LEARNING: A VALIDATION STUDY

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Abstract:

Purpose – The strategic learning perspective has attracted increased interest among strategic management scholars, yet the operationalisation of this concept is still in its infancy. The aim of this study is to develop a multidimensional understanding of the strategic learning process and to build an instrument to measure this concept.

Design/methodology/approach – The article confirms the validity of the developed measurement instrument with expert evaluations and quantitative data from the analysis of 206 Finnish software companies. Structural equation modelling was the primary statistic technique used.

Findings – The results of the validation study suggest that strategic learning is a multidimensional construct that is manifested through the sub-processes of strategic knowledge creation, distribution, interpretation, and implementation. The results demonstrate that the reliability and validity of the developed measurement model is satisfactory, thus enabling its use in further studies.

Research limitations/implications – Although the validation study and the use of a panel of expert judges present substantial support for the developed construct, future research is necessary to continue to examine and refine the measure in other industries and cultural contexts.

Practical implications – Executives and practitioners can use the developed tool to identify potential areas for improvement and thus bring focus to organisational development efforts to enhance collective strategic learning.

Originality/value – This study contributes to strategic management research by developing and validating a measurement method for the concept of strategic learning. To date, the empirical research of strategic learning has been mainly limited to descriptive case studies, and the literature lacks a comprehensive measurement tool.

Keywords: strategic learning, measurement validation, organizational learning, knowledge-based view, dynamic capability

Article Classification: Research paper

Introduction

The perspective of strategic learning advances the strategy research by considering strategy-making as a process of organisational learning (Mintzberg and Waters, 1985; Mintzberg and Lampel, 1999; Thomas *et al.,* 2001). The strategic learning perspective responds to the challenges posed by an unpredictable environment. Strategic learning is a specific learning capability that enables top management teams to continuously integrate organisation-wide experiences and knowledge into strategies that enable companies to cope with growing strategic discontinuities and disruptions (Beer *et al.,* 2005). While the learning perspective in general has gained increasing attention within recent years and has a central role in the strategic management literature, there is very little known about the specific processes and mechanisms of strategic learning (Voronov, 2008). Partly due to these unsolved theoretical issues and the fragmented nature of the research, the literature lacks empirical studies on strategic learning.

Although prior studies have developed measures for exploitative forms of learning, such as single-loop learning (e.g., Jerez-Gómez *et al.,* 2005), previous literature on strategic-level learning is mostly conceptual and case-based (e.g., Kuwada, 1998; Thomas *et al.,* 2001). Only a limited number of quantitative studies and fragmented attempts to develop valid measurements exist (Anderson *et al.,* 2009; Covin *et al.,* 2006). Moreover, these prior empirical studies have taken a very narrow perspective by focusing solely on learning from strategic mistakes. While this approach is important, it does not give a comprehensive view of strategic learning and the opportunities that strategic learning capabilities create for companies. Consequently, researchers (e.g., Easterby-Smith *et al.,* 2000; Voronov, 2008) have called for studies focused on the theoretical elaboration of the mechanics and dynamics of strategic learning as well as studies establishing a valid and reliable measurement method.

To address this need, the present study develops a multidimensional understanding of the strategic learning concept and its sub-processes and develops an instrument to measure it. The study begins by illustrating an integrative strategic learning framework, explaining how knowledge with strategic value is continuously acquired and applied to create, extend and modify a firm's strategies to create and sustain a competitive advantage. The study builds on the information processing view of organisational learning (Huber, 1991) and on two complementary strategic learning models (Kuwada, 1998; Thomas *et al.,* 2001) in the development of the framework. Strategic learning is understood as a firm's higher-

order learning capability, consisting of its knowledge processes for creation, dissemination, interpretation and implementation of strategic knowledge (Kuwada, 1998; Thomas *et al.,* 2001). Strategic learning is similar to the idea of dynamic capability (Eisenhardt and Martin, 2000), but it extends beyond resource-based theories by integrating the emerging view of strategy into the dynamic capability discussion.

Recently researchers (e.g., Casey and Goldman, 2010; Pandza and Thorpe, 2009) have argued that in uncertain strategic situations, especially characteristic to high-technology contexts, the strategic learning processes are influenced by two cognitive processes: creative search and strategic sense-making (Ambrosini and Bowman, 2005; Thomas *et al.,* 1993; Weick, 1995). This study incorporates these knowledge processes in the strategic learning framework and suggests that creative search is an important element underlying new external knowledge acquisition, whereas the concept of strategic sense-making sheds light on the internal knowledge development processes. Furthermore, the model highlights that strategic learning is generated by many strategic actors and therefore takes place at several levels in an organisation. Consequently, the managerial agency is needed to facilitate the knowledge transfer from an individual (or a small network of agents) to a large network that is capable of implementing change.

Building on the proposed theoretical framework, the study develops an instrument for the measurement of strategic learning. The measurement tool is developed by integrating items from various existing organisational learning and dynamic capability scales that capture the strategic nature of learning. The items were identified through a literature review. The developed measurement model is validated with expert evaluations and quantitative survey data from 206 software firms. The software industry represents a dynamic context with knowledge-intensive and growing companies, many of which compete in and target global markets. In general, the software industry can be characterised as an industry where competitive advantage is built through intangible "know-how". Therefore, the software industry provides an appropriate, dynamic context for building and testing the proposed measurement tool for strategic learning.

The validated strategic learning instrument has several implications. For instance, it contributes to the future empirical research on strategic learning by providing a tool that researchers can use to measure the possible antecedent and effects of strategic learning and to identify the different sub-dimensions from which it is formed. Essentially, strategic learning enables firms to survive during unpredic-

table times, such as the macroeconomic uncertainty facing many industries today. The concept of strategic learning can also be used diagnostically at the organisational level. Executives and practitioners can use the strategic learning instrument to identify potential areas for improvement, thus focusing organisational development efforts to enhance collective strategic learning. The article concludes by discussing how the measurement model and the associated framework contribute to the current debate on the important challenges faced when designing, implementing and assessing strategic learning.

Conceptual framework

Theoretical foundations of strategic learning

A new approach to strategy formation has emerged from the idea of strategy-making as a learning process. This approach has been referred to as the learning school of strategy (Mintzberg and Lampel, 1999). The learning perspective follows an emergent view of strategy identification (Mintzberg, 1994), which suggests that viable strategies are formed and discovered by experimenting and observing an organisation's actions rather than by conducting formal analyses of its strengths and opportunities (Farjoun, 2002; Mintzberg *et al.,* 1998). A characteristic of the emergent view is that strategic aims are rarely announced or recorded in formal planning documents, and when they are, they remain broad, general, and non-quantified (Brews and Hunt, 1999). Strategic actions develop and evolve over time as organisations learn from environmental interactions (Quinn, 1980). Especially in a turbulent, fast-changing environment, organisations need to respond to events and information more quickly than a formal strategic planning cycle allows. In these environments, the learning approach enables the strategic agility of the companies by enabling them to rapidly detect the changes in the markets and quickly capitalise on the emerging opportunities (Doz and Kosonen, 2010; Kenny, 2006).

Building on the resource-based (Barney, 1991; Wernerfelt, 1984) and knowledge-based view (Grant, 1996), the learning approach uses organisational learning theories to provide insight into how organisations can acquire, interpret, distribute, and incorporate strategically important new knowledge to facilitate and continuously re-create competitive advantage. Strategy scholars of the learning school (e.g., Kenny, 2006; Kuwada, 1998; Mintzberg and Waters, 1985; Thomas, *et al.,* 2001) have referred to learning behaviours and processes that enable a

firm's long-term adaptive capability as strategic learning. The strategic learning concept shares a number of similarities with the information-processing view of organisational learning (Huber, 1991) and the dynamic-capability view of absorptive capacity (Zahra and George, 2002). The present study therefore builds on these theories in developing the concept. However, in agreement with several researchers (e.g., Anderson *et al.,* 2009, Covin *et al.,* 2006, Kuwada, 1998, Thomas *et al.,* 2001), this study argues that strategic learning is a strategic-level process and should be defined as a specific type of organisational learning that relates to an organisation's ability to process strategic-level knowledge in a way that renews its strategies. This assertion extends the traditional view of organisational learning by suggesting that strategic learning aims to develop and renew a firm's strategies to stay ahead of the competition, whereas organisational learning helps firms to realise and implement their pre-defined strategies (Anderson *et al.,* 2009; Kuwada, 1998; Voronov and Yorks, 2005). Thus, strategic learning encompasses double-loop learning where an organisation analyses and modifies its existing norms, procedures, strategies and objectives (Argyris and Schön, 1978; Thomas *et al.,* 2001). Compared to single-loop learning processes that enable small but effective adjustments to familiar solutions, processes and procedures, strategic learning enables organisations to obtain higher levels of necessary adaptation (Anderson *et al.,* 2009; Kuwada, 1998). In conclusion, strategic learning represents a firm's higher-order learning process through which firms internalise knowledge that enables them to make changes to their strategy.

The integrated strategic learning framework

Few prior case studies (Kuwada, 1998; Thomas *et al.,* 2001) develop theoretical models for strategic learning. The process model of strategic learning proposed by Kuwada (1998) is based on a study aimed at explaining the role of knowledge in the long-term development and strategic re-orientation of organisations. The model builds on Burgelman's (1991) intra-organisational ecological perspective of strategy-making and on Huber´s (1991) information-processing view of organisational learning. In Kuwada's model, an organisation is viewed as an ecology where new strategic initiatives are continuously created and compete for limited resources. The role of strategic learning is to select and retain the most viable initiatives (Burgelman, 1991). Strategic learning is described as a social-learning process that integrates various levels of learning in organisations, including processes of both strategic knowledge creation and strategic knowledge distillation. In the knowledge distillation and transfer process, tacit individual-level knowledge is converted to explicit corporate-level knowledge and finally crystallised as a

corporate routine (Nonaka, 1994). Kuwada (1998) summarises the main processes that form strategic learning as knowledge creation and acquisition, information interpretation, information transformation and distribution, and retention of knowledge in the organisational memory.

The strategic learning model of Thomas et al. (2001) builds on Kuwada's model but represents a more analytical and rational process of strategic learning, where relevant strategic events can be identified in advance. The model emphasises three characteristics of strategic learning. First, the knowledge creation and acquisition efforts are planned to fit with the strategic-action horizon of the firm. Second, strategic learning influences an organisation's ability to generate, store, and transport strategic knowledge across multiple levels to enhance the firm's performance. Third, strategic learning has institutionally based strategic sense-making mechanisms that help organisations to understand the importance of new knowledge. Thus, knowledge management, information transfer processes and strategic sense-making form the key elements in the development of successful strategic learning behaviours.

Figure 1 integrates the main elements of these two models under one framework for building a measurement model. The components of Figure 1 – the various levels of strategic learning (individual, group and organisation), the main processes linking these levels (strategic knowledge creation, distribution, interpretation and implementation), and the underlying cognitive processes (creative search and strategic sense-making) – form the core elements of the strategic learning concept. Next, a brief analysis of these elements is discussed.

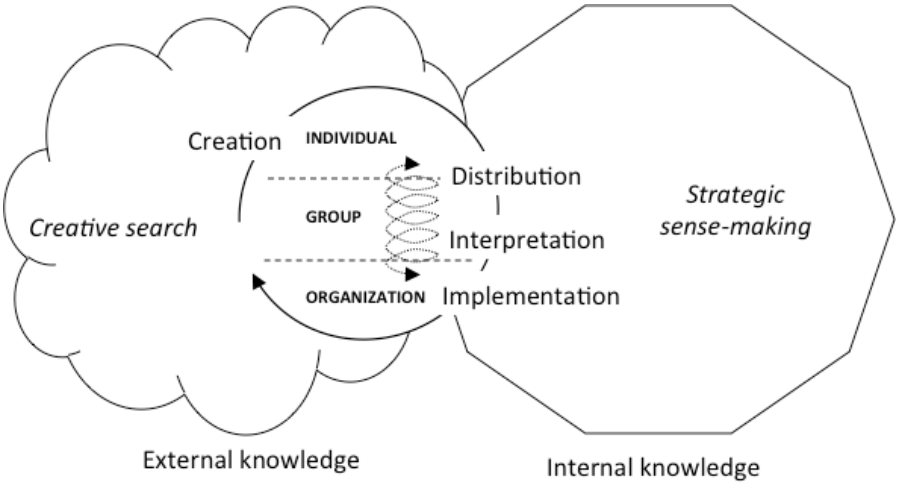

Figure 1. The integrated strategic learning framework

Levels of strategic learning

This study diverges from some of the earlier studies that assign a dominant role in strategy formulation to top management (Quinn, 1980) by arguing that strategic learning is generated by many strategic actors, therefore occurring at several levels in organisation (Burgelman, 1988; Burgelman, 1991). This process is consistent with the emergent view of strategy identification, suggesting that thinking and doing cannot be separated from the individual and the context in which they take place (Casey and Goldman, 2010; Mintzberg, 1994). Strategic learning occurs over three levels in an organisation: the individual, group and organisation (Crossan *et al.,* 1999; Nonaka, 1994). Furthermore, learning occurs between these levels as well as within them (Figure 1).

The strategic learning process starts with the creation of novel strategic knowledge at an individual level. Burgelman (1991) suggests that strategic initiatives are most likely to emerge among people who are directly in contact with new technological developments and change in market conditions. Therefore, potential knowledge is created in different parts of the organisation by people (such as managers, sales staff, account managers, etc.) who interact with firm's external environment and their key informants (such as suppliers, agents, distributors, competitors or customers). Once a strategic initiative is born at the individual level, it should be transferred and communicated at the group and team level to have a larger impact in the organisation (Huber, 1991). In formal or informal work groups, meaning is given to new information through the processes of knowledge interpretation (Daft and Weick, 1984). As a consequence of these interactive and constructive actions, new collective organisational knowledge is created (Hedberg, 1981). This new collective knowledge is then implemented and stored at the organisational level where it impacts the subsequent individual- and group-level learning. Thus, the strategic learning processes form a reinforcing cycle where learning at different levels coexists and complement each other (Pietersen, 2002; Voronov, 2008). To conclude, strategic learning has a socially constructed and collective nature, comprising different knowledge processes at various levels of an organisation.

The key knowledge processes that form strategic learning

Next, in a stepwise order (Figure 1), the analysis of the core knowledge processes forming the strategic learning process is provided. Following the theoretical dimensions identified in the prior literature (Kuwada, 1998; Thomas *et al.,* 2001),

this study defines the underlying strategic learning processes as strategic knowledge creation, distribution, interpretation and implementation. Furthermore, as recent studies on learning capabilities (Casey and Goldman, 2010; Pandza and Thorpe, 2009) argue that creative search and strategic sense-making are crucial cognitive processes influencing new knowledge development, these processes will be introduced and tied to the strategic learning process. According to Kenny (2006) the formation of strategy is a developmental process driven by learning in which the strategy can be considered to mature as a situation comes to be better understood. Similarly in Figure 1 the level of understanding of the strategic problem increases when strategic knowledge develops in the organisation.

Strategic Knowledge Creation. Knowledge creation is usually considered to be an antecedent to knowledge interpretation and action (Daft and Weick, 1984; Thomas *et al.,* 1993). Therefore, it is an important starting point for the strategic learning process (Burgelman, 1991; Kuwada, 1991). Researchers have most often defined knowledge creation as searching the external environment to identify important events or issues that might affect an organisation (Thomas *et al.,* 1993). The key actors in the knowledge creation processes are the individual members of an organisation (Crossan *et al.,* 1999; Nonaka, 1994). Several studies (e.g., Burgelman, 1991; Burgelman, 1988) suggest that at least some individuals repeatedly try to engage their organisations in knowledge-creation activities that are outside of the scope of their current strategy. These activities differ from the existing strategies, for instance, in terms of technology employed, customer functions served, and customer groups targeted (March, 1991).

The process through which individuals engage in exploratory knowledge-creation activities is called creative search (Adler and Obstfeld, 2007; Crossan *et al.,* 1999). The process is a future-oriented and uncertainty-enhancing cognitive process in a deliberate search for and recognition of opportunities (Atuahene-Gima and Murray, 2007; Pandza and Thorpe, 2009). A characteristic of creative search is that knowledge-creation activities are not restricted by the current strategic direction of the firm (Kuwada, 1998). Instead, the information collection aims to lead the company into new markets and technological experiences that will break the boundaries of the current strategic thinking. As a result of creative search, novel knowledge with strategic value is created that initiates further knowledge development at the group and organisational level.

Strategic Knowledge Distribution. New strategic knowledge will remain personal and have only a small impact on an organisation unless it is articulated and

amplified through social interactions (Nahapiet and Goshal, 1998). According to Nonaka (1994), personal knowledge can be brought into a social context through knowledge distribution. Knowledge distribution refers to the internal spread of strategic knowledge, acquired at an individual level through conversations and interactions between individuals and groups within the organisation (Jerez-Gómez *et al.,* 2005; Nicolini and Meznar, 1995). Knowledge can be disseminated, for example, through formal and informal communication, dialogue and debates (Bontis *et al.,* 2002). The effective distribution requires, among others, agile information systems and effective use of teams and personnel meetings to share ideas (Thomas *et al.,* 2001; Jerez-Gómez *et al.,* 2005). In general, prior research highlights the role of face-to-face communication as the most powerful way to exchange and process complex exploratory knowledge. Strategic knowledge distribution activates knowledge interpretation activities and is therefore an important starting point for the development of shared organisational knowledge.

Strategic Knowledge Interpretation. Previous studies have often viewed knowledge interpretation as an individual-level process. However, Daft and Weick (1984) argue that organisations themselves can be viewed as interpretation systems. Knowledge interpretation is defined as a process in which meaning is given to new information and shared understanding is developed (Huber, 1991). According to Thomas et al. (1993), interpretation involves fitting new knowledge into some structure for understanding and action. Interpretation is closely linked to the concept of strategic sense-making. Weick's (1995) conceptualisation of strategic sense-making refers to an uncertainty-reducing cognitive process that enables managers to understand the appropriateness and usefulness of the developed knowledge and its fit with the business opportunities (Pandza and Thorpe, 2009). Strategic learning, in particular, is integrated with sense-making because new interpretive schemas are needed and the current sense-making needs to be altered for strategic learning to occur (Ambrosini and Bowman, 2005). For strategic learning, the diverse interpretations of information are especially important because new strategic knowledge includes uncertainty with respect to its future appropriateness and usefulness (Kuwada, 1998). Conflicting assumptions and alternative interpretations must be considered and, if needed, acted upon to change an organisation's methodology for interpreting information (Woods, 2012). Thus, an organisational culture that encourages questioning and challenging of the current cognitive frameworks and assumptions enhances the development of new insights, leading to strategic learning.

Strategic Knowledge Implementation. Effective organisational action depends on its ability to implement and integrate knowledge into a coherent action (Crossan *et al.,* 1999; Thomas *et al.,* 1993). Strategic knowledge implementation refers to the institutionalisation of knowledge into the collective facets of an organisation, such as organisational systems, structures, procedures and strategies (collectively referred to as the organisational memory) (Huber, 1991; Walsh and Ungson, 1991). Organisational memory refers to the base of prior knowledge that is embedded in organisational-level functions and can be retrieved for future decision-making (Walsh and Ungson, 1991). In the knowledge implementation process, various departments within the organisation test the applicability of the developed strategic initiative in action. Viable initiatives will eventually be realised as strategies and results in concrete outputs, such as new products, services and processes (Nonaka and Takeuchi 1995).

Table 1 summarises the theoretical support for the four strategic learning dimensions, grouping together the different components and main authors. Next, the operationalisation and empirical validation of these dimensions will be discussed.

Table 1. Dimensions of Strategic Learning

Dimensions	Components	Citations
Creation	· Creative search in every level of the organisation · Expansion of the scope of search beyond current strategies · Creation of new strategic initiatives	Kuwada (1998); Thomas *et al*. (2001); Atuahene-Gima *et al*. (2007); Tsai and Huang (2008); Burgelman (1991)
Distribution	· Upward and open communication from lower levels · Various methods for transferring rich strategic experiences	Jerez-Gómez *et al*. (2005); Tippins and Sohi (2003); Bontis *et al*. (2002)
Interpretation	· Strategic sense-making and shared understanding · Questioning and challenging old assumptions · New interpretative schemas to map strategic knowledge	Thomas *et al*. (2001); Weick (1995); Ambrosini and Bowman (2005)
Implementation	· Organisational memory · Integration of emergent strategies into formal strategies · Realised strategies	Walsh and Ungson (1991); Bontis *et al*. (2002); Kuwada (1998)

Method

Scale development

The strategic learning scale is developed from the scale development process described by Hinkin (1995) and its subsequent modification to the organisational learning context by Gallagher and Fellenz (1999). In the first stage, the four latent

factors that constitute this concept were identified from the prior literature. As described in the earlier section, strategic knowledge creation, distribution, interpretation and implementation are the main processes underlying strategic learning. Next, multi-item scales for each sub-process are developed. The measurement items are selected from prior organisational learning and dynamic capability scales that capture the strategic nature of learning. Altogether, 24 items were identified through a literature survey and integrated into one measurement tool through several validation procedures. Table 2 lists the original studies that provided the items that are adapted in this scale.

In the second stage, an item-sorting process suggested by Hinkin (1995) was conducted to ensure the validity of the chosen scale items. In the sorting process, nine academic experts reviewed and sorted the randomly ordered items into the proposed dimensions and an "other" category based on the theoretical construct definitions. Of the judges three were professors, three were assistant professors and three were doctoral students. These academic judges were chosen because all of them are working in the field of management and are familiar with the concept of strategic learning. According to Menor and Roth (2007) choosing judges based on their familiarity with the subject matter provides the most stringent test for the adequacy of the construct definitions and measurement items. The assessments were reported via a web-based questionnaire. Items that were assigned to the proper a priori category less than the suggested 80 percent of the time were reframed or deleted.

To further ensure the validity of the scale items, the scale validation process proposed by Polit *et al.,* (2007) was conducted. In the validation process, ten academic experts (nine experts from the item sorting process plus an additional doctoral student) assessed whether each item fitted with the definition of the construct it was intended to measure. These assessments were also reported via a web-based questionnaire. The assessment of fit was conducted using a scale ranging from 1 to 4 (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant and 4 = highly relevant). After the evaluations, the content validity index (Average I-CVI) was calculated, and the Average I-CVI (I-CVI/AVE) value was compared to the threshold value of 0.8 (Davis, 1992; Polit *et al.,* 2007). In this procedure, the I-CVI/AVE-value is calculated by first summing the number of expert evaluations with a score of 3 or 4 for a particular item and then dividing the sum by the number of experts (item-level content validity). Second, the item-level content validity indexes were averaged into the dimension level and then to the construct level to achieve the I-CVI/AVE value for the strategic learning construct. The I-CVI/AVE

value was 0.89, thus exceeding the threshold (0.80) (Davis, 1992; Polit *et al.,* 2007). In addition, in the measurement item selection state, the business managers from software companies evaluated the questionnaire and provided feedback. Scales were further modified according to these expert evaluations.

In the third stage, the validity and reliability of the measurement model was tested with quantitative survey data collected from the Finnish software industry in 2009. The Finnish software industry represents a dynamic context with knowledge-intensive and growing firms. Concentrating on the software industry helps to make the strategic learning phenomena visible, as firms operating in such an environment often benefit more from strategic learning than firms operating in more stable and predictable environments (Mintzberg and Lampel, 1999). The sample was drawn from the official Statistics Finland database, and included all Finnish software companies (1161) with five or more employees. The managing directors were chosen as key informants because they receive information from various departments and are therefore a valuable resource for evaluating different strategy-related variables of the firm. The variables were measured on a 5-point Likert scale (1=fully disagree, 5=fully agree). The data collection was performed using an e-mailed cover letter and web-based survey. Two reminders were mailed to each managing director who did not initially respond to the questionnaire. To increase the response rate, any companies that had not responded after the reminders were contacted by phone to confirm the identity of the contacts and explain the objectives of the study. A total of 210 managing directors answered the questionnaire, but four responses were excluded because the questionnaires were incomplete. Thus, 206 responses were included in the research (a response rate of 18 percent).

To test for non-response bias, the differences between actual respondents and non-respondents in terms of the variables available from the company register for revenue, profit and age were tested. While the T-tests showed that the non-respondents did not significantly differ from the respondents in terms of revenue and profit, a significant but small difference was found in the company age ($p < 0.05$). The respondent companies' average age was 11.7 years, whereas the age of the non-respondent companies was slightly higher at 13.7 years. Therefore, an additional test was conducted to compare the key study variables in the first third of the respondents to the last third (Armstrong and Overton, 1977; Werner *et al.,* 2007). In this test, the groups of early and late respondents did not differ significantly from each other, indicating that the data were satisfactorily unaffected by a non-response bias. However, it should be acknowledged that companies in this

dataset are on average slightly younger than companies in the Finnish software sector.

The companies in this study had an average turnover in 2009 (median in brackets) of €43.09 million (€1.86 million), had a return on investments (ROI) of 24.70 percent (10.30 percent), employed 426 (32) people, had a current ratio of 2.74 (1.60) and had been operating for 11.7 (9.0) years. Of the respondent companies, 28.2 percent were micro firms, 33.5 percent were small firms, 22.8 percent were medium firms and 15.5 percent were large firms.

Assessing common method bias

Due to the self-reported data, two techniques suggested by Podsakoff *et al.,* (2003) were employed to evaluate common method bias. First, Harman's one-factor test was conducted on all items. The principal axis factoring extracted four distinct factors with eigenvalues greater than one that accounted for 49 percent of the total variance, with the first factor accounting for 31 percent of the variance. Thus, no single factor emerged, nor did one factor account for most of the variance. Second, to confirm this result, a confirmatory factor analysis (CFA) was conducted to analyse if the model fit improved when the complexity of the research model was increased (Korsgaard and Roberson, 1995; McFarlin and Sweeney, 1992; Podsakoff et al. 2003). The results indicate that the single-factor model did not fit the data as well as the more complex models (see Table 3), thus supporting the results obtained from the Harman's one-factor test. Collectively, the results of these tests demonstrate that common method variance was not significantly present in the data and posed no threat to the interpretation of the results of the validation study.

Analysis and results

Exploratory factor analysis

To reduce the number of items and refine the scale, exploratory factor analysis (EFA) using principal axis factoring and promax rotation was used. A combination of methods was used to identify items and factors for inclusion in the final factor solution, and items were deleted incrementally. First, items that had low communalities (< 0.3) were considered for deletion. Three items were deleted according to this criterion. The items were 'Meetings are periodically held to inform all the employees about the latest innovations in the company', 'Our or-

ganisation has instruments (e.g., manuals, databases, files, and routines) that allow what has been learnt in past situations to remain valid, although the employees are no longer the same', and 'We have standard procedures that we follow to determine the usage of new strategic information'.

In addition, two items were deleted because they focused on separate factors that did not include the other items. These items were 'Individuals generate many new insights that are important to our competitiveness' and 'We continually question the perceptions we have made about our markets and customers'. In the final decision, the representativeness of each item identified was also examined as a candidate for deletion. Thus, the most representative and parsimonious set of factors was obtained. The final solution comprises 19 of the original 24 items. Four factors emerged from the analysis, each with an eigenvalue greater than one that accounted for 49 percent of the total variance. The final items are considered to be satisfactory because their main loadings range from 0.449 to 0.926, while side loadings remain below 0.3. The four-dimensional structure of the strategic learning construct followed the theoretical dimensions suggested by prior researchers. Table 2 shows the pattern matrix with a final list of the items.

To verify the internal consistency, Cronbach's alpha values were calculated for each of the four dimensions. All dimensions of strategic learning show satisfactory Cronbach's alpha values (0.77, 0.86, 0.80 and 0.78) that exceed the acceptable limit of 0.7 set by earlier research (Nunnally, 1978; Peterson, 1994). This result suggests that the reliability of the strategic learning measurement model is satisfactory.

Table 2. Exploratory factor analysis of strategic learning scale

Scale items		Factor loadings			
		1	*2*	*3*	*4*
Factor 1: Strategic knowledge creation (α: .77) (Atuahene-Gima *et al.*, 2007; Tsai *et al.*, 2008)					
CR1	In information search, we focus on acquiring knowledge of strategies that involve experimentation and high market risks	.492			
CR2	We prefer to collect market information with no identifiable strategic needs to ensure experimentation	.564			
CR3	Our aim is to acquire knowledge to develop projects that lead us into new areas of learning such as new markets and technological areas	.774			
CR4	We collect novel information and ideas that go beyond our current market and technological experiences	.679			
CR5	Our aim is to collect new information that forces us to learn new things in product development	.645			
Factor 2: Strategic knowledge distribution (α: .86) (Tippins and Sohi, 2003; Bontis *et al.*, 2002)					
DI1	Within our firm sharing strategic information is the norm		.645		
DI2	Within our firm, strategically important information is easily accessible to those who need it most		.709		
DI3	Representatives from different departments within our firm meet regularly to discuss new strategically important issues		.623		
DI4	Within our firm, strategically important information is actively shared between different departments		.926		
DI5	When one department obtains strategically important information, it is circulated to other departments		.793		
Factor 3: Strategic knowledge interpretation (α: .80) (Tippins and Sohi, 2003; Bontis *et al.*, 2002; Sinkula *et al.*, 1997)					
IN1	When faced with new strategically important information, our managers usually agree on how the information will impact our firm			.521	
IN2	In meetings, we seek to understand everyone's point of view concerning new strategic information			.631	
IN3	Groups are prepared to rethink decisions when presented with new strategic information			.612	
IN4	When confronting new strategic information, we are not afraid to reflect critically on the shared assumptions we have about our organisation			.740	
IN5	We often collectively question our own biases about the way we interpret new strategic knowledge			.633	
Factor 4: Strategic knowledge implementation (α: .78) (Bontis *et al.*, 2002; Crossan and Hulland 1997)					
IM1	Strategic knowledge gained by working groups is used to improve products, services and processes				.779
IM2	The decisions we make according to new strategic knowledge are reflected in changes to our organisational systems and procedures				.648
IM3	Strategic knowledge gained by individuals is input into the organisation's strategy				.600
IM4	Recommendations by groups concerning the use of strategic knowledge are adopted by the organisation				.449

Extraction Method: Principal Axis Factoring
Rotation Method: Promax with Kaiser Normalisation
Rotation converged in five iterations

Confirmatory factor analysis

To confirm the dimensionality of the strategic learning construct, a CFA was conducted with LISREL 8.80. Using the strategy of competing models suggested by Jöreskog (1993), fifteen competing models were analysed to validate the struc-

ture of the strategic learning construct. At this stage, no further items had to be removed to improve the model fit. The analysis of fit used the Maximum Likelihood estimation. The four-factor model (model 15) offered the best fit to the data ($\chi 2/df=1.30$, RMSEA=0.038, GFI=0.90, NFI=0.95, CFI=0.99, IFI=0.99, RFI=0.94) (Table 3). Furthermore, previous studies have treated learning as a higher-order construct (e.g., Jerez-Gómez *et al.,* 2005; Tippins and Sohi, 2003). In higher-order CFA models, the goal is to reproduce the correlations among the factors of an initial CFA solution with a more parsimonious higher-order factor structure (Brown, 2006). The results demonstrate that the second-order model (model 16) ($\chi 2/df=1.29$, RMSEA=0.037, GFI=0.90, NFI=0.95, CFI=0.99, IFI=0.99, RFI=0.94) fits the data satisfactorily and should be preferred over first-order factor models because it is more parsimonious. The final second-order measurement model is presented in Figure 2.

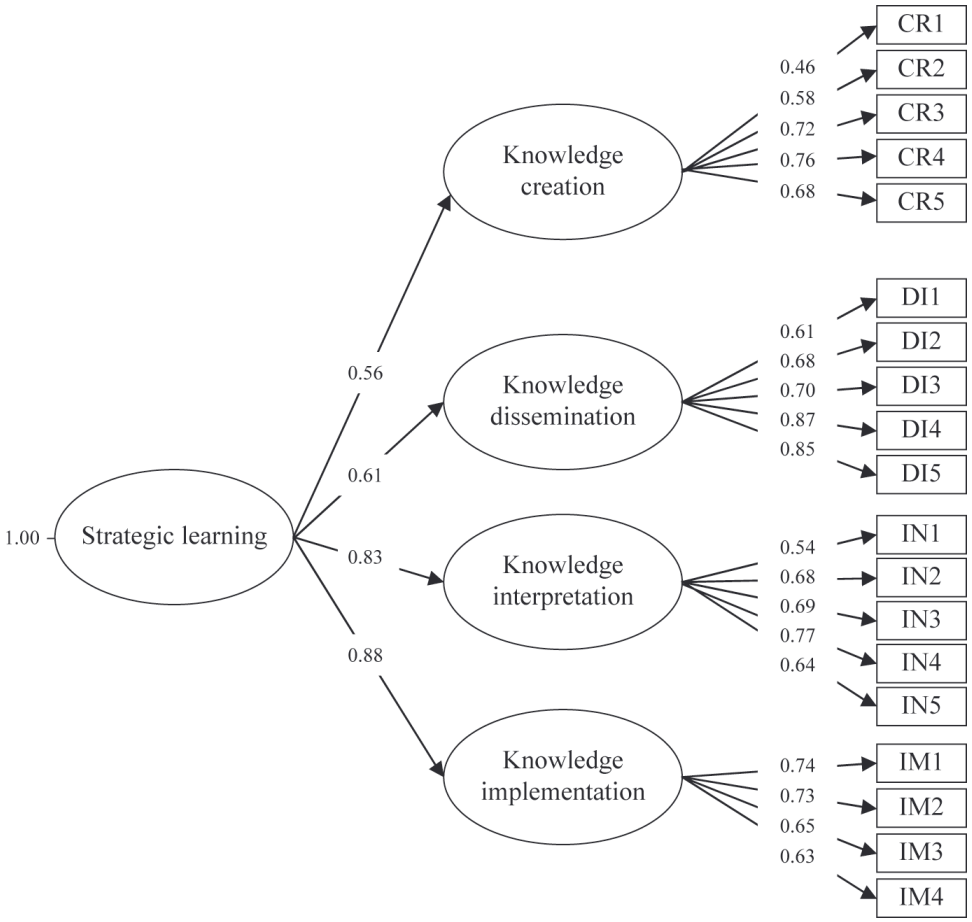

Figure 2. Second-order confirmatory factor model (standardised loadings)

Table 3. Summary results of confirmatory factor analysis: competing models

Models	df	χ2	p-value	χ2/df	RMSEA	GFI	NFI	CFI	IFI	RFI
M1: 1 dimensional	152	742.36***	0.00000	4.88	0.138	0.69	0.79	0.82	0.82	0.76
M2: 2 dimensions (CR-DI) (IN-IM)	151	542.64***	0.00000	3.59	0.112	0.75	0.84	0.88	0.88	0.82
M3: 2 dimensions (CR-DI-IN) IM	151	700.33***	0.00000	4.64	0.133	0.70	0.80	0.83	0.83	0.77
M4: 2 dimensions (CR-IM-DI) IN	151	682.64***	0.00000	4.52	0.131	0.70	0.80	0.84	0.84	0.78
M5: 2 dimensions (CR-IM-IN) DI	151	421.6***	0.00000	2.79	0.093	0.79	0.88	0.92	0.92	0.86
M6: 2 dimensions (CR-IN) (DI-IM)	151	603.2***	0.00000	3.99	0.121	0.73	0.83	0.86	0.86	0.80
M7: 2 dimensions (CR-IM) (IN-DI)	151	591.13***	0.00000	3.91	0.119	0.73	0.83	0.87	0.87	0.81
M8: 2 dimensions (IN-IM-DI) CR	151	566.26***	0.00000	3.75	0.116	0.75	0.84	0.87	0.88	0.82
M9: 3 dimensions (CR-DI) IN IM	149	484.47***	0.00000	3.25	0.105	0.77	0.86	0.90	0.90	0.84
M10: 3 dimensions (CR-IN) IM DI	149	387.78***	0.00000	2.60	0.105	0.81	0.89	0.93	0.93	0.87
M11: 3 dimensions (CR-IM) IN DI	149	342.64***	0.00000	2.30	0.105	0.82	0.90	0.94	0.94	0.89
M12: 3 dimensions (IN-DI) CR IM	149	451.91***	0.00000	3.03	0.100	0.79	0.87	0.91	0.91	0.85
M13: 3 dimensions (IN-IM) CR DI	149	254.38***	0.00000	1.71	0.059	0.97	0.93	0.97	0.97	0.92
M14: 3 dimensions (IM-DI) CR IN	149	342.64***	0.00000	2.30	0.080	0.82	0.90	0.94	0.94	0.89
M15: 4 dimensions	146	189.47***	0.00899	1.30	0.038	0.90	0.95	0.99	0.99	0.94
M16: second-order factor model	148	190.2***	0.01100	1.29	0.037	0.90	0.95	0.99	0.99	0.94

***p < 0.01

NOTE: df=degree of freedom; χ2 = Satorra-Bentler Scaled Chi-Square; RMSEA=Root Mean Squared Error of Approximation; GFI=Goodness-of-Fit Index; NFI= Normed Fit Index; CFI=Comparative Fit Index; IFI= Incremental Fit Index; RFI= Relative Fit Index.

Discriminant and convergent validity

The comparison of the competing CFA models provides evidence of discriminant validity. Fewer underlying factors lead to a significant deterioration of the model fit relative to the four-factor model. Further evidence of discriminant validity is provided by a low-to-moderate correlation among items constituting the various strategic learning sub-dimensions. As shown in Table 4, the correlations among items within each subscale are in principal greater than the correlations among items belonging to different subscales. However, the weak correlation between item IN1 and IN3 is an exception to this rule.

Table 4. Descriptive statistics and correlation matrix

Item	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CR1	2.79	1.036																		
CR2	3.35	0.991	0.340**																	
CR3	3.67	0.882	0.319**	0.430**																
CR4	3.73	0.868	0.301**	0.446**	0.541**															
CR5	3.89	0.877	0.334**	0.320**	0.509**	0.514**														
DI1	3.93	0.950	0.108	0.160*	0.148*	0.138*	0.132													
DI2	3.69	0.998	0.087	0.117	0.166*	0.191**	0.196**	0.605**												
DI3	3.87	0.920	0.053	0.239**	0.175*	0.158*	0.158*	0.397**	0.439**											
DI4	3.76	0.899	0.005	0.197**	0.173*	0.219**	0.205**	0.531**	0.555**	0.642**										
DI5	3.78	0.945	0.013	0.135	0.094	0.214**	0.165*	0.472**	0.579**	0.584**	0.766**									
IN1	3.81	0.862	0.118	0.150*	0.140*	0.204**	0.198**	0.329**	0.270**	0.220**	0.244**	0.289**								
IN2	3.89	0.845	0.164*	0.211**	0.205**	0.325**	0.267**	0.325**	0.369**	0.263**	0.314**	0.336**	0.472**							
IN3	3.82	0.803	0.108	0.234**	0.185**	0.226**	0.173*	0.201**	0.241**	0.311**	0.240**	0.323**	0.297**	0.454**						
IN4	4.04	0.798	0.041	0.202**	0.173*	0.299**	0.216**	0.223**	0.287**	0.307**	0.294**	0.349**	0.395**	0.513**	0.563**					
IN5	3.50	0.870	0.185**	0.165*	0.218**	0.215**	0.284**	0.263**	0.303**	0.269**	0.197**	0.340**	0.346**	0.379**	0.481**	0.509**				
IM1	3.89	0.741	0.129	0.180**	0.189**	0.310**	0.213**	0.189**	0.224**	0.372**	0.365**	0.390**	0.248**	0.361**	0.377**	0.429**	0.250**			
IM2	3.77	0.803	0.259**	0.205**	0.209**	0.283**	0.291**	0.221**	0.186**	0.263**	0.310**	0.261**	0.286**	0.349**	0.362**	0.442**	0.319**	0.556**		
IM3	3.85	0.764	0.237**	0.184**	0.263**	0.235**	0.245**	0.208**	0.172*	0.223**	0.250**	0.247**	0.311**	0.276**	0.325**	0.307**	0.239**	0.481**	0.503**	
IM4	3.43	0.750	0.251**	0.166*	0.285**	0.310**	0.231**	0.179*	0.300**	0.380**	0.306**	0.394**	0.181**	0.336**	0.368**	0.339**	0.455**	0.451**	0.401**	0.412**

CR= knowledge creation; DI=knowledge dissemination; IN=knowledge interpretation; IM= knowledge implementation

**$p \leq 0.01$; *$p \leq 0.05$ (two-tailed)

Convergent validity exists when a significant correlation is obtained among variables that form part of the studied construct. Table 5 presents the correlations between the four strategic learning sub-dimensions. The results show that the correlations are significant (**p ≤ 0.01), which validates the presence of convergent validity.

Table 5. Correlation among strategic learning capabillity subscales

	1. Creation	2. Distribution	3. Interpretation	4. Implementation
1. Creation	1.00			
2. Distribution	0.247**	1.00		
3. Interpretation	0.362**	0.477**	1.00	
4. Implementation	0.416**	0.434**	0.568**	1.00

**p ≤ 0.01; *p ≤ 0.05 (two-sided test)

In summary, the results show strong evidence for the four dimensions of strategic learning, as suggested by prior research. The results confirm that strategic learning is a latent multidimensional construct that is manifested through strategic knowledge creation, distribution, interpretation, and implementation processes. Collectively, the results demonstrate that the reliability and validity of the developed 19-item measurement model is satisfactory, thus enabling its use in future studies.

Discussion

This study was motivated by the lack of an applicable measurement tool for strategic learning. Although the studies of Anderson et al. (2009) and Green *et al.,* (2008) highlighted the empirical testing of strategic learning, they examined only a type of learning that results from strategic mistakes. The present research aims to create a better understanding of strategic learning that draws not only on mistakes, but also on other sources of knowledge. In this study, strategic learning is defined as a firm's higher-order learning capability that concerns an organisation's ability to process strategic-level knowledge gained from creative search in a way that renews its strategies. Building on this definition, the current study's goal was to contribute to the strategic learning literature by developing a multidimensional measurement tool for strategic learning, demonstrating the validity and usefulness of this construct for future learning studies. Using prior theoretical models of strategic learning (Kuwada, 1998; Thomas *et al.,* 2001) and the infor-

mation processing view of organisational learning (Huber, 1991), the study illustrated an integrative strategic learning framework that is consistent with the emergent view of strategy identification (Mintzberg, 1994). The proposed model advances the strategic learning theory by describing a multidimensional learning process that involves different key knowledge processes and various actors across the organisation. Furthermore, the model integrates the cognitive knowledge processes of creative search and strategic sense-making and proposes that these two processes are fundamental to developing the capability of strategic learning.

Expert evaluations and an empirical study of 206 software companies showed strong evidence for the developed and operationalised strategic learning model. Furthermore, the results demonstrate the internal consistency and construct reliability of the developed 19-item measurement scale, suggesting that the measurement scale is valid and reliable. Based on these results, this study confirms the theoretical assumption that strategic learning is a four-dimensional construct consisting of strategic knowledge creation, distribution, interpretation and implementation. The critical contribution of the developed scale provides a device to assess strategic learning in its entirety instead of only focusing on learning from mistakes, as previous measures have. The evidence of the results suggests that the strategic learning measurement model will be a useful tool for future research requiring the measurement of higher-order learning. In addition, the developed model helps to identify processes and activities that should be present for a firm to learn strategically.

Implications for management practice

At the organisational level, managers can use the developed measurement tool diagnostically. For example, using the model to identify potential areas for improvement can bring focus to organisational development efforts to enhance strategic learning. Furthermore, the strategic renewal literature emphasises the proactive role of managers in initiating novel knowledge progressions (Crossan and Berdrow, 2003). To facilitate strategic knowledge creation, managers are advised to use "boundary spanners" (Daft and Weick, 1984) and encourage individuals to engage in new and risky projects that have the potential to produce new knowledge that differs from the existing knowledge domains. A method that enables managers to stimulate knowledge creation and expand the number of strategic options is the use of dialectical inquiry (Chanin and Shapiro, 1985). Woods (2012) notes that in dialectical inquiry conflicting information disseminated via debate groups can lead to a higher level understanding of the problems, issues and as-

sumptions facing strategic decision makers. The use of debate groups facilitate the development of opposing viewpoints, challenge old assumptions and foster the creation of alternative conceptions that may prove to be valuable when the manager confronts difficult strategic decisions. Raising conflicting viewpoints to the surface of management practice is argued to be effective stimulator of manager's cognitive learning process and thus a valuable tool to promote strategic learning in organisations.

To facilitate knowledge distribution, managers should reduce internal communication barriers. Cross-functional teams, face-to-face interactions, discussion forums, and other cross-functional interfaces enhance the knowledge sharing between teams and departments. In particular, middle-level managers appear to have an important role in supporting initiatives from operating levels, combining these with firm strengths and transferring them to decision-making level (Wooldridge *et al.,* 2008). Interpretation requires organisations to advance reflective discussion that creates a shared interpretation of the new knowledge among personnel, which may then lead to an implementation decision. Implementation refers to the development of organisational practices, such as databases, formal training, manuals, and descriptions of best practices, to enable effective organisational action.

Beer *et al.,* (2005) notes that commitment and accountability from all members is crucial if the organisation is to achieve its strategic goals. One of the strengths of strategic learning, compared to more formal strategy processes, is that it integrates strategists from different levels of organisation. The increased participation increases individuals' commitment and responsibility for the strategic actions of the firm, thus improving its goal achievement. To increase the participation in the strategic learning process at the individual level, it is important for managers to create a rationale for "intelligent failure" in their organisations (McGill and Slocum, 1993; Vera and Crossan, 2004). Thus, creating an open and tolerant culture that encourages individuals to experiment with new strategic alternatives, even if they sometimes fail, provides a fertile ground to the creation of superior strategic initiatives.

Some researchers suggest that strategic learning situations are applicable to only some type of strategy-making. For example, Mintzberg and Waters (1985) suggest that in a situation when necessary strategic information can be easily brought to a central location in the organisation and when the environments can be largely understood, strategic learning may not achieve its full benefits. In these situations, companies may benefit from choosing a more deliberate form of strategy-making

and, at least for a time, pursue a more planned strategy approach. However, Casey and Goldman (2010) emphasise that the emergent view does not preclude participation in the strategic planning processes. Therefore, those companies that operate in more stable industries also benefit from dedicating sufficient resources to cultivating strategic learning within their firms. Thus, for those companies a combination of strategic learning and strategic planning appears to be an advisable approach (Brews and Hunt, 1999; Goold, 1992).

Limitations and areas for future research

Notwithstanding its contributions, this study has limitations, many of which highlight areas for future research. First, future research is needed to ensure that this study has identified the most relevant sub-processes for strategic learning. Although the study followed well-documented strategic learning models when identifying the four key knowledge processes, the development of all potential constructs involves multiple empirical examinations. Thus, future research might examine whether there are other dimensions of strategic learning that should be incorporated in the measurement. Second, although the validation study and the use of a panel of expert judges present substantial support for the developed construct, future research is necessary to further examine and refine the measurement method. Third, although the validation data have many strengths, the data represent a cross-section of single informants. Future research would benefit from a longitudinal design and from capturing the views of other members in an organisation that are involved in the strategic learning process. Fourth, the data were collected from the Finnish software industry, which limits the generalisability of the results. Thus, future studies should test the measurement model in other industries and cultures. However, given that this study is the preliminary test of a new four-dimensional scale for strategic learning, the measurement model has the potential to provide a valid and reliable tool for future research. This 19-item scale can be contrasted with the prior measures that have captured strategic learning only with four to six items. Therefore, despite the limitations, this study provides a strong starting point for future empirical research concerning measurements of strategic learning.

Conclusions

Given that firms face increasing pressures in all sectors to quickly adapt to changes in their business environment, the ability of companies to adapt and renew their strategies is fundamental to understanding their ability to adjust, survive and achieve success. The current study has provided researchers and practitioners with an important tool for measuring the concept of strategic learning, which is at the core of this understanding. The measurement model developed and tested in this study reinforces the strategic learning literature by identifying and measuring the different sub-processes that enable a company to strategically learn from discovery and to change. The developed model suggests that firms that demonstrate enhanced strategic learning capabilities tend to be those with more effective skills in creating, distributing, interpreting and implementing strategic knowledge. In conclusion, the measurement tool provides an important foundation for additional strategic learning research.

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EXPLORATION AND EXPLOITATION STRATEGIES, PROFIT PERFORMANCE, AND THE MEDIATING ROLE OF STRATEGIC LEARNING: ESCAPING THE EXPLOITATION TRAP

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This study focuses on the role of strategic learning as a mediating construct between opportunity-seeking (exploration) and advantage-seeking (exploitation) strategies and profit performance. Prior studies argue that the effect of these core elements of strategic entrepreneurship (exploration and exploitation) cannot be fully captured through their direct effects on profit performance, but that this relationship consists of mediating factors. This study proposes that the process of strategic learning, through its intraorganizational elements that enable the dissemination, interpretation, and implementation of strategic knowledge, enables firms to capitalize on the benefits of both exploration and exploitation strategies. Results from 206 Finnish software firms indicate that strategic learning fully mediates the relationship between exploration, exploitation, and profit performance. The result contributes by stressing the importance of strategic learning processes, especially in conjunction with entrepreneurial exploration strategies. Furthermore, the study demonstrates that the effect from exploration to strategic learning is moderated by the level of exploitation. This moderation effect suggests that the strategic learning is limited, being a path dependent capability that favors exploitation over exploration when stretched. However, strategic learning effectively allows both types of strategies to improve profit performance. Copyright © 2012 Strategic Management Society.

INTRODUCTION

The strategic entrepreneurship literature integrates entrepreneurship and strategic management research to study the antecedents, effects, and mechanisms of opportunity-seeking (exploration strategy) and advantage-seeking (exploitation strategy) behaviors, suggesting the existence of positive performance effects derived from the balanced application of these strategies (Hitt *et al*., 2011; Hitt *et al*., 2001; Ireland, Hitt, and Sirmon, 2003; March, 1991; O'Reilly and Tushman, 2008). Although some of the studies report direct effects of exploration and exploitation on firm performance, others (Raisch *et al*., 2009; Raisch and Birkinshaw, 2008; Simsek *et al*., 2009) contend that the relationships are more complex, with various factors either mediating or moderating the linkages. Recently, researchers have proposed various processes (e.g., innovation process) and capabilities (e.g., absorptive capacity) that support the capitalization of these strategies (Kohtamäki, Kautonen, and Kraus, 2010; Lubatkin

Keywords: exploration strategy; exploitation strategy; ambidexterity; strategic learning; exploitation trap; profit performance
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et al., 2006; Rothaermel and Alexandre, 2009). Overall, researchers (e.g., Simsek *et al*., 2009) call for studies analyzing firms' internal process-related mediating and moderating factors in the link between exploration, exploitation and firm performance.

To address this issue, we introduce the construct of strategic learning (e.g., Mintzberg and Waters, 1985) as a mediating factor. The study builds on the information processing view of organizational learning (Huber, 1991) and on Thomas, Sussman, and Henderson's (2001) strategic learning framework in developing the concept of strategic learning. Here we define strategic learning as an organization's dynamic capability, consisting of intraorganizational processes for the dissemination, interpretation, and implementation of strategic knowledge (Kuwada, 1998; Pietersen, 2002; Thomas *et al*., 2001). Recently, scholars have suggested that such strategic learning capabilities enable firms to incorporate strategic knowledge from past entrepreneurial and strategic actions in a way that yields competitive advantages and performance benefits (Anderson, Covin, and Slevin, 2009; Covin, Green, and Slevin, 2006; Kuwada, 1998). For example, Garrett, Covin, and Slevin (2009) found that strategic learning improves the effectiveness and efficiency of market pioneering strategies. Strategic learning makes this opportunity-seeking entrepreneurial behavior more acceptable to risk-averse managers, thus improving new business creation and competitive advantage (Garrett *et al*., 2009). In addition, Kyrgidou and Hughes (2009: 52) argue that 'learning, surprisingly, is absent in the current model of strategic entrepreneurship' and that 'by understanding the role of learning and dynamic capabilities in strategic entrepreneurship, we would be in better position to understand the tension caused by exploration and exploitation' (Kyrgidou and Hughes, 2009: 58) Building on these arguments, we suggest that firms require strategic learning to capture and apply strategic knowledge gained from opportunity-seeking and advantage-seeking strategies.

This proposition is based on two main hypotheses. First, the exploration strategy creates new knowledge through experimental and exploratory actions that are inherent to entrepreneurial behavior (Anderson *et al*., 2009). This new knowledge departs from a firm's existing knowledge and strategies. The strategic learning process allows a firm to evaluate, distribute, and integrate exploratory knowledge in such a way that the entire organization can use and act on it to achieve common organizational goals (Garrett *et al*., 2009; Slater and Narver, 1995). Second, exploitation strategy creates knowledge regarding improved applications of existing resources and capabilities, primarily in localized practices. The strategic learning process increases the value of exploitation because it enables exploitative initiatives originating in one subunit to be assimilated and incorporated by others. Therefore, strategic learning allows firms to capture the benefits of both exploration and exploitation strategies (Lubatkin *et al*., 2006; Verona and Ravasi, 2003).

However, scholars suspect that strategic learning is a limited capability that can be applied only to a particular extent within a specific time frame (Crossan, Lane, and White, 1999; Deeds, Decarolis, and Coombs, 2000; Levinthal and March, 1993). That is, strategic learning capabilities are constrained in their use due to path dependencies and a firm's complementary assets (Cohen and Levinthal, 1990; Deeds *et al*., 2000). Often, the limited learning capacity manifests in exploitative learning initiatives because companies have a tendency to invest in and execute exploitative learning initiatives at the expense of explorative ones. Organizations are prone to meeting the needs of existing customers via established competences and products to strengthen current customer ties and short-term profits (Jansen *et al*., 2009; Jansen, van den Boch, and Volberda, 2006). This phenomenon is defined as the exploitation trap. Researchers warn companies not to overinvest in exploitation because exploitation obstructs learning from explorative actions, thus endangering the long-term viability of the firm (Crossan *et al*., 1999).

This study seeks to contribute to the strategic entrepreneurship literature by addressing the following research question: to what extent does strategic learning mediate the relationships between opportunity-seeking (exploration) strategy, advantage-seeking (exploitation) strategy, and a firm's profit performance? We found that the impacts of exploration and exploitation strategies on the firm's profit performance are fully mediated by the strategic learning process. These findings increase our understanding of the internal processes in which companies should invest to capitalize on their exploration and exploitation strategies. Furthermore, we advance the strategic entrepreneurship research by testing whether the relationship between exploration and strategic learning varies in strength depending on the level of exploitative activities the firm chooses. Therefore, the second research question is as follows:

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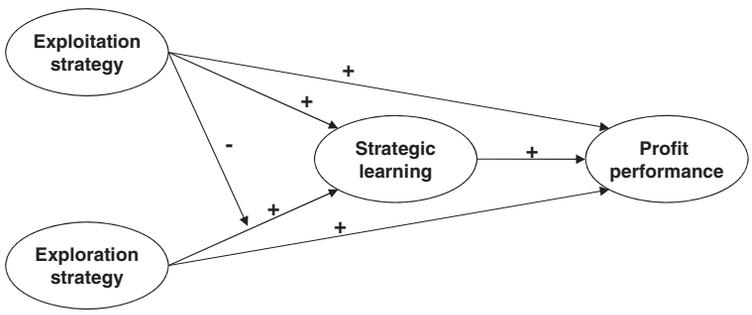

Figure 1. Theoretical model

does a firm's exploitation strategy moderate its exploration-strategic learning relationship? Our results demonstrate that exploitation negatively moderates the relationship between exploration and strategic learning. The findings contribute to our knowledge of strategic learning capabilities by demonstrating its limited nature. Therefore, managers must make careful decisions regarding the strategic activities on which they focus.

The following section presents the theoretical basis for the relationships, followed by hypotheses for the proposed research model (Figure 1). The Methods section summarizes the research design and methodology and is followed by an empirical analysis and results. The article concludes with a discussion of the findings and their implications.

THEORY AND HYPOTHESES

Exploration and exploitation strategies

Researchers have applied the tensions of exploration and exploitation to a wide range of organizational phenomena, including strategic entrepreneurship (Hitt *et al*., 2011; Ireland *et al*., 2003). In this study, exploration and exploitation are viewed as two distinct strategic activities (Burgelman, 1991, 2002; Hitt *et al*., 2011; Lubatkin *et al*., 2006). The exploration strategy represents entrepreneurial actions (Hitt *et al*., 2011) that aim to create new business opportunities that emerge outside the scope of the current strategy. Exploration strategies are formed by increasing the innovation proximity of a firm's current technological/product trajectory and its existing customer/market segment. By increasing variety, exploration activities enable firms to recognize opportunities, develop new knowledge, and create capabilities that are necessary for survival and long-term prosperity (Ireland *et al*., 2003; March, 1991; Uotila, *et al*., 2009). Exploration strategies manifest in new products, processes, and markets (Ireland *et al*., 2003; Lumpkin and Dess, 1996). In contrast, the goal of exploitation strategies is to exploit a firm's current competitive advantage by efficiently managing the firm's existing resources and capabilities to improve the designs of current products and services or to strengthen current customer relationships (Benner and Tushman, 2003; Hitt *et al*., 2011; Lubatkin *et al*., 2006). The exploitation strategy reduces variety by increasing operational efficiency and improving the capability to adapt to the current environment (March, 1991; Uotila *et al*., 2009).

Prior empirical research has provided evidence of the positive performance impacts of ambidexterity—the joint pursuit of exploration and exploitation strategies (Gibson and Birkinshaw, 2004; He and Wong, 2004; Lubatkin *et al*., 2006). However, some have argued that these strategies do not necessarily guarantee performance and that the connection between ambidexterity and performance is more complicated. For example, Venkatraman, Lee, and Iyer (2007), did not find empirical support for the relationship between ambidexterity and performance. Moreover, studies have provided evidence that exploration and exploitation are curvilinearly related to performance. For example, Bierly and Daly (2007) found that the relationship between exploitation and performance is concave and that the relationship between exploration and performance was weaker than prior studies had suggested. Furthermore, using a multi-industry sample, Rothaermel and Alexandre (2009) identified an inverted, U-shaped relationship between firms' technology sourcing mixes and performance. They found

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that firms with higher levels of absorptive capacity obtained greater benefits from exploration and exploitation. Building on these initial results, we introduce the emerging concept of strategic learning and suggest that firms should invest in strategic learning processes to benefit from both opportunity-seeking and advantage-seeking behaviors.

Strategic entrepreneurship and strategic learning

The question of how firms create and sustain a competitive advantage (strategic management) while simultaneously identifying and exploiting new opportunities (entrepreneurship) is at the heart of strategic entrepreneurship research (Hitt *et al*., 2011; Hitt *et al*., 2001; Ireland *et al*., 2003). For a firm, a successful strategic entrepreneurship process requires the continuous development, utilization, and even radical renewal of its resources and capabilities (Sirmon, Hitt, and Ireland, 2007). Learning how to acquire, bundle, leverage, and renew the firm's strategic resources is critical to achieving a competitive advantage and creating value (Hitt *et al*., 2011). The importance of learning is particularly evident for firms operating in dynamic environments (Mintzberg and Waters, 1985; Teece, 2007; Volberda, 1996), such as the information technology industry. In these environments, organizations that can convert information into knowledge and learning will succeed (Grant, 1996; Thomas *et al*., 2001). In general, whereas prior strategic management (Mintzberg and Waters, 1985) and entrepreneurship (Covin *et al*., 2006) literature recognizes the strategic role of organizational learning, scholars have only recently begun to study in-depth the effects of strategic learning on firms' success (e.g., Anderson *et al*., 2009; Covin *et al*., 2006; Garrett *et al*., 2009).

Interest in levels of strategic learning stemmed from the criticism directed toward traditional strategic planning research (Mintzberg and Waters, 1985). Scholars have questioned the formality and rationality of the strategy process (Mintzberg and Lampel, 1999) and have argued that the essence of a firm's success is in its ability to continuously craft and reformulate strategies (Voronov and Yorks, 2005). This approach is sometimes referred to as the learning school of strategy (e.g., Mintzberg and Lampel, 1999). Building on the resource-based (Barney, 1991; Wernerfelt, 1984) and knowledge-based views (Grant, 1996), the learning school uses organizational learning theories to provide insight into how organizations can interpret, distribute, and incorporate strategically important knowledge to facilitate and continuously recreate competitive advantages (Hamel, 2009).

Some strategy scholars from the learning school (e.g., Kuwada, 1998; Mintzberg and Waters, 1985; Thomas *et al*., 2001) refer to learning behaviors and processes that generate a firm's long-term adaptive capabilities as strategic learning. Therefore, strategic learning represents an organization's dynamic capability (Collis, 1994; Eisenhardt and Martin, 2000). Strategic learning is a process in which strategic knowledge, gained from strategic activities and used for subsequent strategic purposes (Zack, 2002), is transferred from the individual to the group and finally to the organizational level and back again to facilitate individual learning (Bontis, Crossan, and Hulland, 2002; Crossan *et al*., 1999; Huber, 1991). Therefore, strategic learning is organizational, socially constructed, and collective in nature (Crossan *et al*., 1995).

Establishing the concept of strategic learning and its relationship with exploration and exploitation strategies

The strategic learning process shares a number of similarities with the information processing view of organizational learning (Huber, 1991) and the dynamic capability view of absorptive capacity (Zahra and George, 2002). In fact, strategic learning captures the main dimensions of absorptive capacity, i.e., 'to recognize the value of new information, assimilate it, and apply it to commercial ends' (Cohen and Levinthal, 1990: 128). Therefore, we built on these streams of literature in developing the construct. In line with Anderson *et al*. (2009), Covin *et al*. (2006), Kuwada (1998), Thomas *et al*. (2001), Voronov and Yorks (2005), and several other researchers, we argue that strategic learning should be considered a specific type of organizational learning that concerns an organization's ability to process strategic-level knowledge in a way that renews its strategies.

In this study, strategic learning is defined as a higher-order learning process through which firms internalize strategic knowledge gained from opportunity-seeking and advantage-seeking strategic activities in a way that improves their competitive position. The distinctive definition of strategic learning involves three key components. First, strategic learning leads to a firm's strategic renewal, aimed at

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improving the firm's competitive position (Anderson *et al*., 2009; Kuwada, 1998; Voronov and Yorks, 2005). Therefore, strategic learning aims to develop and renew a firm's strategies to keep ahead of the competition, whereas organizational learning helps firms realize and implement their predefined strategies (Voronov and Yorks, 2005).

Second, strategic learning is, by definition, a strategic knowledge application process (Crossan *et al*., 1999; Kuwada, 1998; Thomas *et al*., 2001). We argue that strategic knowledge itself is an important asset but requires a strategic learning process to spread and incorporate the know-ledge into new technologies, products, and services (see also Nonaka and Takeuchi, 1995). The definition of strategic learning highlights the role of organizations' higher-level internal processes of knowledge transfer and integration.

Third, strategic learning enables firms to process the knowledge created by exploration and exploitation strategies (Anderson *et al*., 2009; Covin *et al*., 2006; Kuwada, 1998). As the strategic learning process does not create strategic knowledge by itself, it is dependent on the know-ledge created by opportunity-seeking and advantage-seeking strategies. Exploration strategy generates strategic knowledge of new market opportunities, which is capitalized through strategic learning regarding new businesses of the firm (Anderson *et al*., 2009; Lubatkin *et al*., 2006; Wang, 2008). In contrast, the exploitation strategy creates strategic knowledge that is based on current business practices and competitive advantage, thus expanding the firm's present know-ledge base and ability to evaluate, incorporate, and apply current capabilities to commercial ends (Cohen and Levinthal, 1990). This study introduces exploration and exploitation strategies as antecedents of strategic learning because they are expected to generate strategic knowledge that facilitates the strategic-level knowledge application process.

The strategic learning model

Several prior case studies (Kuwada, 1998; Thomas *et al*., 2001) develop theoretical models for strategic learning and establish its underlying dimensions, but they do not empirically measure or test the dimensions constituting the concept. However, the process model of strategic learning proposed by Kuwada (1998) describes strategic learning as a process of knowledge creation and acquisition, information interpretation, transformation and distribution, and the retention of knowledge in organizational memory (Kuwada, 1998). The model highlights the importance of the strategic learning process as a part of firms' innovation processes. Thomas *et al*.'s (2001) strategic learning model builds on Kuwada's (1998) model, proposing that strategic learning manifests in knowledge acquisition, interpretation, and assimilation processes. Their findings emphasize the importance of deliberate learning in the successful development of firms' strategic actions. By building on these prior studies, we define the underlying dimensions of strategic learning as strategic knowledge distribution, interpretation, and implementation.

Strategic knowledge distribution

Strategic knowledge distribution refers to the sharing of strategic knowledge, which is acquired at an individual level and is shared through interactions between individuals within and across organizational units (Jerez-Gómez, Céspedes-Lorente, and Valle-Cabrera, 2005). Knowledge can be disseminated between individuals and units through formal and informal communication, dialogue, and debate (Garvin, 1993; Jerez-Gómez *et al*., 2005, Tippins and Sohi, 2003). Effective distribution of knowledge for strategic purposes requires the existence of previously obtained and related knowledge, agile information systems, and effective use of teams and personnel meetings to share ideas (Cohen and Levinthal, 1990; Jerez-Gómez *et al*., 2005). Strategic knowledge distribution is an important starting point for the development of shared organizational knowledge, which is important in the capitalization of exploration and exploitation strategies (Bierly and Hämäläinen, 1995; Crossan *et al*., 1999).

Strategic knowledge interpretation

Without the interpretation and development of shared understanding, learning will not occur (e.g., Day, 1994; Huber, 1991; Slater and Narver, 1995). For example, the interpretation of strategic knowledge allows firms to identify strategically meaningful fragments and take collective actions that affect a firm's strategy and performance (Tippins and Sohi, 2003). A firm's ability to develop a shared interpretation of knowledge influences how individuals act and how the organization performs (Huber, 1991; Tippins and Sohi, 2003).

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Strategic knowledge implementation

Strategic knowledge implementation is a formal process that institutionalizes new strategic knowledge into the nonhuman facets of organizations, such as organizational systems, structures, procedures, and routines (collectively referred to as organizational memory) (Huber, 1991; Walsh and Ungson, 1991). Organizational memory refers to the stock of knowledge possessed by an organization and includes knowledge about the recognized opportunity, thus enabling the effective implementation of new strategic opportunities (Levitt and March, 1988; Moorman and Miner, 1997). The level of prior strategic knowledge residing in the firm, in the form of organizational memory, also affects the development and outcomes of absorptive capacity (i.e., the firm's ability to access and absorb external R&D-related knowledge) (Cohen and Levinthal, 1990; Zahra and George, 2002). Moreover, organizational memory enables organizations to reduce unproductive exploration because the previously experienced and memorized successes and failures allow companies to compare and make conclusions regarding favorable strategies. Thus, strategic learning also helps an organization identify unfavorable business practices, recognize alternative approaches, and change approaches midstream (Garrett *et al*., 2009). To conclude, strategic learning is a latent multidimensional construct that is manifested through strategic knowledge distribution, interpretation, and implementation processes, and it plays an important role in the capitalization of entrepreneurial and strategic behaviors.

The mediating role of strategic learning

Recent studies posit possible internal processes for improving the effects of opportunity-seeking and advantage-seeking strategies on firm performance (Covin *et al*., 2006; Garrett *et al*., 2009; Rothaermel and Alexandre, 2009; Wu and Shanley, 2009). For instance, Wu and Shanley (2009) found that in the context of the U.S. electromedical device industry, the impact of exploration on innovative performance is complex and contingent on the characteristics of a given firm's knowledge stock. Furthermore, Rothaermel and Alexandre (2009) found that in technology sourcing settings, a firm's absorptive capacity allows it to achieve ambidexterity. In the entrepreneurial orientation literature, Covin *et al*. (2006) hypothesized that entrepreneurial firms need to learn from strategic failures to improve their sales growth rate. They argued that because entrepreneurial behaviors are inherently risky and often fail, strategic learning from these failures would help firms capture information about what should be changed to make new efforts successful. However, by concentrating on only one specific aspect of strategic learning, they did not find empirical support for their argument. In contrast, in the context of market pioneering, Garrett *et al*. (2009) found empirical support for the argument that the strategic learning capability of top management improves the effectiveness and efficiency of market pioneering. Market pioneering is a domain-redefinition form of strategic entrepreneurship (Kuratko and Audretsch, 2009), meaning entrepreneurial behaviors 'whereby the organization proactively creates or is among the first to enter a new product-market arena that others have not recognized or actively sought to exploit' (Covin and Miles 1999: 54). In uncontested markets, strategic learning ability reduces unproductive experimentation in the organization by helping it identify deficient business practices, recognize alternative approaches, and change behaviors (Garrett *et al*., 2009). Managers who are able to learn from their strategic actions and outcomes are also more likely to respond to truly novel market opportunities (Garrett *et al*., 2009). These initial results suggest that both opportunity-seeking and advantage-seeking strategies require specific learning capabilities to exert positive performance effects.

Firms that execute opportunity-seeking strategies concentrate on managing and designing their operations in ways that enable them to enter new business areas. They look for novel technological ideas, proactively search for creative ways to satisfy emerging customers' needs, and actively target new customer groups. According to Simsek *et al*. (2009), such explorative actions create new technical, social, and organizational knowledge. However, explorative behaviors do not generate returns without investment in the development, evaluation, and implementation of the new knowledge generated (Jansen *et al*., 2009; McGrath, 2001; Rothaermel and Alexandre, 2009). This argument is derived from the basic assumption of organizational learning literature that explorative ideas originate from individuals, not organizations (Crossan *et al*., 1999; Crossan *et al*., 1995; Nonaka and Takeuchi, 1995). However, organizations can support the development of these ideas into products, services, or process innovations. For example, Crossan *et al*. (1999) state that the

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commercial success of individuals' explorative insights depends on effective learning at all organizational levels. To utilize knowledge gained from exploration activities, organizations require a strategic learning process to transfer knowledge from the individual level to the organizational level. Crossan *et al*. (1999) referred to this feature as the 'feed-forward process' of strategic learning.

In detail, the dissemination of strategic knowledge enables individuals to share knowledge about their personal experiences and insights. While spreading the explorative ideas to others, individuals interpret the knowledge using words. These interactions result in the development of a shared understanding and consensus regarding the new strategic knowledge, which can be implemented into organizational activities through strategic knowledge implementation process. In such processes, the knowledge regarding new innovative technologies, product designs, or customer needs is institutionalized into the organizational systems, structures, and procedures that guide the actions of organizational members to achieve common goals (Crossan *et al*., 1999; Slater and Narver, 1995). Therefore, strategic learning carries explorative ideas from the individual level to organizational-level actions and performance.

Organizations typically structurally differentiate units that execute exploration and exploitation strategies (O'Reilly and Tushman, 2008; Teece, 2007). O'Reilly and Tushman (2008: 191) suggest that the critical task is not the structural decision that determines how the exploratory and exploitative functions are separated, but the processes by which these functions are integrated to create value. Therefore, we argue that to benefit from exploration and exploitation strategies, organizations require integrative strategic learning processes to increase the flow of knowledge across the structurally separated functions (Jansen *et al*., 2009). In the case of exploration, the knowledge is novel, complex, and in many cases, ambiguous (Atuahene-Gima and Murray, 2007; McGrath, 2001). In addition, the integration and use of exploratory knowledge becomes more difficult when the distance between a firm's existing knowledge base and the new knowledge increases (Cohen and Levinthal, 1990). Strategic learning enables the integration of knowledge into the organization (Atuahene-Gima and Murray, 2007; McGrath, 2001), enhances the speed of opportunity capitalization, and increases firms' profit performance (Cohen and Levinthal, 1990).

Furthermore, rapid capitalization of the recognized entrepreneurial opportunities is of importance as, in time, the value of those opportunities will decrease, particularly in dynamic business environments (Eisenhardt and Sull, 2001). Therefore, the ability to share, interpret, and implement knowledge enhances the probability of rapid market entry and capitalization of the radical or disruptive innovation that is derived from entrepreneurial opportunity (Ireland *et al*., 2003; Wu and Shanley, 2009). We argue that strategic learning serves as a mechanism that transforms new business opportunities into new products and services.

Hypothesis 1 (H1): The relationship between exploration strategy and profit performance is mediated by strategic learning.

Several scholars have argued that strategic learning helps firms benefit from exploitation strategies (Bontis *et al*., 2002; Crossan and Berdrow, 2003; Crossan *et al*., 1999). Their argument is that although exploitative actions are, by definition, developments that take place in any part of the organization, the lessons learned during the development process must be mobilized, integrated, and applied across all organizational units (Jansen *et al*., 2009; Rothaermel and Alexandre, 2009). Crossan *et al*. (1999) refers to this feature as the 'feedback process' of strategic learning. This process allows different functions and teams to take advantage of the exploitative actions of others through incremental learning (Crossan *et al*., 1999). Indeed, exploitative knowledge is primarily developed through localized practices relating to interactions with a business unit's existing customers and suppliers. This occurrence may facilitate diverse operational capabilities or competencies at dispersed locations within an organization (Gilbert, 2006). According to Jansen *et al*. (2009), these divergent competences must be effectively mobilized and integrated to generate sustaining innovations i.e., new combinations of exploitative products and technologies (see also Ireland *et al*., 2003). Strategic learning processes enable the dissemination and institutionalization of localized practices to increase firm performance through incremental innovations (Kuwada, 1998). Therefore, strategic learning mechanisms serve as information bridges across functions and help integrate and recombine differentiated knowledge sources (Jansen *et al*., 2006; Nahapiet and Ghoshal, 1998). Therefore, we argue that strategic learning mediates the relation-

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ship between exploitation strategies and profit performance because it integrates exploitative knowledge sources across organizational units.

Hypothesis 2 (H2): The relationship between exploitation strategy and profit performance is mediated by strategic learning.

The moderating role of exploitation strategies and the exploitation trap

Prior studies suggest that although the ability to learn is critical for the success of exploration and exploitation strategies (Cohen and Levinthal, 1990; Rothaermel and Alexandre, 2009), the learning processes are fundamentally constrained (Crossan *et al*., 1999; Deeds, *et al*., 2000; Levinthal and March, 1993). For example, Crossan *et al*. (1999) recognized that firms may face bottlenecks in the successful accomplishment of exploration and exploitation strategies due to organizations' limited capabilities to internalize and use new knowledge. Steensma (1996), who studied the acquisition of technological competencies through interorganizational collaborations, proposes that this limited learning capability means that high levels of interaction may have little influence on the depth of knowledge attained because firms will not be able to fully utilize the rich information acquired. According to Deeds *et al*. (2000), the learning capabilities, though dynamic, are constrained in their direction due to path dependencies (i.e., learning is inherently linked to a firm's history and previous activities) and complementary assets (i.e., learning is linked to the complementary nature of established resources). Cohen and Levinthal (1990; Zahra and George, 2002) state that the path dependency of absorptive capacity is due to the previously accumulated knowledge stock, which influences the effectiveness of exploration and exploitation.

The tendency of learning processes to favor the assimilation of exploitative knowledge for commercial ends has been found to form exploitation traps, which are also referred to as competency traps (Levinthal and March, 1993; Wu and Shanley, 2009). In a case of an exploitation trap, high levels of exploitation dominate the strategic learning capability of a firm, restricting the explorative innovations (He and Wong, 2004). Investing in exploitation at the cost of exploration is often tempting for a firm because the outcomes of exploitation are proximate and certain (March, 1991). However, this choice may result in firms focusing only on the near future, thus weakening the probability that long-term investments and opportunities will be realized through strategic learning (Auh and Menguc, 2005), leading to core rigidity (Leonard-Barton, 1992).

Therefore, by building on the previous arguments, we contend that the impact of exploration on strategic learning is influenced by exploitation. In particular, exploitation weakens the hypothesized relationship between exploration and strategic learning due to organizations' limited strategic learning capabilities that favor the internalization of knowledge from exploitation strategies.

Hypothesis 3 (H3): Exploitation strategies will negatively moderate the relationship between exploration and strategic learning.

METHODS

Data collection, response pattern, and respondents

The data for the study were collected from the software industry in Finland between June and August of 2009, in the middle of a period of economic recession and high economic uncertainty. The timing of the study was particularly relevant because strategic learning is expected to play an important role in dynamic and uncertain business environments (Mintzberg and Lampel, 1999; Volberda, 1996). The sample was drawn from a comprehensive database that contained information regarding all Finnish businesses that were liable to pay value-added tax. Our sampling frame included all software companies with five or more employees, resulting in a sample size of 1,161. We received 210 responses to our Web-based survey, which was addressed to managing directors; four responses were excluded because the questionnaires were incompletely filled. During the data collection process, two reminders were sent to the companies; after the reminders, all of the nonrespondents were contacted by phone and asked to complete the questionnaire. The data collection resulted in a final sample size of 206, representing a response rate of 18 percent, which is acceptable for this type of survey (Baruch, 1999).

To assess the quality of the data, we tested for various potential biases, but found no considerable indication. First, we tested the data for a potential nonresponse bias. Initially, we compared actual respondents to real nonrespondents in terms of three

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variables available from the firms' registers for revenue, profit, and age. Whereas the nonresponders did not statistically significantly differ from the respondents in terms of revenue and profit, we found a statistically significant but small difference in terms of firm age ($p < 0.05$). The respondent companies' average age was approximately 11.7 years, whereas the age of the nonrespondent companies was slightly greater (13.7 years). Therefore, we tested for the potential effects of nonresponse by comparing the first third of the respondents to the last third via the key study variables (Armstrong and Overton, 1977; Werner, Praxedes, and Kim, 2007). In this test, the groups of early and late respondents did not differ statistically significantly from each other, suggesting that the data were sufficiently free from nonresponse bias. Nevertheless, based on the combined results of the two tests, we must acknowledge that in our data set, the companies are slightly younger than companies in the Finnish software sector on average. However, the favorable results of the wave analysis suggested that this difference was not a serious issue for the main analysis of the study.

Being familiar with the important issue of common method variance, we tested and controlled for this potential bias using different methods. For example, various response formats and items intended to reduce bias caused by social desirability were utilized (Podsakoff *et al*., 2003). Statistically, we applied three different techniques to analyze and control for the effect of common method bias. First, Harman's one-factor test (1976) was conducted by using principal axis factoring. According to Podsakoff and Organ (1986), common method variance is not a problem if items load on multiple factors and one factor does not account for most of the covariance. Some researchers state that the first factor frequently explains more than 50 percent of the variance in the factor model, even in cases where the common method bias does not yet create a serious threat to the interpretation of the results (Ylitalo, 2009). Factor analysis of our 38 items resulted in 10 factors with eigenvalues greater than 1, which explains 64 percent of the variance among the items. However, the first factor accounted for only 20 percent of the variance. This suggested that common method variance did not pose a serious threat to the interpretation of the results. However, we also tested for the existence of common method variance by analyzing whether the model fit improved when the complexity of the research model was increased. Prior studies recommend this technique over Harman's one-factor test (Iverson and Maguire, 2000; Korsgaard and Roberson, 1995; McFarlin and Sweeney, 1992; Podsakoff *et al*., 2003). We compared the single-factor model to the original and more complicated research model and found that the research model obtained a better goodness-of-fit index (0.40) than the single-factor model (0.23). This suggested that the research model provides a better fit to the data than the single-factor model, indicating that common method variance was not a problem in this data set. Finally, we applied the marker variable approach, which has been described as a good method to control for the effect of common method variance (Podsakoff *et al*., 2003; Ylitalo, 2009). Prior studies note that because researchers typically do not include theoretically nonrelated marker variables in their questionnaires, as was the case in this study, they can instead apply a construct that exhibits a low correlation with the main study variables (Richardson, Simmering, and Sturman, 2009; Ylitalo, 2009). Therefore, in the present study, we applied environmental dynamism as a marker variable to control for the common method effects on both dependent variables during the analysis. Environmental dynamism was applied because it was measured in a similar way to the main variables and, thus, was likely to include the same method variance. During the analysis, the application of the marker variable did not seriously affect the results, as it only slightly strengthened the hypothesized path from exploitation to strategic learning while simultaneously weakening the direct path from exploitation to firm performance, providing support for the research model and our interpretation. Therefore, based on these results, we concluded that common method variance was not present in the data, was effectively controlled for in the analysis, and posed no threat to the interpretation of the results of the study.

The study applied the key respondent approach, using managing directors as the key respondents. Of the respondents, 83.5 percent were managing directors, 11.7 percent were middle management (e.g., sales managers), 2.4 percent were experts (e.g., product development specialists), and 1.0 percent worked in other positions. Of the responding companies, 28.2 percent were micro firms, 33.5 percent were small firms, 22.8 percent were medium-sized firms, and 15.5 percent were large firms. A typical respondent firm in the sample (median value) had an annual turnover of 2.3 million euros and a return on investment of 31 percent, employed a staff of 19,

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served 50 customers, and had been in business for nine years.

Methods and data analysis

The present study applied a nonparametric approach to structural equation modeling, namely the partial least squares (PLS) approach (Chin, 1998). Estimations were performed using the application SmartPLS 2.0 (Ringle, Wende, and Will, 2005). Although there are many reasons to favor one structural equation modeling technique over another, we had two important motives for using PLS. First, PLS is particularly well suited for testing for interaction effects due to its ability to model latent constructs without measurement error (Mitchell, Mitchell, and Smith, 2008). Second, PLS modeling does not require multivariate normal data (Chin, 1998). Given these characteristics, PLS has increasingly been employed by management researchers in recent years (e.g., Kautonen *et al*., 2010; Mitchell *et al*., 2008).

Measurement of the constructs

The present study primarily used measures that were adapted from prior studies, and the relevant items are reported in Table 1. All of the key study variables (i.e., exploration strategy, exploitation strategy, strategic learning, and profit performance) and one control variable (i.e., environmental dynamism) were measured on five-point Likert scales (1 = fully disagree, 5 = fully agree). Therefore, rather than measuring objective facts, the items measured respondents' perceptions. The remainder of the control variables (i.e., firm age, size, and current ratio) were measured objectively and obtained from a secondary database.

Prior to data collection, the construct items exploration strategy, exploitation strategy, and strategic learning were tested according to the process described by Polit, Beck, and Owen (2007). In the validation process, we called on experts in the strategy and organization research fields (17 exploration and exploitation experts and 10 strategic learning experts) to assess whether each item fit the definition of the construct it was supposed to measure. These assessments were reported via a Web-based questionnaire. The assessment of fit used a scale ranging from 1 to 4 (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant). After the evaluations, the researchers calculated the content validity index (Average I-CVI) and compared the Average I-CVI (I-CVI/AVE) value to the threshold value of 0.8 (Davis, 1992; Polit *et al*., 2007). In this procedure, the I-CVI/AVE-value is calculated by first summing the number of expert evaluations scoring 3 or 4 for a particular item and then dividing the sum by the number of experts (item-level content validity). Second, we averaged the item-level content validity indexes into the dimension level (in case the construct has many dimensions) and then to the construct level to achieve the I-CVI/AVE value for the construct. In addition to the CVI, the business managers from software companies evaluated the questionnaire and provided feedback prior to data collection.

Exploration strategies are aimed at managing the creation of new business opportunities that emerge outside the scope of current strategies. Therefore, the items measured a firm's ability to seek novel ideas by thinking 'outside the box,' to explore new technologies, to create innovative product and services, to identify whether the firm looked for innovative ways to satisfy customer needs, and to identify whether the firm aggressively ventured into new markets or targeted new customer groups. The items were adapted from the study of Lubatkin *et al*. (2006; see also Benner and Tushman, 2003; He and Wong, 2004), and their validity was pretested prior to data collection by using the content validity index (I-CVI/AVE). The I-CVI/AVE-value was 0.82, thus exceeding the threshold (Davis, 1992; Polit *et al*., 2007). The six items were averaged into two parcels based on the results of principal axis factoring (Little *et al*., 2002). Following the domain-sampling model, we conducted a factor analysis (principal axis with Promax rotation method) that showed that the construct exhibited a two-dimensional structure, with four variables loaded on the first factor and the other two loaded on the second factor. The factors were named 'creativity-focused exploration strategy' and 'market-focused exploration strategy.' Previously published literature recommends a threshold value of 0.4 for items' main loadings, suggesting that the cross-loadings should remain below 0.4. The items were considered satisfactory because their main loadings ranged from 0.47 to 0.82, whereas their cross-loadings were well below 0.1. The Cronbach's alpha value for Parcel 1 was 0.64, whereas the alpha value for Parcel 2 was 0.79, thus exceeding the acceptable limit of 0.6 set by prior studies (Nunnally, 1978; Peterson, 1994). In addition, the values for Average Variance Extracted (AVE) (0.63) and com-

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Table 1. Means, standard deviations (SDs), parcel/item loadings, Cronbach's alpha, AVE, and composite reliability values

Constructs and items (all measured on five-point Likert scales)	Mean	SD	Loading	Parcel
Firm age	11.66	8.16		
Firm size	171.34	434.02		
Slack resources	1.97	1.40		
Environmental dynamism (α: 0.71; AVE: 0.63; CR: 0.84) (Green *et al.*, 2008)	3.22	0.79		
How would you assess your firm's business environment with the following statements?				
Product demand is hard to forecast.	2.99	1.08	0.80***	
Customer requirements and preferences are hard to forecast.	2.58	1.06	0.83***	
My industry is very unstable with huge change resulting from major economic, technological, social, or political forces.	2.71	1.14	0.76***	
How would you rate the orientation of the firm during the past three years?				
Exploration strategy (AVE: 0.63; CR: 0.76) (Lubatkin *et al.*, 2006; see also Benner and Tushman, 2003; He and Wong, 2004)	3.86	0.60		
Creativity-focused exploration (α: 0.64)	3.97	0.59	0.96***	
Our firm looks for novel technological ideas by thinking 'outside the box.'	4.07	0.81		Parcel 1
Our firm bases its success on its ability to explore new technologies.	3.82	0.95		Parcel 1
Our firm creates products and services that are innovative to the firm.	3.88	0.91		Parcel 1
Our firm looks for creative ways to satisfy its customers' needs.	4.11	0.69		Parcel 1
Market-focused exploration (α: 0.79)	3.65	1.01	0.57***	
Our firm aggressively ventures into new markets.	3.62	1.11		Parcel 2
Our firm actively targets new customer groups.	3.68	1.12		Parcel 2
Exploitation strategy (AVE: 0.68; CR: 0.81) (Lubatkin *et al.*, 2006; see also Benner and Tushman, 2003; He and Wong, 2004)	3.97	0.60		
Internally focused exploitation (α: 0.69)	3.98	0.71	0.81***	
Our firm commits to improve quality and lower cost.	3.98	0.86		Parcel 3
Our firm continuously improves the reliability of its products and services.	4.28	0.67		Parcel 3
Our firm increases the levels of automation in its operations.	3.68	1.14		Parcel 3
Market-focused exploitation (α: 0.71)	3.96	0.73	0.85***	
Our firm constantly surveys existing customers' satisfaction.	3.72	1.07		Parcel 4
Our firm fine-tunes what it offers to keep its current customers satisfied.	3.99	0.82		Parcel 4
Our firm penetrates more deeply into its existing customer base.	4.17	0.87		Parcel 4

Strategic learning (AVE: 0.66; CR: 0.85) (Crossan and Berdrow, 2003; Huber, 1991; Kuwada, 1998; Thomas *et al*., 2001)	3.79	0.54		
Strategic knowledge dissemination (α: 0.86) (Bontis *et al*., 2002; Tippins and Sohi, 2003)	3.80	0.76	0.75***	
Within our firm, sharing strategic information is the norm.	3.93	0.95		Parcel 5
Within our firm, strategically important information is easily accessible to those who need it most.	3.69	1.00		Parcel 5
Representatives from different departments meet regularly to discuss new strategically important issues.	3.87	0.92		Parcel 5
Within our firm, strategically important information is actively shared between different departments.	3.75	0.90		Parcel 5
When one department obtains strategically important information, it is circulated to other departments.	3.78	0.95		Parcel 5
Strategic knowledge interpretation (α: 0.80) (Bontis *et al*., 2002; Sinkula, Baker, and Noordewier, 1997; Tippins and Sohi, 2003)	3.81	0.62	0.84***	
When faced with new strategically important information, our managers usually agree on how the information will impact our firm.	3.81	0.86		Parcel 6
In meetings, we seek to understand everyone's point of view concerning new strategic information.	3.89	0.85		Parcel 6
Groups are prepared to rethink decisions when presented with new strategic information.	3.82	0.80		Parcel 6
When confronting new strategic information, we are not afraid to critically reflect on the shared assumptions we have about our organization.	4.04	0.80		Parcel 6
We often collectively question our own biases about the way we interpret new strategic knowledge.	3.51	0.87		Parcel 6
Strategic knowledge implementation (α: 0.78) (Bontis *et al*., 2002; Crossan and Berdrow, 2003)	3.73	0.60	0.84***	
Strategic knowledge gained by working groups is used to improve products, services, and processes.	3.88	0.74		Parcel 7
The decisions we make according to any new strategic knowledge are reflected in changes to our organizational systems and procedures	3.77	0.81		Parcel 7
Strategic knowledge gained by individuals has an effect on the organization's strategy.	3.84	0.77		Parcel 7
Recommendations by groups concerning the use of strategic knowledge are adopted by the organization.	3.42	0.76		Parcel 7
Profit performance (α: 0.87; AVE: 0.60; CR: 0.90) (Covin *et al*., 1990; Gupta and Govindarajan, 1984)	12.52	3.95		
How satisfied are you with your firm's performance against each of the following financial performance criteria? How important is the measure in terms of your firm performance?				
Cash flow	15.23	5.08	0.68***	
Return on shareholders' equity	11.50	5.20	0.81***	
Gross profit margin	11.82	5.02	0.79***	
Net profit from operations	13.07	5.09	0.82***	
Profit to sales ratio	12.51	5.18	0.76***	
Return on investments	10.99	5.06	0.78***	

***$p \leq 0.001$, **$p \leq 0.01$, and *$p \leq 0.05$ (one-sided test).

posite reliability (0.76) exceeded the threshold values set by prior studies (0.5 and 0.7, respectively) (Chin, 1998), while loadings for both parcels were also acceptable (ranging from 0.57 to 0.96).

Exploitation strategies are aimed at efficiently managing firms' existing resources and capabilities. Exploitation strategies were measured using six items that assess a firm's commitment to improving quality and reducing costs, the firm's continuous search to improve the quality of its products and services, its effort to increase the automation of its operations, its constant surveying of the satisfaction of its existing customers, whether the firm fine-tuned its offerings to keep its customers satisfied, and whether the firm penetrated its existing customer base. The items were adapted from Lubatkin *et al*. (2006; see also Benner and Tushman, 2003; He and Wong, 2004). Furthermore, the validity of these items was tested using a process similar to that used to test the exploration strategy items. The test resulted in a construct's content validity index (I-CVI/AVE) of 0.81, exceeding the threshold value (Davis, 1992; Polit *et al*., 2007). As with the exploration strategy, we tested the construct's dimensional structure using principal axis factoring with the Promax rotation method. Again, the test revealed a two-dimensional factor structure for this construct. The items were satisfactory because their main loadings ranged from 0.44 to 0.85, whereas their cross-loadings were well below 0.1. On this basis, we divided the six items into two parcels of three. The factors were named 'internally focused exploitation strategy' and 'market-focused exploitation strategy.' Again, Parcels 3 and 4 exhibited acceptable Cronbach's alpha values (0.69 and 0.71, respectively). Furthermore, both the AVE (0.68) and composite reliability (0.81) values exceeded the typical thresholds and the item loadings of the two parcels, which were 0.81 and 0.85, respectively.

Strategic learning is defined as an organization's dynamic capability, which consists of intraorganizational processes of the dissemination, interpretation, and implementation of strategic knowledge (Kuwada, 1998; Pietersen, 2002; Thomas *et al*., 2001). The scale for strategic learning was developed based on three theoretical dimensions: strategic knowledge dissemination, strategic knowledge interpretation, and strategic knowledge implementation. The theoretical dimensions represent the typical dimensions of strategic learning suggested by prior studies (Crossan and Berdrow, 2003; Huber, 1991; Kuwada, 1998; Thomas *et al*., 2001), and the measures for these three dimensions were adapted from previous reports. Both the measures and the references are reported in Table 1. The validity of these items was also tested via the construct's content validity index (I-CVI/AVE), which was 0.91, thus exceeding the threshold (Davis, 1992; Polit *et al*., 2007). Similarly, we tested the construct's dimensional structure using principal axis factoring with the Promax rotation method. The test revealed a three-dimensional factor structure that followed the theoretical dimensions. The items were satisfactory because their main loadings ranged from 0.46 to 0.92, whereas their cross-loadings were all less than 0.4. On this basis, we divided a total of 14 items into three parcels with four or five items in each. Again, Parcels 5, 6, and 7 exhibited satisfactory Cronbach's alpha values (0.86, 0.80, and 0.78, respectively). In addition, the AVE (0.66), composite reliability values (0.85), and item loadings for the three parcels (0.75, 0.84, and 0.84) were satisfactory.

Previous studies have found that the performance of a firm is a multidimensional concept and suggested that the different dimensions should be studied separately (Combs, Crook, and Shook, 2005). Thus, we specifically focused on firms' profit performance. Firms' profit performances were measured using an approach adapted from Covin, Prescott, and Slevin (1990) and first developed by Gupta and Govindarajan (1984). Six items measured cash flows, returns on shareholders' equity, gross profits, net profits from operations, profit to sales ratios, and returns on investments. In the questionnaire, respondents were first asked to rate the importance of a particular measure and then asked how satisfied they were with their firm's profit performance in terms of each particular measure. For the final measure, we multiplied the importance and satisfaction scores to determine a weighted average performance score for each case. The dimensional structure of the weighted profit performance items was also tested by using principal axis factoring with the Promax rotation method. This test resulted in a unidimensional factor structure, suggesting the use of a first-order construct in PLS. The items were considered satisfactory because their main loadings ranged from 0.58 to 0.79. The construct exhibited a satisfactory Cronbach's alpha (0.87), AVE (0.60), composite reliability values (0.90), and factor loadings ranging from 0.68 to 0.82. Finally, we compared the average weighted profit performance scores and returns on investment from the year 2007 using correlation analysis. This analysis revealed a

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Table 2. Correlations among the constructs and control variables

	Construct	1.	2.	3.	4.	5.	6.	7.	8.	9.
1.	Firm age	–/–								
2.	Firm size	0.11	–/–							
3.	Environmental dynamism	0.01	–0.02	–/–						
4.	Exploitation strategy	0.04	0.13	–0.18**	–/–					
5.	Exploration strategy	–0.04	–0.10	0.07	0.35**	–/–				
6.	Exploration * Exploitation	0.02	0.08	–0.01	–0.14*	–0.17*	–/–			
7.	Profit performance	0.11	0.07	–0.30**	0.25**	0.12	0.07	–/–		
8.	Slack resources	0.16*	0.00	–0.03	–0.06	–0.04	0.16*	–0.01	–/–	
9.	Strategic learning	0.02	–0.17	–0.01	0.40**	0.42**	–0.20**	0.25**	0.07	–/–

**$p \leq 0.01$ and *$p \leq 0.05$ (two-sided test).

statistically significant correlation (0.29, $p \leq 0.01$) between the subjective and objective performance measures, providing evidence of the reliability of the subjective performance measure used in the study (Stam and Elfring, 2008). This also supports the evidence provided by prior studies (Murphy and Callaway, 2004; Murphy, Trailer, and Hill, 1996).

The discriminant validity of the constructs was analyzed at both the item and construct levels. In the construct-level consideration, we found that the AVE value for each construct exceeded the squared latent variable correlation (Table 2), suggesting a satisfactory construct discriminant validity (Chin 1998; Cool, Dierickx, and Jemison 1989). The item discriminant validity was also satisfactory. Considering that all items loaded most highly on their respective constructs, none of the items loaded higher on any construct they were not intended for, and all the item loadings are statistically significant.

We included four firm-level controls—size, age, slack resources, and environmental dynamism—in our model. Prior studies suggest that strategic learning (Bontis *et al*., 2002), exploration and exploitation (McGrath, 2001), and performance (Tippins and Sohi, 2003) may vary depending on a firm's age and size. A firm's age and size are associated with its accumulated learning curve experience (Amburgey and Miner, 1992), enhanced knowledge systems and procedures (Bontis *et al*., 2002), and greater resources to overcome the costs of innovation (Atuahene-Gima and Murray, 2007), all of which support innovation and strategic learning. In contrast, complexity and inflexibility can increase with age and size, thus narrowing (and even biasing) the search for and adoption of new technologies and new knowledge (Aldrich and Auster, 1986). Here, firm size was measured by the total number of employees and firm age by the number of years a firm had been in business.

Prior research suggests that organizational slack can provide resources for creative behaviors (Bourgeois, 1981; Cyert and March, 1963). Furthermore, scholars have suggested that strategic learning (Kuwada, 1998; March, 1991), exploration and exploitation strategies (Greve, 2007), and performance (Bromiley, 1991) may vary depending on the level of slack. Available slack serves to capture the extent to which firms have resources that are unused but readily available (Bourgeois, 1981). In this study, available slack was measured using the firm's current ratio (Bourgeois, 1981).

Finally, prior studies suggest that strategic learning plays a particularly important role in dynamic business environments (Lichtenthaler, 2009; Mintzberg and Lampel, 1999; Teece, 2007; Volberda, 1996). For example, Volberda (1996) stated that hypercompetitive environments require the development of a supporting learning system, particularly the information processing functions of management. In addition, Lichtenthaler (2009), who studied industrial firms in Germany, found that technological and market turbulence positively moderate the impact of absorptive capacity on performance. Therefore, we added a control variable for environmental dynamism, which reflects the demand uncertainty in the market, to rule out as much of the environment's effects on strategic learning and profit performance as possible (Green, Covin, and Slevin, 2008). The construct and the three items were adapted from Green *et al*. (2008), and the items measured the difficulty of forecasting product demand, the difficulty of forecasting customer

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requirements and preferences, and the level of instability in the industry resulting from major economic, technological, social, or political forces. The construct was tested to assess its multidimensional factor structure using principal axis factoring and the Promax rotation method. Factor analysis revealed that the construct exhibited a unidimensional factor structure, while the loadings from three items ranged from 0.52 to 0.77. In the research model, the construct's AVE (0.63), Cronbach's alpha (0.71), and composite reliability (0.84) values were satisfactory. In addition, the item loadings were also satisfactory, ranging from 0.76 to 0.83. Overall, the evaluation of all of the measurement models revealed that all constructs were satisfactorily reliable and valid.

RESULTS

We begin our analysis in the following paragraphs by presenting the correlation matrix, and we continue by analyzing the results of the structural model. In the analysis, we studied the mediating role of strategic learning in the relationships between exploration strategy and profit performance, as well as exploitation strategy and profit performance (the direct relationships of which we controlled). This study follows the structural equation modeling (SEM) approach to test the mediating effect as suggested by James and Brett (1984; Kenny, Kashy, and Bolger, 1998). According to them, a full mediation model should be tested with a path from the independent variable (exploration and exploitation strategies) to the mediator (strategic learning) and from the mediator to the dependent variable (profit performance). A direct relationship between the independent variable and dependent variable is not expected and, hence, the direct path does not need to be included in the model, but it can be controlled (James, Mulaik, and Brett, 2006; Kenny *et al*., 1998). The use of the SEM approach has been strongly recommended for testing full mediation (for a detailed discussion see MacKinnon *et al*., 2002; Schneider *et al*., 2005) and is increasingly adopted in management research (e.g., Wang, 2008). Additionally, we tested the data in the case of the exploitation trap by moderating the exploration strategy-strategic learning relationship with the exploitation strategy construct. We applied four control variables: firm age, size, slack resources, and environmental dynamism.

Table 2 presents the correlations between the given constructs and control variables, revealing that the highest correlation between the independent variables (strategic learning and exploration strategy) is 0.42. Although multicollinearity is typically not considered an issue when modeling in PLS, the low to medium correlations among the variables suggest that the data were not affected by potential multicollinearity. However, we also tested for multicollinearity using the variance inflation factor (VIF) index. A typical threshold value for the VIF index is 10; in this study, the value for each independent variable was less than 1.1. This result suggests that the research model was satisfactorily free of multicollinearity.

The path-weighting scheme (Lohmöller 1989) was chosen to estimate paths between the variables. To determine the significance of each estimated path, a standard bootstrapping procedure was applied with 200 resamples consisting of the same number of cases as in the original sample (n = 206). The estimated model explains a satisfying amount of variance in the endogenous variables. Moreover, the Stone-Geisser Criterion supports the interpretation that the model is of satisfying predictive relevance, given that the Q^2 values for both endogenous variables were greater than 0. Table 3 presents the results of the structural equation modeling.

The research model revealed no statistically significant impact on strategic learning for the control variables of age ($\beta = 0.02$; n.s.) and environmental dynamism ($\beta = 0.06$; n.s.), but displayed a statistically significant impact of firm size ($\beta = -0.18$; $p \leq 0.01$) and slack resources ($\beta = 0.12$ $p \leq 0.05$). Furthermore, in terms of profit performance, the effects of slack resources ($\beta = -0.05$; n.s.) and firm size ($\beta = 0.08$; n.s.) were statistically nonsignificant, whereas firm age ($\beta = 0.11$ $p \leq 0.05$) and environmental dynamism ($\beta = -0.29$; $p \leq 0.001$) had statistically significant impacts.

To continue our analysis of the main hypothesized relationships, the first two hypotheses suggested that both exploration and exploitation strategies require strategic learning to have positive profit performance effects. Specifically, H1 suggested that the relationship of exploration strategy and profit performance should be mediated by strategic learning. Our analysis revealed a statistically insignificant direct relationship between exploration strategy and profit performance ($\beta = -0.02$; n.s.), a statistically significant positive impact of exploration strategy on strategic learning ($\beta = 0.28$; $p \leq 0.001$), and a statistically

Table 3. Path coefficients from partial least squares analysis

Path from	To	Research model	
		Path coefficient (t)	
Firm age	Strategic learning	0.02	(0.57)
Firm size	Strategic learning	–0.18**	(2.82)
Slack resources	Strategic learning	0.12*	(2.25)
Environmental dynamism	Strategic learning	0.06	(1.08)
Firm age	Profit performance	0.11*	(1.76)
Firm size	Profit performance	0.08	(1.40)
Slack resources	Profit performance	–0.05	(0.86)
Environmental dynamism	Profit performance	–0.29***	(4.34)
Exploration strategy	Profit performance	–0.02	(0.45)
Exploitation strategy	Profit performance	0.10	(1.54)
Exploration strategy	Strategic learning	0.28***	(4.63)
Exploitation strategy	Strategic learning	0.33***	(5.52)
Strategic learning	Profit performance	0.23**	(2.75)
Exploration strategy * exploitation strategy	Strategic learning	–0.11**	(2.75)
R^2 Strategic learning		0.31	
R^2 Profit performance		0.19	
Goodness of fit		0.40	

***$p \leq 0.001$, **$p \leq 0.01$, and *$p \leq 0.05$ (one-sided test).

significant positive impact of strategic learning on profit performance ($\beta = 0.23$; $p \leq 0.01$), thus supporting H1.

H2 suggested that the relationship between exploitation strategy and profit performance should also be mediated by strategic learning. Our analysis provided support for this hypothesis because we identified a statistically insignificant direct relationship between exploitation strategy and profit performance ($\beta = 0.10$; n.s.), a statistically significant positive impact of exploitation strategy on strategic learning ($\beta = 0.33$; $p \leq 0.001$), and (again) a statistically significant positive impact of strategic learning on profit performance ($\beta = 0.23$; $p \leq 0.01$). Therefore, we concluded that the strategic learning construct fully mediates the relationship between exploration strategy and profit performance as well as the relationship between exploitation strategy and profit performance (James *et al*., 2006).

Finally, in H3, we wanted to study the existence of the exploitation trap, i.e., whether exploitation strategy moderates the link between exploration strategy and strategic learning. We identified a statistically significant moderating effect of exploitation strategy on the exploration-strategic learning relationship ($\beta = -0.11$; $p \leq 0.01$). This statistically significant effect indicates that an increase in exploitation strategy by one standard deviation decreases the path leading from exploration to exploitation by 0.11. To illustrate this moderating effect, we plotted the interaction in Figure 2, as suggested in Mitchell *et al*. (2008).

Figure 2 shows the direction of moderation, suggesting that high levels of exploitation strategies constrain the impact of high levels of exploration strategies on strategic learning, thus supporting the existence of an exploitation trap. Figure 2 also confirms H3, suggesting that the strategic learning of an organization is a limited resource and a dynamic capability. In addition, the moderation plot indicates the possibility of a curvilinear moderation effect, which means that high exploitation appears to facilitate the impact of low and medium levels of exploration on strategic learning. This result is mainly exploratory and requires further attention in the Discussion section. However, it adds an interesting aspect to our theory and discussion on the interaction between exploitation and exploration. Finally, Figure 3 summarizes the statistically significant model paths.

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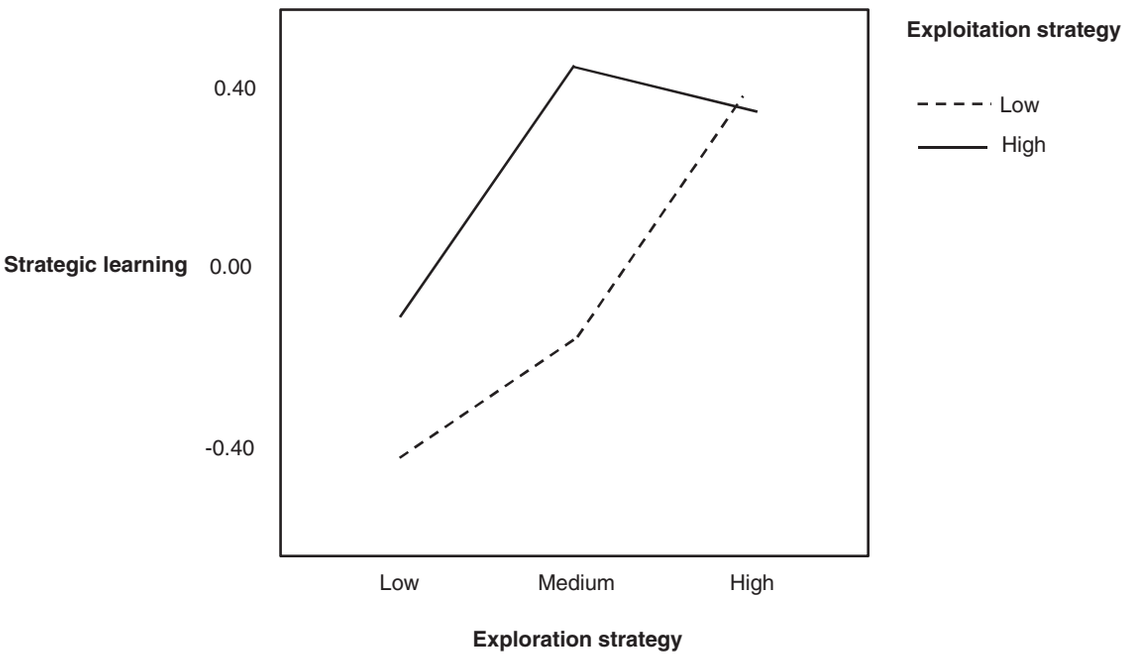

Figure 2. The moderating effect of exploitation on the exploration-strategic learning relationship

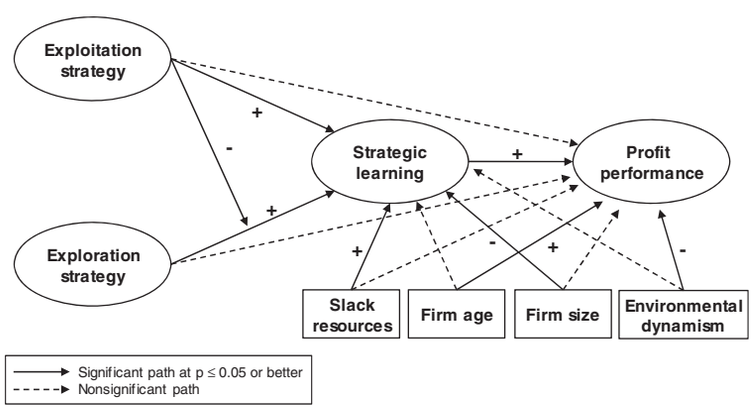

Figure 3. Statistically significant model paths

DISCUSSION AND IMPLICATIONS

The study set out to analyze whether strategic learning mediates the relationship between opportunity-seeking (exploration) and advantage-seeking (exploitation) strategies and profit performance (Hitt *et al*., 2011; Ireland *et al*., 2003; Raisch *et al*., 2009; Simsek *et al*., 2009). We approached strategic learning as a potential dynamic capability consisting of the intraorganizational processes of strategic knowledge distribution, interpretation, and implementation. Building on the argument that learning capabilities are constrained and, in principle, favor exploitative activities, we analyzed whether exploitation moderates the relationship between exploration and strategic learning to test the possible existence of the exploitation trap (Levinthal and March, 1993). Our empirical study of 206 software

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companies reveals that exploitation and exploration does not directly affect profit performance, whereas strategic learning fully mediates these relationships. Furthermore, we found evidence that exploitation moderates the exploration-strategic learning relationship. Indeed, it seems that strategic learning tends to favor exploitative learning initiatives at the cost of opportunity exploration. This result provides evidence for the constrained nature of the strategic learning capabilities of a firm (Levinthal and March, 1993).

Implications for theory and research

This study contributes to the strategic entrepreneurship literature by providing evidence of a mechanism that enables firms to benefit from opportunity-seeking (exploration) and advantage-seeking (exploitation) strategies. First, the results show that exploration strategies do not directly increase profit performance but that the performance effect can be realized through the strategic learning process. As hypothesized, the relationship between exploration strategy and firm profit performance is fully mediated by strategic learning. This result suggests that organizations require strategic learning capabilities to utilize new technologies or market information gained as result of entrepreneurial activities. Specifically, strategic learning is the vehicle through which strategic knowledge generated by exploration strategy is disseminated and incorporated into the organization and guides the collective actions of the firm. Strategic learning translates the recognized entrepreneurial opportunities from individuals to organizational-level actions and performance. Strategic learning also increases the knowledge flow across strategic units, broadening the organization's knowledge base and enabling the effective integration of novel, complex, and often ambiguous exploratory knowledge into the organization. Access to a broad knowledge base enhances the quality and speed of opportunity capitalization and increases a firm's profit performance. Moreover, through strategic learning, organizations can develop new competencies to better respond to changes in the business environment. In summary, our results suggest that strategic learning forges the missing link between exploration strategies and firm performance.

Second, our findings suggest that strategic learning enables firms to benefit from exploitation strategies. This phenomenon is evident, as strategic learning fully mediates the relationship between firms' exploitation strategies and profit performance. This finding supports the argument that advantage-seeking ideas require dynamic capabilities to be mobilized, integrated, and applied across all organizational units to have a performance effect (Jansen *et al*., 2009). Specifically, strategic learning serves as an information bridge across organizational functions, through which divergent organizational capabilities developed in localized practices can be integrated and mobilized to generate new combinations of exploitative products and technologies. Therefore, our results demonstrate that organizations are able to create value for existing customers in a performance-enhancing way only when they are able to integrate differentiated capabilities through the strategic learning process.

Third, our findings contribute to the understanding of the interaction between exploration and exploitation strategies with respect to their influence on strategic learning. Empirical results show that exploitation strategies have a statistically significant negative moderating effect on the exploration-strategic learning relationship. This finding suggests that by neglecting the role of exploration strategy, companies may end up in an exploitation trap, where high levels of exploitation consume the firm's limited strategic learning resources, weakening the possibility of explorative innovations arising. This finding confirms the suggestion of other scholars (Cohen and Levinthal, 1990; Deeds *et al*., 2000; Levinthal and March, 1993; Zahra and George, 2002) that strategic learning capability is a constrained resource due to path dependencies (i.e., firms learn in areas that are related to previous activities) and a firm's complementary assets (i.e., learning is connected to the prior established asset base). In contrast, the plotted moderation demonstrates that when the level of exploration is low, high levels of exploitation facilitate the impact of exploration strategy on strategic learning. We believe that this occurrence may result from a company's motivation and capability to observe and implement disruptive and sustaining innovation strategies. We suspect that those companies that are motivated to exploit are also more willing and capable to explore and vice versa. Therefore, the same characteristics behind the latent variables are reflected in both strategies. Moreover, in higher levels of exploitation and exploration, strategic learning begins to constrain the realization of explorative and exploitative strategies, ultimately causing the exploitation trap. With an

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unlimited strategic learning capability, the exploitation trap would not exist. This result provides evidence for the argument of Katila and Ahuja (2002) that exploration and exploitation strategies are complementary to the extent that resources are available.

Fourth, our results demonstrate that both exploration and exploitation positively impact strategic learning which, in turn, increases firm performance (Anderson *et al*., 2009; Lubatkin *et al*., 2006). Exploration facilitates strategic learning through the entrepreneurial processes of search, discovery, and experimentation (Garrett *et al*., 2009). Through these processes, an organization scans its environment which, in turn, provides the impulse for strategic learning. Organizations may learn strategically from failed strategic actions that may be motivated by entrepreneurial projects (Covin *et al*., 2006). Furthermore, exploitation has a positive effect on strategic learning because it increases the cumulative experience of the firm, which serves as an important knowledge stock for strategic learning (Holmqvist, 2004; March, 1991). Finally, this study confirms that strategic learning explains firm performance. This result supports Levinthal and March's (1993) argument that learning increases firm performance and that through strategic learning, firms can generate strategic capabilities bestowing competitive advantages and increasing performance. To conclude, our results support the proposition that exploration and exploitation have positive impacts on strategic learning that, in turn, is conducive to firm performance.

Implications for management practice

According to our results, both in opportunity-seeking and advantage-seeking activities, managers should invest in developing structures, processes, and practices that foster strategic learning (i.e., strategic knowledge distribution, interpretation, and implementation). Therefore, to facilitate knowledge distribution and the dissemination of diverse capabilities, organizations are advised to apply practices related to knowledge sharing between teams and departments. Examples include cross-functional teams, face-to-face interactions, discussion forums, and other cross-functional interfaces. These practices provide platforms that keep multiple innovation streams connected by disseminating capabilities and learning about new ways to achieve profit performance. Interpretation requires organizations to advance reflective discussion that creates a shared interpretation of the discovered opportunity among the personnel, which may then lead to an implementation decision. Implementation refers to the development of organizational practices such as databases, formal training, manuals, and descriptions of best practices to enable project, product, or service developments that seize the discovered opportunity (Kuwada, 1998; Thomas *et al*., 2001).

Furthermore, as the results indicate, strategic learning capabilities are constrained and favor exploitative activities. To avoid the exploitation trap, companies must balance these strategies, as suggested by prior studies (He and Wong, 2004; Ireland *et al*., 2003), and extend their strategic learning capabilities to ensure long-term survival, particularly in highly dynamic industries such as the software industry. Building on the prior literature, this study suggests that managers may apply different strategies to balance exploration and exploitation, such as sequential, functional, or contextual approaches (Birkinshaw and Gibson, 2004; Chen and Katila, 2008; Tushman and O'Reilly, 1996). More specifically, given the negative influence of exploitation on the exploration-strategic learning relationship, in addition to the particular curvilinear form of this interaction effect (Figure 2), we suggest that a close to optimal balance between exploration and exploitation can be achieved by focusing on medium levels of exploration and high levels of exploitation. Doing so would maximize strategic learning while efficiently allocating resources. Interestingly, this strategic positioning corresponds to the classic strategy type of the analyzer (Miles and Snow, 1978). This strategy avoids both the dangers of excessive exploration and the exploitation trap and is generally considered an effective strategic approach.

Limitations and future research suggestions

The results of this study must be considered in the light of its limitations. First, although our focus on the software industry allows us to better understand the context under study, it also limits the generalizability of the results beyond this context. Therefore, for greater generalizability, the research model needs to be tested in other industries. Second, the generalizability of this research is limited by its focus on Finnish companies, as strategic learning may differ among different nations and cultures (Bontis *et al*., 2002). Future research would benefit from interna-

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tional data collection and analysis. Third, the cross-sectional design limits the demonstration of causality, and future research would benefit from longitudinal research designs. Fourth, although analyzing strategic learning in the construct level is found to be theoretically meaningful and a parsimonious method (e.g., Law, Wong, and Mobley, 1998), further research is needed on the links between the strategic learning dimensions and their effects. However, in terms of our research model, we believe that the mediating impact of strategic learning requires the coexistence of all the dimensions. Fifth, recent literature highlights critical philosophical and practical differences in dealing with reflective versus formative measures (Diamantopoulos, 2008; Diamantopoulos and Siguaw, 2006; Law *et al*., 1998). As noted earlier, prior studies apply the construct as a reflective measure (e.g., Jerez-Gómez *et al*., 2005; Tippins and Sohi, 2003; Yang, Watkins, and Marsick, 2004). We have followed this trend by adopting the reflective measurement approach, but we also encourage further research that examines the measurement of the strategic learning construct.

CONCLUSION

In conclusion, the construct of strategic learning is promising. This study demonstrates the mediating effect of strategic learning and highlights its constrained nature as a dynamic capability. Our results stress the importance of strategic learning and suggest that managers should place more emphasis on developing activities to institutionalize the knowledge gained from both opportunity-seeking and advantage-seeking strategic actions. Finally, we suggest that further research should focus on the role and mechanisms of strategic learning in various industry contexts.

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FIGHTING INERTIA: BENEFITS OF ENTREPRENEURIAL ORIENTATION AND STRATEGIC LEARNING FOR LARGE AND MATURE FIRMS

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Abstract: Inertia is often considered the most significant threat to organizations that have become established and grown large. In this study, we suggest that larger and more established companies require high levels of entrepreneurial orientation (EO) to overcome what we define as learning thresholds, which prevent companies from engaging in strategic learning and gaining performance benefits. Data from 182 software companies suggest that the non-linearity of the relationship between EO and strategic learning is more pronounced for large and established companies where only high levels of EO positively affect strategic learning. Our results also establish that large and established firms benefit more from strategic learning than do their smaller and younger counterparts. The positive moderating effects of firm size and age on the strategic learning–performance relationship are tested for lagged objective performance measures in terms of both sales growth and profitability. This study identifies how strategic learning assists in understanding the influence of EO on performance through overcoming the structural constraints of inertia, revealing some of the connections between strategic change and organizational inertia.

Keywords: strategic learning; inertia; entrepreneurial orientation; firm age; firm size; performance

Introduction

Arguments that entrepreneurial orientation (EO) is important to company profitability and growth abound (Wiklund, 1999; Wiklund and Shepherd, 2005; Zahra, 1991; Zahra and Covin, 1995). Defined as a strategic posture favouring entrepreneurial activities reflected in risk taking, innovation, and proactiveness (Covin and Slevin 1989; Lumpkin and Dess, 1996), a major proposition regarding EO is that highly entrepreneurial firms are better able to adjust to dynamic competitive environments (Miller, 1988; Zahra, 1993). Despite the mounting evidence for the generally positive effects of EO, establishing its importance to large and established companies is not straightforward (Covin and Slevin, 1991; Wales *et al*., 2011). Inertia, exemplified by limited flexibility (Rosenbusch, Brinckmann and Bausch, 2011), resource dependencies (Leonard-Barton, 1992; Thornhill and Amit, 2003), and ingrained routines (Bruderl and Schussler, 1990; Freeman, Carroll and Hannan, 1983), is heightened as firms increase in size and age, and hence may inhibit the effect of entrepreneurial action.

Recent EO literature (Anderson, Covin and Slevin, 2009; Covin, Green and Slevin, 2006; Green, Covin and Slevin, 2008; Mueller *et al.*, 2012) proposes the concept of strategic learning (SL) as a facilitator of long-term adaptive capability. SL is defined as a *strategic-level process of knowledge creation, dissemination, interpretation, and implementation* (Kuwada, 1998; Thomas, Sussman and Henderson, 2001), and links directly with the key management question of how organizations change their strategy to maintain and develop competitive advantage (Ambrosini and Bowman, 2005). Hence, it has an important role when the change initiatives originating from EO need to be realized and strategy adjusted (Anderson et al., 2009; Covin *et al*., 2006). SL is especially important in explorative settings where firms must determine where their competitive advantage lies (Mintzberg and Waters, 1985). It is well established that as an organization grows in terms of size and age, resistance to change builds, and that resistance can also be expected to affect when new entrepreneurial ideas are absorbed (Wales *et al*., 2011). Hence, the relationship between EO and SL, and also the effects on performance, may differ for companies of different sizes and ages. Although the form of learning that promotes strategic change may be harder to absorb for companies prone to inertia, learning is particularly important to those very companies as they face market and competitive pressure to renew their strategies (Huff, Huff and Thomas, 1992).

Our study contributes to EO literature by proposing that the relationship between EO and SL takes different forms depending on the size and age of the company. Our threshold argument suggests that in larger and more established companies,

SL is positively influenced only by high levels of EO. The study contributes to an under-researched area, answering the call of Wales *et al.* (2011: 21) for studies addressing the question, 'How does the pervasiveness of EO relate to temporally linked organizational factors: liabilities/viabilities of newness, inertia, and core rigidities?' The current research also adds to organizational learning and dynamic capability literature by studying how structurally constrained companies may benefit from SL, and focuses specifically on strategic renewal in established companies where the learning effect may be hampered by inertia (Cohen and Levinthal, 1990; Cyert and March, 1963; Zahra and George, 2002). Zahra, Sapienza and Davidsson (2006, p. 937) noted that prior studies 'provide little direct empirical evidence on differences in learning processes' not only for smaller versus larger but also for newly founded versus established companies. Therefore, we introduce organization size and age as indicators for structural inertia and moderators between EO and SL and SL and performance. We suggest that SL is crucial to understanding how larger and more established companies can benefit from high levels of EO. Our data from 182 software companies, with lagged objective pre- and post-performance measures, suggest that large firms do not excel by being highly entrepreneurial, but rather as a result of the SL they assimilate.

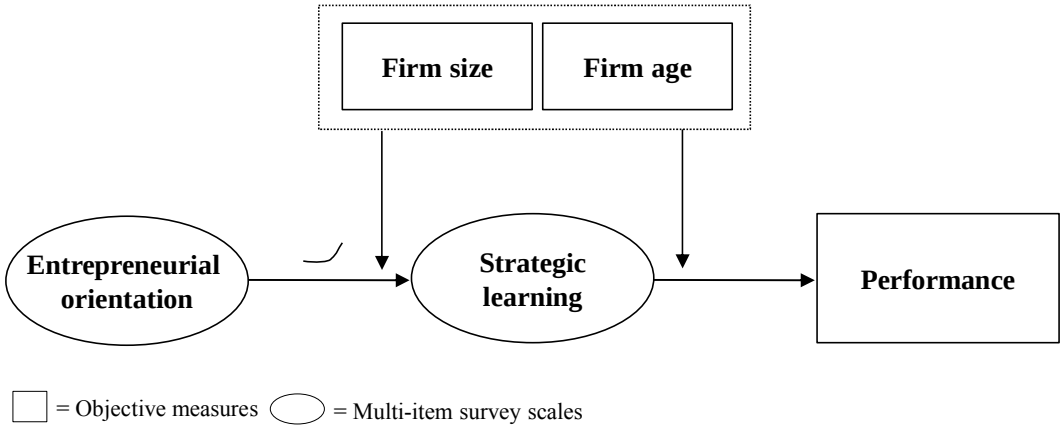

Figure 1. Research Framework

Theoretical background

Conceptualizing Strategic Learning

This study examines organizational learning in the context of strategic management. Using the concept of strategic learning introduced by Mintzberg and Waters (1985) and later developed by Kuwada (1998) and Thomas *et al.* (2001), SL extends the idea of organizational learning as 'something deployed in service of existing strategies' (Voronov, 2008: 196), where a firm learns skills and competencies necessary to realize its intended strategy, and moves the focus to the emergence of new strategies and strategic adjustments (Mintzberg and Waters, 1985).

Concentrating upon a firm's ability to create knowledge and use that knowledge to revise the firm's strategy (Anderson *et al.*, 2009), the concept of SL captures a type of strategic-level learning where 'basic assumptions underlying corporate-level knowledge are reframed and lead to a renewal of the organization's strategic capability' (Kuwada 1998:719). Building on Burgelman's (1991) intra-organizational, ecological perspective on strategy-making and on Huber's (1991) information-processing view, an organization is viewed as an ecology where strategic initiatives are continuously created and compete for limited resources (Kuwada 1998). SL's major role is to retain the most viable initiatives (Burgelman, 1991). Thus, the realized strategies are formed through active learning from entrepreneurial activity, an idea that is broader than just learning from mistakes. Building on the previous SL models (Crossan, Lane and White, 1999; Kuwada, 1998; Thomas et al., 2001), we suggest that SL is based upon four sets of capabilities supporting a firm by way of strategic adjustments: knowledge creation, dissemination, interpretation, and implementation of knowledge in the organizational memory.

Strategic knowledge creation is an exploratory knowledge acquisition process enabling individuals in an organization to gather strategic information from their environment to extend their current knowledge (Atuahene-Gima and Murray, 2007; March, 1991). The process provides a company with new market knowledge to fuel its knowledge-creation processes (Alegre et al. 2013) and bolster its existing stock of knowledge (Crossan and Berdrow, 2003). Knowledge creation drives a firm's ability to perceive and anticipate external change and to develop the knowledge base needed to advance strategic renewal (Ben-Menahem, Kwee, Volberda and Van Den Bosch, 2013).

Strategic knowledge dissemination refers to the sharing of strategic knowledge acquired at an individual level and shared through interactions within and be-

tween organizational units (Alegre et al. 2013; Jerez-Gómez, Céspedes-Lorente and Valle-Cabrera, 2005). Knowledge dissemination is an important social exchange process that aims to ensure new ideas permeate the whole organization (De Clercq, Dimov and Thongpapanl, 2010). Intra-firm knowledge dissemination has been shown to significantly affect internal responsiveness, which is in turn vital for strategic renewal (Liao, Welsch, Stoica, 2003).

In the process of *strategic knowledge interpretation,* organizational members interpret new information about potential opportunities through a mutual process of interaction including open dialogue with people of diverse backgrounds and perspectives (Daft and Weick, 1984; Pandza and Thorpe, 2009; Kuwada, 1998; Slater and Narver, 1995). In this sense-making process, conflicting assumptions and alternative interpretations are considered and, if necessary, acted upon to change behaviours and the way the organization interprets information. Knowledge interpretation allows a firm to identify meaningful fragments of information and act to alter its strategy and thereby its performance (Daft and Weick, 1984; Tippins and Sohi, 2003). According to Kuwada (1998), when strategic learning occurs, some of a firm's basic assumptions change and it acquires a new frame of reference, and thus a different mode of interpreting the created and disseminated knowledge.

Strategic knowledge implementation is a formal process that institutionalizes new strategic knowledge on the non-human facets of organizations, such as organizational systems, structures, procedures, and routines (Alegre *et al.* 2013; Huber, 1991). These are collectively referred to as organizational memory or knowledge storage systems (Walsh and Ungson, 1991). In the knowledge implementation process, various departments, groups, and teams within the organization test the applicability of the strategic initiative. The most viable initiatives eventually become formal strategies and generate new products, services, and processes (Nonaka and Takeuchi, 1995). Previous studies suggest that knowledge implementation is an important indicator of the rate of strategic change (Ben-Menahem et al., 2013; Crossan and Berdrow, 2003).

These four sub-processes converge in SL, a strategic-level process of knowledge creation, dissemination, interpretation, and implementation (Kuwada, 1998; Thomas, Sussman and Henderson, 2001) that reflects a firm's ability to derive knowledge from strategic actions and subsequently leverage that knowledge to adjust its strategy (Anderson *et al.*, 2009). From the dynamic capability perspective, SL is a firm's higher-order dynamic capability because it consists of systematic mechanisms that enable the firm to create, extend, and modify its knowledge base to respond to shifts in the business environment (Collis, 1994; Eisenhardt

and Martin, 2000; Helfat and Peteraf, 2003; Zollo and Winter, 2002). SL is related to double-loop and second-order learning because it is transformational (Ambrosini, Bowman and Collier, 2009), and therefore distinct from operational capabilities (Helfat and Winter, 2011) and single-loop learning processes (Argyris and Schön, 1978, 1996). SL could be juxtaposed with concepts like knowledge management (Alegre, Sengupta and Lapiedra, 2013; Gold, Malhotra and Segars, 2001; Hedlund, 1994; Tanriverdi, 2005) and absorptive capacity (Cohen and Levinthal, 1990; Zahra and George, 2002). However, SL focuses on the process of learning and is hence different from the main body of knowledge management literature that seeks to understand the content of learning or the nature of knowledge as an asset (Vera, Crossan and Apaydin, 2011). Absorptive capacity refers to a firm's ability to recognize, assimilate, and apply new external R&D-related knowledge (Cohen and Levinthal, 1990). It is often seen as a dyad-level construct of limited application at the firm level and is typically used to measure inter-organizational knowledge transfer (Lane, Salk and Lyles, 2001: Mowery, Oxley and Silverman, 1996; Wang and Ahmed, 2007), rather than the firm-level strategic process that is central to SL.

Entrepreneurial Orientation, Strategic Learning and Performance

'An entrepreneurial firm is one that engages in product-market innovation, undertakes somewhat risky ventures, and is first to come up with "proactive" innovations' (Miller 1983, p. 771). Such entrepreneurially oriented firms operate in environments that support new knowledge creation and dissemination (Wang, 2008). Researchers (e.g. Green et al., 2008) have suggested that learning is a vital corrective mechanism through which entrepreneurial firms can minimize the risks inherent in their operations. While both EO and SL are also linked with direct improvements in firm performance, research has found that the effect is complicated (Hakala 2011; Kreiser, 2011; Wales *et al.*, 2011). Hence, it is no surprise that the relationship between EO, learning, and performance has intrigued scholars and prompted a number of empirical studies on the relationship between EO and different types of learning (e.g. Hughes, Hughes and Morgan, 2007; Keh, Nguyen and Ng, 2007; Kreiser, 2011; Real, Roldán and Leal, 2012; Wang, 2008).

Different types of learning have been proposed to mediate the relationship between EO and performance (Real et al., 2012; Wang, 2008) or in other studies, moderate it (Covin *et al.*, 2006; Mueller *et al.*, 2012). However, there is a limited understanding of the shape and form of the relationship between EO and strategic-level learning. Only a handful of empirical studies (Anderson *et al.*, 2009; Covin *et al.*, 2006; Mueller *et al.*, 2012) have touched upon how SL, EO, and

performance might intersect. Anderson *et al.* (2009) found that EO had a positive impact on SL but that the effect was weaker than expected. Covin *et al.* (2006) hypothesized that SL would positively moderate EO and sales growth but, unexpectedly, found that the moderation was negative. Mueller *et al.* (2012) also surprisingly found SL negatively moderated the relationship between pioneering orientation and performance. All these prior studies anticipated a linear relationship between EO and learning; derived their data from the manufacturing industry in the USA; and focused only on one specific conception of SL: learning from mistakes. Although learning from mistakes is very important, SL can take many forms (Covin *et al*, 2006; Crossan and Berdrow, 2003).

Entrepreneurial activity provides opportunities for single-loop learning and enables adjustments to familiar processes and procedures (Argyris and Schön, 1978; March, 1991; Zhao *et al.*, 2011). Prior research on this lower-level (i.e. exploitative or single-loop) learning suggests such learning is related to existing knowledge and does not conflict with the firm's established models (Atuahene-Gima and Murray, 2007), and so is likely to be adopted without much resistance, meaning EO influences such incremental learning relatively easily and linearly (Zhao *et al.*, 2011).

Importantly, research has suggested that EO may have a more complicated relationship with double-loop or explorative learning concepts, which suggests linear effects may be difficult to find (Dess *et al.*, 2003; Kreiser, 2011; Zhao *et al.*, 2011). SL encompasses double-loop learning, whereby the organization analyses and modifies its existing norms, procedures, strategies, and objectives (Argyris and Schön, 1978; Thomas *et al.*, 2001). Compared to single-loop learning processes, implementation of this kind of transformational learning is severely hindered by organizational inertia caused by firm age and size. Fear of wasting limited resources and of unsuccessful experimentation may restrict companies to relying upon existing competences and delimiting activity within known boundaries (Levinthal and March, 1981; Miner, Bassoff and Moorman, 2001; Zahra *et al.*, 2006). In other words, it is significantly more difficult to achieve SL than operational, single-loop learning. These arguments indicate that the relationships between EO, SL, and performance are restricted by inertia brought about by the increased age and size of the firm. While achieving SL from EO becomes increasingly difficult with increases in size and age, the performance effects enabled by this type of strategic adjustment and learning are greater once the firm has grown large and established its market position. Accordingly, below we hypothesize ways in which these relationships are different for large and established firms in comparison to young, small firms.

Entrepreneurial Orientation, Strategic Learning, and Performance in Large and Established Firms

EO ties up considerable resources (Covin and Slevin, 1991; Wiklund, 1999; Wiklund and Shepherd, 2005). It introduces ideas that challenge accepted assumptions and influence SL (Anderson *et al*., 2009). However, especially for larger companies, radically new ideas are likely to encounter organizational resistance and learning thresholds because of the risks associated with entrepreneurial initiatives (Miller and Chen, 1994; Wales *et al.*, 2011). In the process of interpreting and implementing new knowledge, modification of the accepted assumptions on business strategy and management practice involves considerable risk. The management teams in large and more established firms generally act upon solutions proven in past situations and hence are often incapable of envisaging the outcomes of new types of explorative actions (Beer and Eisenstat, 1996; Real et al., 2012). Furthermore, SL is constrained because of path dependencies; that is, learning is inherently linked to a firm's history and previous activities (Fiol and Lyles, 1985; Leonard-Barton, 1992). Firms that have been in the business for some time will be unwilling to discard their accumulated stock of complementary resources and knowledge (e.g. Argyris and Schön, 1978; Deeds *et al*., 2000; Tripsas and Gavetti, 2000). When facing problems, firms often look to prior experience for solutions (Liao *et al*., 2008). This leads to a focus on exploitative, 'lower-level' learning, where the firm acquires knowledge consistent with its current structures, instead of creating the novel insights necessary for SL to occur (Hughes *et al*., 2007; Levinthal and March, 1993). Against this background, it appears that inertia severely impedes the influence of at least low or moderate levels of EO on attaining higher levels of SL in large and more established firms (Reinganum 1983; Wolfe and Shepherd, 2013). As small and young firms enjoy the benefits of flexibility and less bureaucracy, permitting them to swiftly take advantage of new learning opportunities arising from EO, they would not restrict SL in the same way (Real et al., 2012). Their very simple and informal structures and decentralized decision making counter inertia, enabling them to avoid difficulties around SL from EO (Hanks, Watson, Jansen and Chandler, 1993; Wales *et al*., 2011). Consequently, the relationship between EO and SL should be more linear and straightforward in small start-ups than in larger and more established firms.

However, a very high level of exploration has been associated with overcoming the learning traps triggered by inertia in larger and more established entities (March, 1991). Hence, a very high level of EO influences an organization's ability to successfully create, disseminate, interpret, and implement strategically important new knowledge in order to derive performance benefits. Robust EO brings

the organization into contact with diversity, new assumptions, and new organizational frameworks that shift its focus beyond its history or the near future, and on to strategic adjustments and opportunities that may prove invaluable (Cope, 2003). A strongly entrepreneurial mindset focuses on opportunity, and strong opportunity perception relaxes the rigidity in routines (Gilbert, 2005), allowing firms to overcome the inertia hindering SL.

The arguments above lead us to propose that high levels of EO can provide enough material from outside the current domain for SL to occur also in larger and more established firms. Yet the inertia present in large and more established firms trying to change their strategic direction effectively attempts to block SL. To be transferred to the resource modifications and structural changes that SL entails (Huff *et al*., 1992), the stimulus from EO has to be strong enough to overcome the inertia arising from established structures, resource rigidity, and the bounded rationality of managers. That leads us to hypothesize:

H1: Large firms will exhibit a more pronounced non-linear relationship between EO and strategic learning where the effects of EO on strategic learning only occur at higher levels of EO.

H2: Established firms will exhibit a more pronounced non-linear relationship between EO and strategic learning where the effects of EO on strategic learning only occur at higher levels of EO.

According to learning- and knowledge-based arguments, SL provides benefits such as an enhanced ability to recognize new product–market opportunities, to innovate, and to adapt to changes in the marketplace (Anderson *et al.*, 2009; Kuwada, 1998; Thomas *et al.*, 2001). SL may also help release organizational bottlenecks (Bontis, Crossan and Hulland, 2002) by promoting shared understanding and questioning current assumptions. Although SL is important, its relationship to performance is complicated and constrained (Thomas, Clark and Gioia, 1993). For example, Zhao *et al.* (2011) found that the performance benefits of learning new competencies and knowledge originating from outside the firm might be limited because of difficulties in transferring unfamiliar forms of knowledge to the firm and putting them into practice. When entirely new capabilities must be developed in unfamiliar arenas, learning is ever more challenging (Tripsas and Gavetti 2000) and many companies may not observably engage in SL (Covin *et al.*, 2006; Mueller *et al.*, 2012). The benefit derived from SL is affected by issues linked to organizational inertia, such as legitimacy of change, access to information and knowledge networks, and available capabilities and organizational resources.

Mueller *et al.* (2012) note that past research has ignored the fact that the association between SL and firm performance is dependent on the setting in which learning occurs. Both the size and age of a firm are likely to influence SL's effectiveness (Hult, Snow and Kandemir, 2003; Zahra *et al.*, 2006). The arguments that organizational inertia builds with size and age suggest that those routines established to ensure the efficient operation of a firm could also constrain the adoption of new approaches. Obtaining new insights is difficult in large and established organizations because of routines and structures constraining the required activity (Guillén, 2002; Lant and Mezias, 1990; Tripsas and Gavetti, 2000). Structural inertia makes larger and older organizations reluctant to change their core features (Kelly and Amburgey, 1991), and often leaves them encumbered with unproductive, formalized relationships and standardized routines (Hannan and Freeman, 1984). Although many of their routines and action paths were once integral to past successes, they may have become obsolete in a changed environment (Leonard-Barton, 1992). While inertia as such may be useful in safeguarding routine operations, it is problematic when organizational change and radically new competencies are required. In such cases, SL plays a particularly important role as an agent for changing direction without losing the speed and efficiencies generated by established operational routines (Kuwada, 1998). We expect that the inertia present, particularly in larger and more established firms, creates room for significant benefit to be extracted from SL.

The structural inertia argument suggests that the bigger the firm, the better its chances of having more resources to direct at proposals arising from SL (Hitt *et al.*, 2001; Lumpkin and Dess, 1996; Zahra *et al.*, 2006). In contrast, small firms often launch with specialized resources befitting their targeted market niches and depend on effective exchange of knowledge with other organizations (OECD, 2005). However, small firms may then find their capabilities inappropriate when the market changes, and that the effort required to change them makes too heavy a demand on time and resources for the firms to remain fully effective (Carter et al., 1994; Stinchcombe, 1965). In fact, small firms are clearly disadvantaged when trying to introduce new products and services to markets in which customer demand must be created (York and Venkataraman, 2010). Therefore, SL may even have negative effects on company performance in small firms that need to ensure survival and seek to establish simple operating routines (Hult *et al.*, 2003). Meanwhile, larger firms might have accumulated more resources to help them to modify their operations. This suggests that larger firms beset by inertia may benefit more from SL than smaller firms.

Structural inertia arguments on age suggest that reproducible structures are created by institutionalization and routines over time, and therefore the age of an or-

ganization contributes to increased inertia (Kelly and Amburgey, 1991). Then SL permits an organization to implement the positive changes it considers integral to its core features (Anderson *et al.*, 2009), meaning the organization can adapt as it matures. Because strategic change becomes more difficult with age, 'established companies benefit from having dynamic capabilities in overcoming inertia' (Zahra *et al.,* 2006, p. 919). As a trigger of such capabilities (Zollo and Winter, 2002), SL will thus have a greater impact on older companies than on younger ones where the ability to change is still less prone to inertia. In addition, established companies have a developed legitimacy and greater resources to draw upon when positive double-loop learning like that gained from SL is implemented. Taken together, the performance benefits of SL are dependent upon the age and size of an organization, and hence we hypothesize that:

H3: Large firms will benefit more from strategic learning in terms of profitability and sales growth

H4: Established firms will benefit more from strategic learning in terms of profitability and sales growth

Methods

Research Design and Sample

In order to test our hypotheses, we conducted a survey among software companies registered for value-added tax in Finland with at least five employees in 2009. The Statistics Finland database offered 1,161 firms meeting the criteria. Following software industry reports (e.g. Rönkkö et al., 2010), companies belonging to the TOL 2008 industrial classification class 62, equating to NACE codes 'Computer programming, consultancy and related activities', were defined as software businesses. Researchers confirmed the correct business sector and the CEO's email address by consulting websites prior to distributing the web-based survey. After two reminders and a follow-up telephone call to all non-respondent CEOs, we had received 206 responses; a response rate of 18%. After discarding responses that lacked essential data, the final sample numbered 182 firms – a response rate of 16%, which is acceptable for this type of survey (Baruch, 1999). In the data collection year, a typical respondent firm (median value) had an annual turnover of €1.4 m, generated an annual profit of €55,000, employed 14 staff, served 50 customers, and was 11.7 years old. Of the firms, 82.7% had their own software products, 38.9% of the firms offered subcontracting, and almost all of the companies (94.5 %) also provided consulting and training services.

The Finnish software sector provided an attractive context for the study due to the growing importance of software companies for the Finnish economy (Rönkkö et al., 2010) and the high rate of change within the industry, which suggests that learning is indispensable (Bingham & Davis, 2012; Davis & Eisenhardt, 2011). The dynamic setting also increases the number and range of opportunities to learn, suggesting that strategic learning would be a practice that, compared to more stable industries, is more common here. In addition, software firms will actively seek to capitalize on learning opportunities and are more conscious of knowledge-sharing benefits derived from different sources (Autio, Sapienza, & Almeida, 2000). Thus, the software industry provides an excellent, learning-intensive research domain.

To check for non-response bias, we compared respondents to non-respondents in terms of three variables—revenue, profit, and age—available from the company register. There was no statistically significant difference between non-respondents and respondents in terms of revenue and profit, but a small difference in terms of age ($p < 0.05$). Consequently, we also tested for potential non-response effects by comparing the first third of the respondents to the last third via the key study variables (Armstrong and Overton, 1977; Werner, Praxedes and Kim, 2007), but we observed no statistically significant difference between the groups of early and late respondents, suggesting that the data were sufficiently free from non-response bias.

Measures

Entrepreneurial orientation. To measure EO, we relied upon the measure utilized most often (Rauch *et al.*, 2009), that of Covin and Slevin (1989). The scale consists of nine items: three designed to measure innovativeness, three to assess market proactiveness, and three to measure risk taking. The CFA showed that although the chi-square for a three-dimensional EO measure was significant (χ^2=54.41, d.f.=24), the approximate fit heuristics indicated a satisfactory model fit: the Normed Fit Index (NFI) was 0.92, the Comparative Fit Index (CFI) was 0.94, the Goodness-of-Fit Index (GFI) was 0.93, and the Incremental Fit Index (IFI) was 0.94. The Root Mean Square Error of Approximation (RMSEA) was 0.08, indicating only moderate fit, according to some (e.g. MacCallum, Browne and Sugawara, 1996). However, RMSEA is highly sensitive to sample size (Curran *et al.*, 2002) and for samples below 250, RMSEA rates should be judged with caution (Hu and Bentler, 1999). All items significantly loaded on their latent construct ($p<0.001$, with *t*-values greater than 3.8). Furthermore, all the individual EO dimensions significantly loaded on the second-order factor, suggesting that

the variables were equally important to the second-order EO construct. The Cronbach's alpha values for the different dimensions were 0.71, 0.73, and 0.63 respectively and 0.83 for the whole construct, suggesting the measure has internal consistency and reliability. While dropping EO items to improve reliability and validity indicators is common in EO research (e.g. Anderson *et al.*, 2009; Anderson and Eshima, 2013; Pérez-Luño, Wiklund and Cabrera, 2011), we opted for comparability with previous studies[1] by not modifying the scale. As in this study's predecessors, EO was proposed to have three underlying dimensions (i.e. innovativeness, proactiveness, and risk taking) and since the three subscales are manifestations of EO, we follow the previous studies in using the averaged score of the dimensions instead of the individual subscales (for a detailed discussion informing this choice, see Covin *et al.*, 2006; Covin and Wales, 2012; Keh *et al.*, 2007; Slevin and Terjesen, 2011).

Strategic learning. The SL instrument utilized in this study employs 16 items to capture the theoretical dimensions of creation, dissemination, interpretation, and implementation of strategic knowledge (Crossan and Berdrow, 2003; Huber, 1991; Kuwada, 1998; Pietersen, 2002; Sirén, Kohtamäki and Kuckertz, 2012; Thomas *et al.*, 2001). As the SL instrument is new (see Appendix 1), the construct items were tested prior to data collection by a panel of nine experts in the field of strategy and organization research chosen for their experience in the field of management and familiarity with the concept of SL. The three professors, three assistant professors, and three doctoral students undertook an item-sorting process suggested by Hinkin (1995), very similar to a Q-sort exercise (Anderson and Gerbing, 1991; Stephenson, 1953), to review and sort randomly ordered items into the proposed dimensions and an 'other' category based on the theoretical construct definitions. The items the panel assigned to the proper *a priori* category less frequently than the suggested 80% of the time were reframed or deleted (Shepherd, Patzelt and Wolfe, 2011).

All the SL dimensions exhibited satisfactory Cronbach's alpha values (0.76, 0.85, 0.76, and 0.73, respectively, and 0.86 for the whole construct). Furthermore, CFA showed excellent initial fit for the second-order model (χ^2=162.30, d.f.=100, RMSEA= 0.06, NFI = 0.91, CFI = 0.96, GFI = 0.90, and IFI=0.96). All items

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[1] As a robustness check we ran all our regression models using a modified EO scale (one risk-taking item dropped as suggested by the modification indices) that provided slightly better fit indices for the measurement model (χ^2=26.37, d.f.=17, RMSEA= 0.06, NFI = 0.96. CFI = 0.98, GFI = 0.97, IFI = 0.98) than for the whole scale. Our main results were unchanged and thus vindicated the decision to use the entire Covin and Slevin (1989) EO scale.

loaded significantly on their respective latent construct ($p<0.001$, with *t*-values greater than 5.0). In addition, the CFA result showed that the SL dimensions exhibited a roughly similar loading, which suggests that the variables were equally important to the second-order construct.

Firm age and size. Firm age was measured as the number of years the firm had been in business, and firm size by the number of employees. Both measures were obtained from the Orbis secondary database. Firm size is treated in the subsequent analysis as a natural scale. Using the cut-off point of six years suggested by Zahra, Ireland and Hitt (2000), firms were divided into two age categories: young and established.

Profitability and sales growth. Previous studies indicate that firm performance is a multidimensional concept (Combs, Crook and Shook, 2005). Consequently, this study investigated two dimensions of performance separately: profitability and growth. We used profit or loss before tax in 2010 as our measure of profitability. Sales growth was measured as the absolute increase in turnover 2008–2010. All performance variables were obtained from the Orbis secondary database and were based on the firms' financial statements. The time lag between independent variables collected in the survey and the dependent performance variables was 18 months. Furthermore, by including past performance as a control variable we were able to cover the three-year period 2007–2010.[2]

Control variables. We controlled for several variables that, while beyond the purview of our research, might have affected EO, SL, and performance. These included Orbis database variables for slack resources, number of patents, and past performance, and multi-item survey variables for environmental dynamism and environmental hostility. The study controlled for an organization's readily available but unused resources or slack (Bourgeois, 1981), because previous research suggests that organizational slack can provide resources for creative behaviours (Bourgeois, 1981; Cyert and March, 1963). In particular, SL (Kuwada, 1998; March, 1991), EO (Bradley, Wiklund and Shepherd, 2011), and performance (Bromiley, 1991) may vary depending on the level of slack. Available slack in this study was measured using the firm's current ratio (Bourgeois, 1981). We also controlled for the number of patents a company held to encompass a firm's

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[2] We used absolute performance figures instead of ratios because we expressly wanted to study the effect of firm size. A ratio combines two different variables as numerator and denominator. When applying ratios, it is difficult to determine whether their joint effect is based on the numerator or driven by the denominator (Rothaermel and Alexandre, 2009). Therefore, the use of financial ratios as dependent variables is discouraged.

unique proprietary assets that indicate the technological capabilities directly affecting its performance (Lee, Lee and Pennings, 2001).

We included environmental dimensions in the models to rule out as much environmental effect on SL, EO, and performance as possible (Green *et al.*, 2008). The hostility and dynamism dimensions (adapted from Green *et al.,* 2008) serve as control variables in our models because they reflect the competitive intensity and demand uncertainty in the market, respectively. Prior studies suggest that the importance of SL (Mintzberg and Lampel, 1999; Teece, 2007; Volberda, 1996) and EO (Covin and Slevin, 1989; Green *et al.*, 2008; Wiklund and Shepherd, 2005) is affected by the type of environment a firm operates in. The three items for dynamism measured the difficulty of forecasting product demand; customer requirements and preferences; and the level of instability in the industry resulting from major economic, technological, social, or political forces. The four items for environmental hostility measured competitive intensity, customer loyalty, pricing strategies, and the profit margins in the industry.

Finally, we also controlled for a company's past performance, because it could strongly influence future profitability and growth. In the profitability models, we controlled for past profitability using profit or loss before tax from the year immediately preceding the data collection period. In the sales growth models, we included past sales growth measured as an absolute difference in sales growth 2007–2008 as a control variable. As prior studies suggest that learning may occur when organizations alter subsequent behaviour in response to prior performance outcomes (e.g. Greve, 2003), we controlled for both of the past performance variables in the models where SL was the dependent variable. These performance indicators were also obtained from the Orbis database.

Tests of Measures

In following Gerbing and Hamilton (1996), this study estimates the quality of the (nine-factor) measurement model using CFA in addition to its measurement of individual constructs. The measurement model (including three EO dimensions, four SL dimensions, and hostility and dynamism) provided an acceptable fit to the data ($\chi^2 = 674.98$, d.f. = 428, RMSEA=0.06, NFI=0.80, CFI=0.90 GFI = 0.81, and IFI = 0.90). We also tested the extent to which the survey items of EO, SL, environmental dynamism, and hostility might have been prone to common method bias, first by performing Harman's (1967) one-factor test to determine whether a single factor accounts for more than 50% of the total variance (Podsakoff and Organ, 1986). The analysis revealed nine factors with eigenvalues > 1; in total, these factors explained 65% of the variance among the tested items. The most

influential factor only accounted for 20% of the variance, suggesting that common method bias did not materially influence the results of this investigation. Second, we analysed whether the model fit improved as the complexity of the research model increased (Iverson and Maguire, 2000; Korsgaard and Roberson, 1995; McFarlin and Sweeney, 1992; Podsakoff *et al*., 2003). We compared the single-factor model to the more complicated research model and found that the research model provided better goodness-of-fit indices than the single-factor model (χ^2 = 2213.07, d.f. = 464, RMSEA=0.14, NFI=0.56, CFI=0.64, GFI = 0.57, and IFI = 0.64), indicating that common method variance was not a problem in this dataset. Furthermore, as we used objective performance variables obtained from a secondary database to measure outcomes, any such problems should be negligible. Overall, the testing undertaken establishes the reliability and validity of the measurements used.

Results

Table 1 presents descriptive statistics and the correlation matrix for the variables used in the study. We calculated variance inflation factors for each regression model in Table 2 and found all to be substantially below the established threshold of 10 (model VIFs<2; Hair *et al.*, 2006, p. 230), indicating that multicollinearity did not influence the model results.

Given the expectation of non-linear relationships and linearity assumptions inherent in structural equation modelling (Gefen, Straub and Boudreau, 2000), we opted to test the four hypotheses by ordinary-least-squares (OLS) regression using *Stata 12* software. The different steps used and the OLS regression models adopted for testing the hypotheses are reported in Table 2. In the Table, Step 1 and Models 1–4 test Hypothesis 1 and 2 and suggest that due to inertia, large and established firms require high levels of EO in order to generate SL from their entrepreneurial orientation.

Table 1. Descriptive Statistics and Intercorrelations[a]

	Variable	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	Firm size	43.69	83.08	1.00											
(2)	Firm age[c]	0.73	0.44	0.09	1.00										
(3)	Slack resources	1.99	1.84	-0.09	0.08	1.00									
(4)	Number of patents	1.61	5.07	0.13	-0.01	0.03	1.00								
(5)	Environmental dynamism	2.76	0.85	-0.07	-0.07	-0.06	0.06	1.00							
(6)	Environmental hostility	3.08	0.71	0.10	-0.02	-0.10	-0.11	0.32***	1.00						
(7)	Past profitability (n-1)[b]	432.09	1827.38	0.73***	0.05	0.06	0.27**	-0.11	-0.03	1.00					
(8)	Past sales growth (n-1)[b]	558.84	1468.83	0.70***	-0.02	-0.28***	-0.06	0.04	0.05	0.36***	1.00				
(9)	Entrepreneurial orientation	3.41	0.70	-0.03	0.02	-0.06	0.15	-0.12	-0.16*	-0.01	-0.03	1.00			
(10)	Strategic learning	3.87	0.50	-0.21**	0.05	0.10	0.11	-0.00	-0.05	-0.09	-0.19*	0.36***	1.00		
(11)	Profitability[b]	385.45	1765.85	0.45***	-0.10	0.03	0.16	-0.18*	-0.10	0.46***	0.08	0.07	-0.10	1.00	
(12)	Sales growth[b]	547.15	4313.63	0.08	-0.17*	-0.11	-0.04	-0.16	-0.11	-0.20*	-0.04	0.07	-0.07	0.63***	1.00

Notes: [a] Pearson correlations; [b]Measured in 1000 euros; [c] Firm age is coded as 0, "Young firms" and 1, "Established firms"; *p < 0.05, **p < 0.01, ***p < 0.001 (two-tailed tests)

Table 2. Results of Hierarchical Regression Analyses[a]

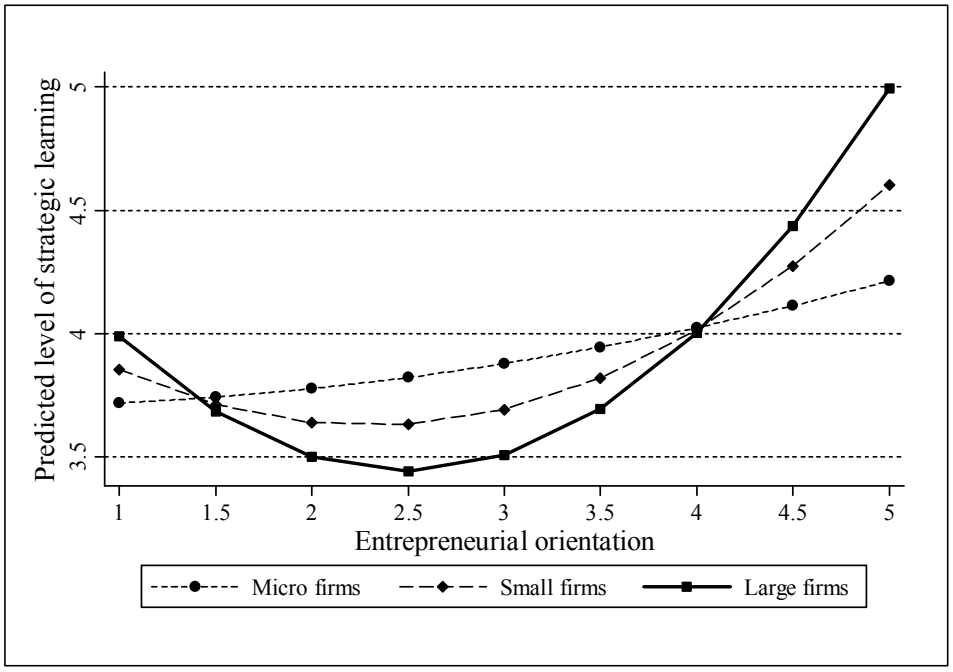
	Strategic learning				Profitability		Sales growth	
	Step 1				Step 2		Step 3	
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Controls								
Slack resources	0.09	0.12	0.13	0.11	-0.02	0.03	-0.13	-0.15
Number of patents	0.12	0.07	0.06	0.12	0.11	0.13	-0.04	-0.12
Environmental dynamism	-0.03	0.02	0.05	0.05	-0.13	-0.10	-0.14	-0.08
Environmental hostility	-0.03	0.02	0.03	0.08	-0.03	-0.02	-0.05	-0.08
Past profitability (n-1)	-0.12	-0.09	-0.07	0.31*	0.41***	0.25*		
Past sales growth (n-1)	-0.09	-0.10	-0.10	0.06			-0.08	-0.30*
Main effects								
EO		0.35***	-0.91	2.58†	0.56	0.90	-0.16	0.19
EO squared			1.29†	-2.21	-0.52	-0.87	0.22	-0.13
Strategic learning					-0.11	-0.50***	-0.13	-0.65***
Firm size				3.41*		-1.37*		-1.68**
Firm age				3.59*		-1.80**		-2.15**
Interactions								
EO squared * Firm age				4.72*				
EO squared * Firm size				5.57**				
Strategic learning * Firm age						1.72**		2.06**
Strategic learning * Firm size						1.63**		2.00**
ΔR2		0.12	0.02	0.11		0.16		0.22
R2	0.05	0.17	0.19	0.30	0.26	0.42	0.06	0.28
F	1.13	3.53	3.59	3.62	5.19	6.92	0.84	3.49

Notes: [a] Standardized coefficients are reported ; † < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001 (two-tailed tests)

The baseline model in Step 1 Model 1 reports the potential influence of the controls on SL. Our results in Step 1 Model 2 controlled for the linear influence of EO on SL. This model differed statistically significantly from the baseline model ($\Delta R^2 = 0.12$, F=17.05, d.f.=1, 123, p<0.001), explaining 17% of the variation in SL. Next, in Step 1 Model 3, we evaluated the non-linear effect of EO on SL, before age and size were introduced as moderators. Comparing the variation explained by Models 2 and 3 in Step 1 suggests that R^2 improved moderately, providing prima facie evidence of a non-linear effect ($\Delta R^2 = 0.02$, F=3.47, d.f.=1, 122, p<0.10). However, the non-linear specification of EO implies that EO interacts with itself and therefore that its marginal effect on SL is always dependent on the actual level of EO. Therefore, the coefficients in the standard regression output are insufficient to make a correct assessment of the relationship between EO and SL (Brambor, Clark and Golder, 2006). In order to estimate this relationship, we computed the marginal effect of EO at the full range of values that EO takes at 0.5 intervals. The marginal effects, including the 95% confidence interval, suggested that EO's non-linear effect on SL is statistically significant at different levels of EO, confirming the non-linear relationship.

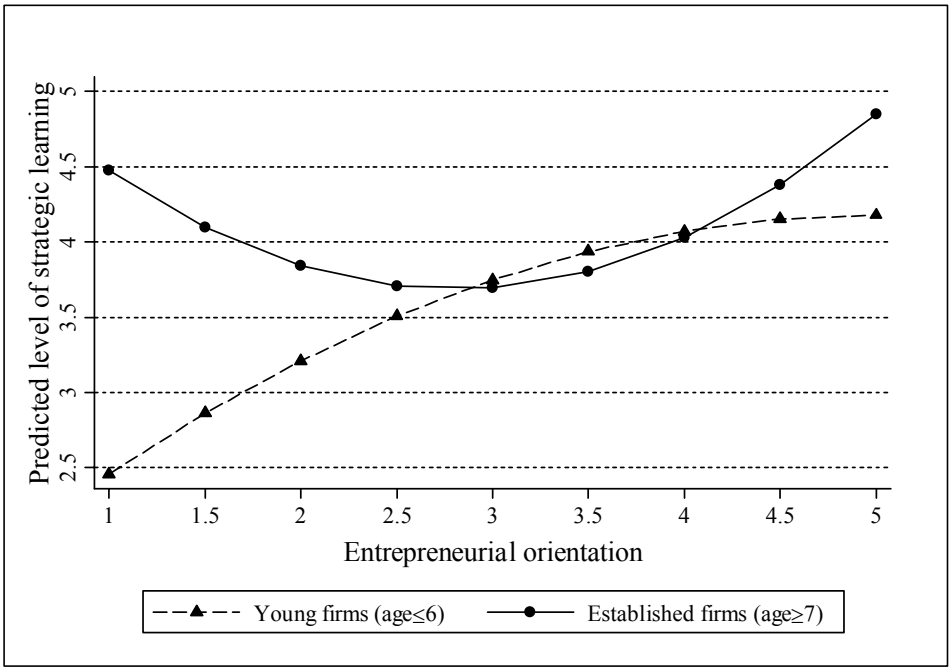
The results from Step 1 Model 4 support Hypotheses 1 and 2, as the data suggest that both size and age moderate EO's non-linear effect on SL. The variation captured by Models 3 and 4 in Step 1 suggests that R^2 significantly increases when age and size are introduced as moderators (ΔR^2 = 0.11, F=3.15, d.f.=6, 116, p<0.01). In Step 1, Model 4 explains 30% of the SL, suggesting that configurations of non-linear EO, size, and age account significantly for SL differences between firms.

However, given the conditional nature of the effects in these models, the regression coefficients themselves are not of interest or even interpretable (Brambor *et al.*, 2006). Instead, attention should be directed towards the marginal effect of non-linear EO on SL at different substantially meaningful levels of the moderating variables. In order to facilitate interpretation, we plotted the interactions in Figure 2 and 3. In the interests of clarity, Figures 2 and 3 omit the confidence intervals but a footnote specifies the areas of significance, indicating that all the curves are significant. The plots in Figure 2 with different levels of firm size suggest that the larger the firm, the more quadratic the relationship between EO and SL. Furthermore, the plots in Figure 3 with different levels of firm age suggest that EO's effect on SL is quadratic, especially for established firms. Together these results confirm Hypotheses 1 and 2.



Note: The marginal effect of the interaction between non-linear EO and size on strategic learning is significant at least at the 5% level (two-tailed) for all of the curves. Micro firms = employees<10; Small firms = employees<50, Large firms = employees>50.

Figure 2. Interaction of Non-linear EO and Size on SL

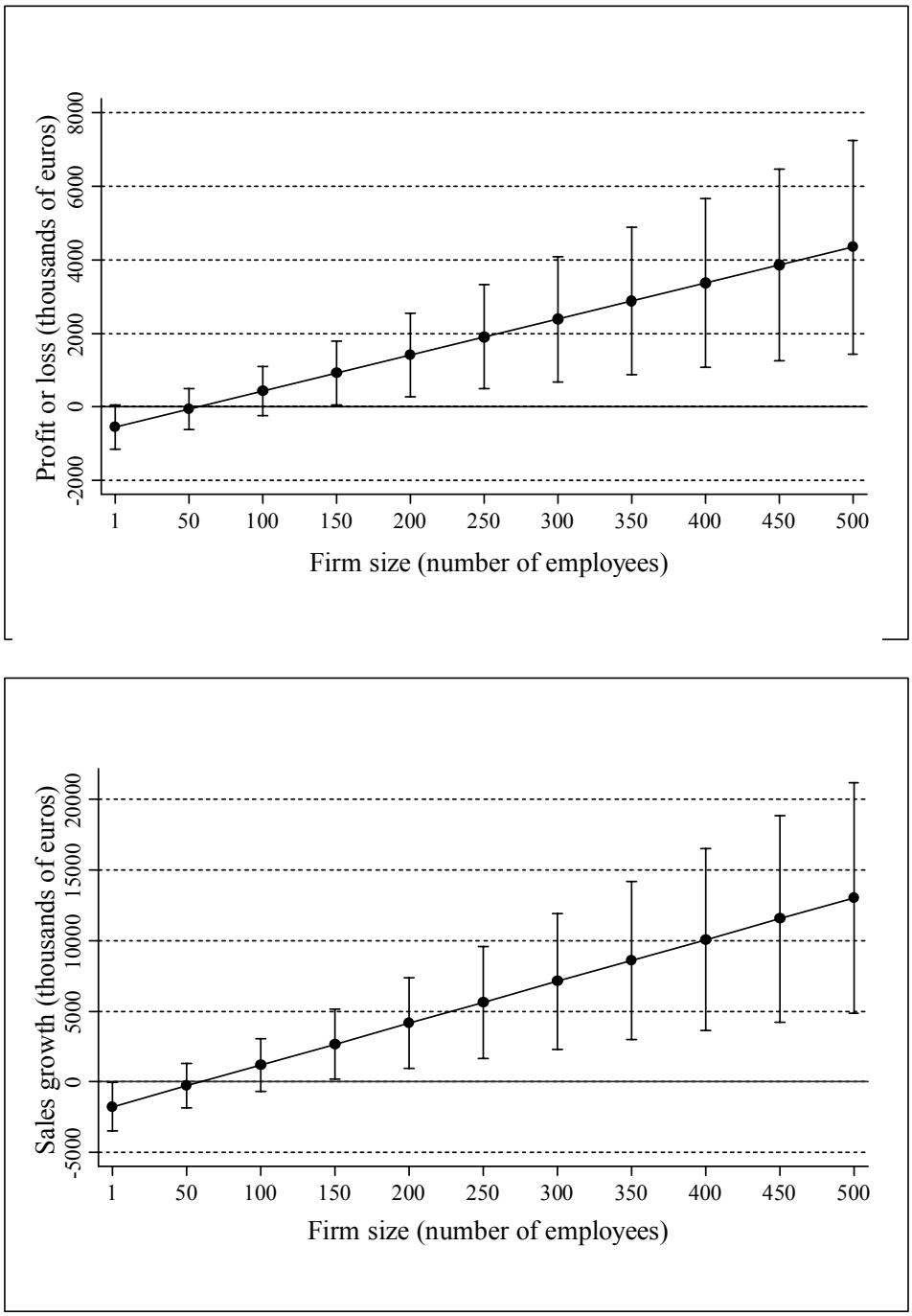


Note: Both in young and established firms, the marginal effect of EO on strategic learning is significant at least at the 5% level (two-tailed).

Figure 3. Interaction of Non-linear EO and Age on SL

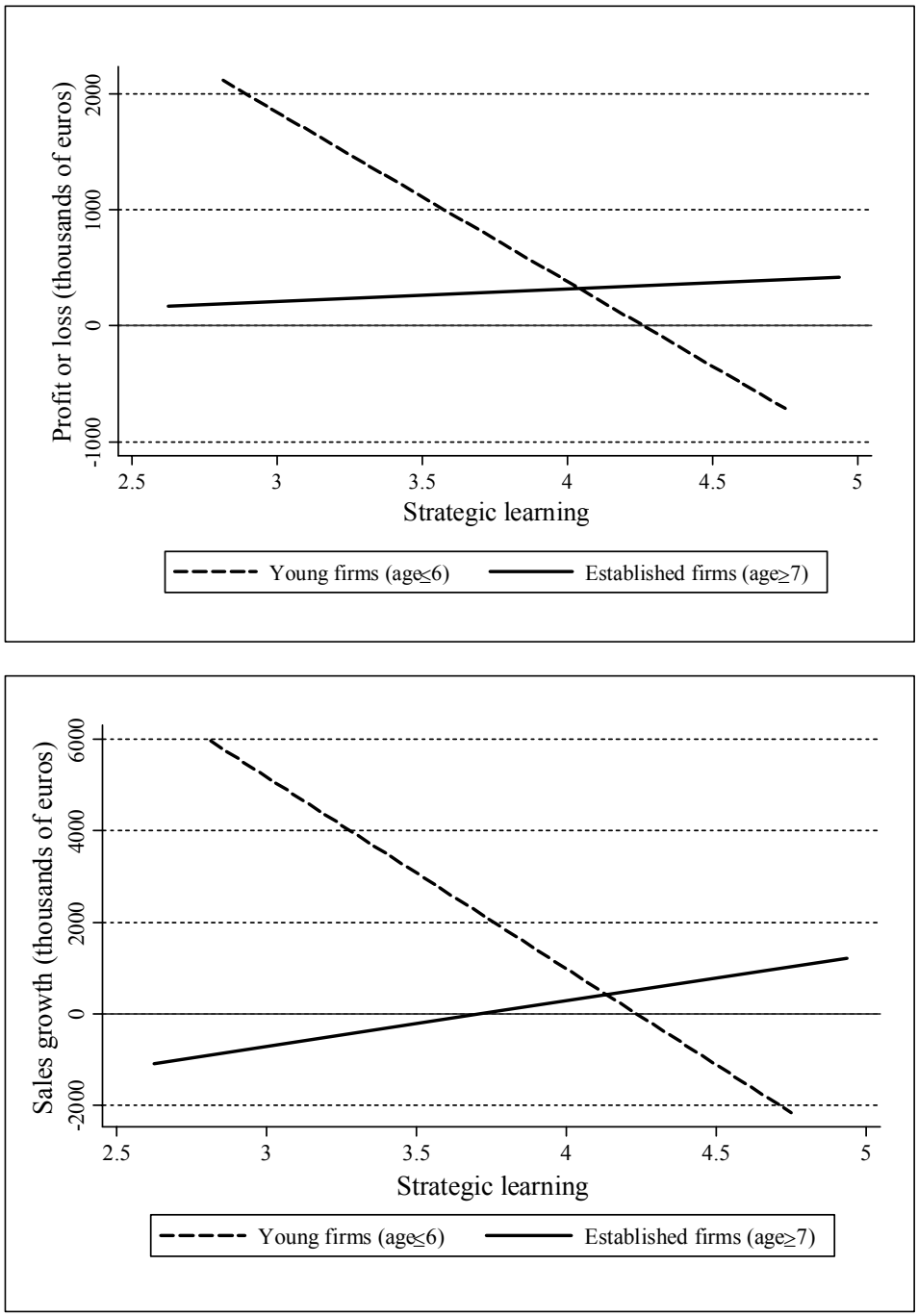
The plotted marginal effects for different firm sizes suggest that the effect of SL on both profitability and sales growth becomes significant once the company acquires 150 employees (see Figure 4). In the interests of clarity, Figure 4 omits the confidence intervals but the footnote specifies the areas of significance.

Although the regression coefficients for the moderation between SL and age on both profitability and firm growth models are statistically significant and positive, the confidence intervals indicate that in established firms the marginal effects of SL on profitability or sales growth are not statistically significant. However, the plotted relationships indicate a positive interaction in established companies. In young firms, the marginal effect of SL on profitability is negative and statistically significant when the level of SL is low (less than 3.5). In addition, SL's effect on sales growth is negative and statistically significant in young firms when the level of SL is less than about 3.7 (see Figure 5). In conclusion, these plots confirm that SL's effect is conditional on both the size and age of the firm.



Note: Hannan and Freeman (1984) advised that size-related inertia increases gradually as companies expand, so we used size as a continuous variable in our calculation of marginal effects. The line represents the marginal effects of strategic learning on profit or sales growth at different values of moderator firm size. The marginal effect of strategic learning on both profitability and sales growth is positive and significant at least at the 5% level (two-tailed) when the firm has 150 or more employees.

Figure 4. Interaction of SL and Size on Profitability and Sales Growth (Marginal effects 95% confidence intervals)



Note: In young firms, the marginal effect of strategic learning on profitability is negative and significant at least at the 5% level (two-tailed) when the level of strategic learning is low (less than 3.5). In addition, the effect of strategic learning on sales growth is negative and significant in young firms when the level of strategic learning is less than approximately 3.7. The marginal effects of strategic learning on profitability or sales growth are not significant in established firms.

Figure 5. Interaction of SL and Age on Profitability and Sales Growth

Robustness Checks

We applied several additional robustness tests to the findings. First, we analysed a competing model testing whether SL would moderate the linear relationship between EO and performance when age and size were controlled for, but found no support for this alternative model. Second, we tested a competing model where age and size were introduced as moderators to the linear relationship between EO and performance indicators. We tested the interactions between firm size and EO and firm age and EO, while controlling for SL. All the interaction terms including EO proved statistically non-significant, and therefore supported the core idea in our framework. Third, we tested whether age and size would moderate the linear relationship between EO and SL, but found no evidence of interaction. Finally, we investigated whether SL has a curvilinear relationship to performance indicators, but found no empirical support for that argument.

Discussion

Our empirical evidence suggests that large and more established firms require high levels of EO to trigger the formation and application of strategic knowledge. Although prior research offers some evidence that EO positively and linearly contributes to increased learning, it has largely applied exploitative concepts of learning; so our results do not conflict with those earlier studies, but the indication of a quadratic relationship between EO and strategic-level learning complements them. The EO literature, with a few exceptions, has largely ignored the importance of strategic-level learning. The SL construct applied in this study captures a type of double-loop learning that draws not only on mistakes but also on other sources of knowledge. Hence, the current study extends the boundary conditions and contingencies under which EO can influence higher-level learning and, subsequently, company performance. A key finding here is that the positive relationship between EO and SL in large and more established firms exists only when there are higher levels of EO. Rauch *et al.* (2009), for example, argued that older companies with more established habits derive less benefit from EO. Such arguments have led to suggestions that entrepreneurship is better executed in new ventures (Anderson and Eshima, 2013; Lumpkin and Dess, 2001) as yet unhindered by inertia related to size and age. However, it appears that high levels of EO positively affect the identified set of SL mechanisms. These mechanisms, in turn, appear highly beneficial for older and larger firms, allowing the integration of EO and strategic change arguments even in established firms.

The findings also suggest that larger firms require SL processes to maintain and improve company performance. In other words, size in particular appears to moderate the relationship between SL and objective performance indicators for profit and growth. This effect suggests that larger firms, while less inclined to change, are likely to benefit more from the strategic change and learning contributed by EO. Although it has long been argued that organizational size and age reflect inertia (Hannan and Freeman, 1984; Kelly and Amburgey, 1991), research has not focused directly on how entrepreneurial strategies, strategic change, and higher-order organizational learning can counter structural inertia as organizations grow and mature. We suggest that the forces of inertia (e.g. resistance to change, core rigidities, and the bounded rationality of managers) act to prevent the effects of EO on SL. Key works on change management (e.g. Lewin, 1947) and later reappraisals (e.g. Burnes, 2004) suggest that in order to change the course of a firm, it is necessary to reduce the obstacles to change. Our amalgamation of EO and learning, though, would suggest that while SL capability counters obstacles to change, EO promotes the change itself. Both learning and behavioural theories of organizational change indicate that decisions to change are dependent on the willingness to change, the awareness of the need to change, and the perceived capacity to change effectively (Katona, 1951; Penrose, 1959; Zahra *et al.*, 2006). Maintaining a high level of EO in conjunction with effective SL apparently provides a viable combination of driving forces, and being moderately entrepreneurial will not suffice when change is unavoidable.

Although we argued that the benefits of SL would be greater in larger and more established companies, we were not expecting such clear results suggesting that engaging in high levels of SL could actually weaken performance in younger firms. The arguments in our framework suggest the relationship may be negative because younger firms often launch with offerings designed to fit a current niche market, so have no need for immediate strategic change. The dynamic capability lifecycle models (e.g. Helfat and Peteraf, 2003) generally suggest that the capabilities necessary in the early stages of a business differ from those required for strategic renewal. SL may not be the core issue for younger firms because they may still be focusing on establishing and improving operations, and would therefore benefit more directly from entrepreneurial activity and implementation. The findings of Anderson and Eshima (2013) support this conclusion, indicating that EO has its strongest impact on growth among younger firms that already possess intangible resource advantages. Our findings also align with Hult *et al.*'s (2003) finding that large and old organizations perform best when they focus on learning, whereas learning had a negative relationship with performance in small and young firms.

The findings of this study stress the need for management pursuing EO strategies in larger and more established organizations to extend their focus towards systematic creation, dissemination, interpretation, and implementation of strategic information. Among larger companies, SL capability has a key role to play in supporting the positive development of both profitability and growth. To facilitate SL, organizations should apply practices fostering knowledge sharing across teams and departments, such as cross-functional teams, face-to-face interactions, and discussion forums providing platforms connecting multiple innovation streams by disseminating learning about new means to boost performance. Interpretation requires organizations to promote reflective discussion that creates a shared interpretation of the entrepreneurial opportunity among their personnel, which may then lead to an implementation decision. Implementation refers to the development of organizational practices such as databases, formal training, manuals, and descriptions of best practices, to instigate project, product, or service developments that seize the entrepreneurial opportunity. Furthermore, an organization aiming to improve SL would benefit from its management mastering what Argyris and Schön (1978, 1996) call deutero-learning: reflective routines aimed at improving the learning system itself. These routines might involve the whole staff applying a 'stop-and-think' approach to improve the quality of problem solving and learning (Visser, 2007).

Despite our best endeavours and the objective pre- and post-performance measures deployed alongside high-quality survey measurements, this research is not without its limitations. For example, while focusing on the software industry helps to understand the knowledge-intensive context studied, it also limits the generalizability of the results. Therefore, the research model should be tested in other industries with different lifecycles, technological intensity, and institutional contexts. The generalizability of this research is also limited by its focus on Finnish software companies, and the results might differ between nations and cultures (Bontis *et al.*, 2002; Lee, Lim, and Pathak, 2011). Organizations may also vary their learning processes over their lifetimes (Bingham and Davis, 2012). Although SL appeared important for software firms at the time of data collection, other learning processes may be equally important in different contexts. It would also be valuable to further integrate dynamic capabilities and learning literatures, as doing so could advance understanding in both fields of the dynamics of competitive advantage. Finally, while we have sufficient time lag between the survey-based SL and database-derived performance measures, the cross-sectional survey design limits the demonstration of causality between EO and SL. The limitations also reveal interesting avenues for further research. In general, accurate and context-specific study of the complicated relationship between EO, the various types of learning, and different kinds of performance measures would appear to offer

the best potential to understand the challenges of combining entrepreneurial and learning strategies.

Conclusions

Given that larger and more established companies face a struggle to overcome the inertia that blocks adaptation, the question is how such companies might be able to strategically renew themselves in order to adjust, survive, and improve performance. Our conclusion suggests that a larger and more established firm that does not derive SL from EO is likely to provoke its own decline. The findings outline that the structural and resource hurdles facing larger and more established companies can be countered by the SL effects created by high-level EO decisions and by decision-makers striving for innovation and proactiveness and sanctioning risk taking.

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Appendix 1

Measurement Scales

Constructs and items

Entrepreneurial orientation (Covin and Slevin, 1989)

Innovativeness
Our firm places a very strong emphasis on R&D, technological leadership, and innovations, instead of trusting only in tried-and-tested products and services
In the past 5 years, we have marketed a number of new lines of products or services
In the past 5 years, changes to our product or service lines have usually been quite dramatic

Proactiveness
In dealing with competitors, my firm typically initiates actions which competitors then respond to
In dealing with competitors, my firm is very often the first business to introduce new products/services, administrative techniques, operating technologies, etc.
In dealing with competitors, my firm typically adopts a very competitive 'undo-the-competitors' posture

Risk taking
In general, the top managers of my firm have a strong proclivity for high-risk projects (with chances of very high returns)
In general, the top managers of my firm believe that owing to the nature of the environment, bold, wide-ranging acts are necessary to achieve the firm's objectives
When confronted with decisions involving uncertainty, my firm typically adopts a bold posture in order to maximize the probability of exploiting opportunities

Strategic learning

Strategic knowledge creation (Atuahene-Gima and Murray, 2007)
We prefer to collect market information before determining strategic needs to ensure experimentation
Our aim is to acquire knowledge to develop projects that lead us into new areas of learning such as new markets and technological areas
We collect novel information and ideas that go beyond our current market and technological experiences
Our aim is to collect new information that forces us to learn new things during product development

Strategic knowledge dissemination (Bontis *et al*., 2002; Tippins and Sohi, 2003)
Within our firm, sharing strategic information is the norm
Within our firm, strategically important information is easily accessible for those who need it most
Representatives from different departments meet regularly to discuss new strategically important issues
Within our firm, strategically important information is actively shared between different departments
When one department obtains strategically important information, it is circulated to other departments

Strategic knowledge interpretation (Bontis *et al*., 2002; Sinkula et al., 1997; Tippins and Sohi, 2003)
When faced with new strategically important information, our managers usually agree on how the information will impact our firm
In meetings, we seek to understand everyone's point of view on new strategic information
Groups are prepared to re-think decisions when presented with new strategic information
When confronting new strategic information, we are not afraid to critically reflect on the shared assumptions we have about our organization

Strategic knowledge implementation (Bontis *et al*., 2002)
Strategic knowledge gained by working groups is used to improve products, services, and processes
The decisions we make according to any new strategic knowledge are reflected in changes to our organizational systems and procedures
Strategic knowledge gained by individuals has an effect on the organization's strategy

Environmental dynamism (Green *et al*., 2008)

How would you assess your firm's business environment with the following statements?
Product demand is hard to forecast
Customer requirements and preferences are hard to forecast
My industry is very unstable and subject to huge changes resulting from major economic, technological, social, or political forces

Environmental hostility (Green *et al*., 2008)

How would you assess your firm's business environment with the following statements?
Competitive intensity is high in my industry
Customer loyalty is low in my industry
Severe price wars are a characteristic of my industry
Low profit margins are a characteristic of my industry

STRETCHING STRATEGIC LEARNING TO THE LIMIT: THE INTERACTION BETWEEN STRATEGIC PLANNING AND LEARNING

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Abstract: Considering strategy work as an emergent process, this study set out to analyze the potential performance benefits of the interaction between strategic planning and SL processes. In particular, by basing the study on limited firm-level dynamic capabilities, we test a nonlinear interaction between strategic planning and learning. By analyzing data including pre- and post-performance measures from 182 software companies, the study contributes to strategic planning and dynamic capabilities research by confirming that strategic learning has a nonlinear (inverted U-shape) interaction effect on the relationship between strategic planning and firm performance. From low to medium levels of planning, strategic learning functions as an important mechanism that increases the positive performance benefits derived from planning. However, at higher levels of strategic planning and strategic learning, the interaction becomes negative, suggesting a knowledge overload caused by the extensive planning procedures that, at high levels, exhaust the limited learning process.

Keywords: strategic planning; strategic learning; dynamic capabilities; organizational learning; limited learning capabilities; objective performance

1. Introduction

Formal strategic planning (Ansoff, 1991, 1994) and adaptive strategy making (Mintzberg & Lampel, 1999) are frequently identified as separate and opposite approaches to strategy formation. This distinction has evoked debates on the nature of successful strategy development in ways that highlight the benefits and limitations of both approaches. However, recent academic discussions on strategy processes have highlighted the interplay between planning and emergence and have suggested that effective organizations engage in complex strategy formation processes including detailed strategic planning but also emergent learning processes (Andersen, 2004; Brews & Hunt, 1999; Hart, 1992; Mintzberg & Waters, 1985). Although the benefits of these mixed models have been recognized, empirical testing of the effectiveness of these balanced applications is still rare (Andersen, 2004; Hart & Banbury, 1994).

Strategy process literature provides a fertile ground to consider the role of strategic planning for competitive advantage and firm performance. The existing empirical studies on the relationship between strategic planning and company performance provide mixed evidence that has been suggested to result from the complex relationship between strategic planning and its potential moderators (Andersen, 2004; Powell, 1992; Wolf & Floyd, Forthcoming), such as business environment (Brews & Hunt, 1999; Eisenhardt, 1989). A very limited set of studies have noted that these effects are influenced by the firm´s intra-organizational capabilities related to strategy implementation (Eisenhardt & Sull, 2001; Liedtka, 2000; Miller, Wilson, & Hickson, 2004), such as the firm personnel's ability to adapt to changing strategic circumstances (Dooley, Fryxell, & Judge, 2000; Kohtamäki, Kraus, Mäkelä, & Rönkkö, 2012). This gap in the literature is puzzling, given that strategy implementation is suggested to be "an important lever in strategy-process effectiveness" that "has largely been overlooked" in prior research (Hutzschenreuter & Kleindienst, 2006, p. 701). Strategy process studies underline the importance of organizational adaptation, such as knowledge sharing (Kuvaas, 2002), sense-making (Gioia & Chittipeddi, 1991; Gioia, Thomas, Clark, & Chittipeddi, 1994) and organizational memory (Bontis, Crossan, & Hulland, 2002), in strategy implementation, but they also highlight the lack of evidence concerning implementation practices (Mantere & Vaara, 2008). Strategy processes, which are designed to leverage the potential of human capital accumulated within the organization, have become a key factor in strategy implementation. Consequently, studies have suggested that dynamic capabilities (Teece, Pisano, & Shuen, 1997) are "at the heart of strategy processes" but have also noted that strategy process research "has hardly witnessed any application of this concept"

(Hutzschenreuter & Kleindienst, 2006, p. 709; See also Wolf & Floyd, Forthcoming).

In this study, we contribute to the strategic planning and dynamic capability literature by addressing these two identified gaps. By integrating the existing views, we suggest that strategic planning needs to be paired with *strategic learning* (SL) capabilities. We argue that SL, which consists of firm´s intraorganizational processes for the creation, dissemination, interpretation, and implementation of strategic knowledge (Kuwada, 1998; Thomas, Sussman, & Henderson, 2001), enables the adaptation of the new strategy and, hence, effective implementation of planned strategy. However, studies have suspected that firms' SL capabilities may be limited (Mueller, Titus, Covin, & Slevin, 2012; Sirén, Kohtamäki, & Kuckertz, 2012) and that the moderating effect of SL on the strategy-performance relationship may be nonlinear. Thus, we theorize that the limited nature of SL capabilities (i.e. information-processing limits and cognitive biases) constrain firm personnel's capability to adapt to changing strategic circumstances and implement new strategies (Hwang & Lin, 1999; O'Reilly, 1980; Paruchuri, 2009).

In this study, we propose and analyze an inverse U-shaped interaction between strategic planning and SL by asking the following research question: *How do strategic planning and SL interact to generate the potential performance effect?* The key contribution of this study is twofold. First, we challenge the valuable and somewhat dichotomous debate in the existing literature by arguing that the interaction between planning and SL is required for the effective implementation of planned strategies. Second, building on prior theorization of the firm's limited learning capabilities, we assess whether the interaction between strategic planning and SL is nonlinear in nature (i.e., whether the effect of planning on profitability varies as a nonlinear function of SL). This study extends the existing research, which has not provided evidence on the nonlinear interaction between strategic planning and SL, by demonstrating not only that SL plays a key role in the planning-performance relationship but also that the benefits of planning are restricted by the limitations of the organization's SL capabilities. This study highlights the need to understand the characteristics of dynamic capabilities and the restrictions in their use in the planning process.

2. Theoretical background

The existing literature regarding firms' strategy work builds on the established streams of research ranging from strategic planning to strategy process research (Burgelman, 1991) and is paralleled by the strategy-as-practice school of thought

(Jarzabkowski, 2008; Mantere & Vaara, 2008; Whittington, Molloy, Mayer, & Smith, 2006). The classical debate in this field has addressed the contrast between planning (Ansoff, 1991, 1994) and emergence perspectives (Mintzberg & Lampel, 1999; Mintzberg & Waters, 1985). The planning paradigm was introduced as a rational analytical approach to provide strategic direction to organizational actions, whereas emergence perspective examines the social processes in which strategies are actually realized and implemented (Chakravarthy & Doz, 1992; Mantere & Vaara, 2008; Pettigrew, 1992). Our study builds on the notion of a coalition between strategic planning and emergent strategies by agreeing that both processes are necessary for a firm and that neither is sufficient alone. For instance, relying only on emergent strategies may make firms subject to strategic drift and noncumulative strategic opportunism (Idenburg, 1993; Titus, Covin, & Slevin, 2011), whereas building only on planned strategies blocks adaptability and prevents the firm from exploring opportunities that are not part of the plan (Miller & Cardinal, 1994). The study by Titus, Covin, & Slevin (2011) shows initial support to this argument by evidencing that the growth rate is highest when a manufacturing firm's strategy exhibits both emergent and planned qualities. This complementary view has also been justified by Mintzberg and Waters (1985, p. 271), who have attempted to bridge the gap between intended and emergent strategies by stating that *"managing requires a light [and] deft touch - to direct in order to realize intentions while at the same time responding to an unfolding pattern of action"*

Thus, aligned with Mintzberg and Waters (1985), this study combines strategic planning and SL capabilities in such a way that strategies may be effectively implemented. Using this approach, we suggest that strategic planning provides important strategic decisions that are then implemented through the favorable facilitation of SL capabilities. Once the firm's executive has made its plans, the firm must be prepared to rework them and implement them incrementally (Brews & Hunt, 1999). SL enables personnel to adapt to new strategies and changing strategic circumstances by enabling the acquisition and utilization of real-time knowledge that can aid the response to changing environmental and organizational demands.

2.1. Strategic planning and strategic learning

In this study, we apply the concept of strategic planning to study and measure the planning process that generates strategic decisions, objectives and goals for the long-term survival of an organization (Collier, Fishwick, & Floyd, 2004). By bridging the gap between the planning and emergence perspectives, we aim to

extend the increasingly prominent perspective of behavioral strategy to examine how executives of firms make and execute strategic decisions. Mintzberg and Waters (1985) first drew the conceptual link between emergent strategy and SL. Building on the ideas of evolutionary economics (Nelson & Winter, 2002; Zollo & Winter, 2002), we consider SL to be a specific type of dynamic capability that is defined as a firm's ability to create, extend and modify its knowledge base to strategically adapt to shifts in changing strategic circumstances (Anderson, Covin, & Slevin, 2009). SL represents a true source of sustained competitive advantage (De Geus, 1988; DiBella, 2001; Mueller et al., 2012) and is considered a combination of knowledge creation, knowledge dissemination, knowledge interpretation and knowledge implementation (Kuwada, 1998; Thomas et al., 2001). Knowledge creation is defined as the process of knowledge acquisition in which individuals actively collect strategic information from the environment (Atuahene-Gima & Murray, 2007). Strategic knowledge dissemination refers to knowledge sharing that occurs in intra-organizational interactions among individuals (Jerez-Gómez, Céspedes-Lorente, & Valle-Cabrera, 2005). The interpretation of strategic knowledge allows a firm's personnel to process relevant knowledge and engage in collective actions that affect the firm's strategy and performance (Daft & Weick, 1984; Tippins & Sohi, 2003). Finally, knowledge implementation enables effective execution within an organization and its processes. In combination, these four subdimensions create firm-level dynamic capability that enables firm "sensing" and "seizing" opportunities (Teece, 2007). However, because the dimensions of SL are interrelated (Crossan & Berdrow, 2003; Flores, Zheng, Rau, & Thomas, 2012) and the largest effects are realized through the shared core of the dimensions, the coexistence of all learning dimensions is especially important.

Although SL is important, recent studies have found unexpected results regarding the benefits of SL capabilities (Covin & Slevin, 1989; Mueller et al., 2012) and have determined that these capabilities can be limited when stretched (Sirén et al., 2012). Recently Wales, Parida and Patel (2013) found that beyond intermediate levels, absorptive capacity has harmful performance effects. Mueller et al. (2012) found, in contrast to their expectations, that the relationship between pioneering orientation and performance was negatively moderated by SL. A few recent studies have presented incongruous findings that, according to Pierce and Aguinis (2011), could indicate the possibility of an effect coined as "too-much-of-a-good-thing", suggesting that after certain thresholds, some organizational capabilities may also have negative consequences. Subsequently, scholars (Coff, Coff, & Eastvold, 2006; Mueller et al., 2012) have called for empirical studies that explore the benefits and risks associated with the use of SL capabilities. This study considers the possibility that SL capabilities are constrained, limiting the positive performance outcomes of the interaction between strategic planning and SL.

Thus, the research model concentrates on only one hypothesized interaction that provides conjectures regarding the interaction between the strategic planning and learning constructs and concentrates on the development of an underlying theory that explains the nonlinear nature of this interaction in particular.

2.2 On the interaction between strategic planning and strategic learning

In the absence of appropriate synthesis and implementation, plans are merely empty words (Taylor, 1997). Previously published studies have highlighted the importance of implementation capabilities with respect to strategic planning but have only examined limited empirical evidence (Hutzschenreuter & Kleindienst, 2006). According to prior studies, an organization's ability to rapidly implement strategies is highly affected by its intra-organizational ability to adapt to changes in internal and external circumstances (Dooley et al., 2000). For example, the recent study by Santos-Vijande et al. (2012) showed that organizational learning improves firm's competitiveness through strategy implementation. Furthermore, both Rudd, Greenley, Beatson, and Lings, (2008) and Dibrell, Craig, and Neubaum (Forthcoming) provided evidence that flexibility is a key factor in successful capitalization of strategic planning. Thus, given that the effective execution of strategies requires organizational adjustment, SL capability is a central aspect of strategy implementation research (Mintzberg & Lampel, 1999; Mintzberg & Waters, 1985; Sirén et al., 2012).

Strategic planning can set the stage for learning. Brews and Hunt (1999) found that firms operating without any sound planning spend too much time in trial and error learning that results in poor performance. Andersen (2004) found that centralized strategic planning guides and coordinates learning, which, particularly in dynamic environments, complements strategic planning. Along those lines, Miller, Wilson and Hickson (2004, p. 211) suggested that planning "by focusing minds and effort" directs learning by reducing the feelings of ambiguity and uncertainty related to strategic changes. Successful strategic planning builds on the organization's ability to generate creative strategic ideas that facilitate renewal and competitive advantage (Hamel & Prahalad, 1994; Liedtka, 2000). The organizational capability to construct alternative futures involves creation of strategic knowledge that is novel to the firm and often derived from joint ventures, suppliers or customers (Kogut & Zander, 1992). SL, through its knowledge creating function, enables the firm to add knowledge for novel combinations of business initiatives (Daft & Weick, 1984; Huber, 1991; Kuvaas, 2002; Santos-Vijande et al., 2012).

Furthermore, the organizational information-processing perspective posits that an increase in the organizational flow of information facilitates environmental awareness, improving the quality of strategic discussions (Kuvaas, 2002). For instance, Andersen (2004) notes that crossfunctional processes together with strategic planning yield performance benefits. Similarly, Simon (1993) highlights the importance of personnel participation for the improved dissemination of ideas. Horizontally and vertically inclusive participation is central for dialogical two-way communication that facilitates the examination and testing of ideas (Liedtka, 2000). Thus, SL enables the strategic knowledge flows required for the effective implementation of planned strategies.

Sense-making of the reconstructed strategies is an important component of SL and is central when an organization is seeking a shared understanding about strategic plans (Narayanan, Zane, & Kemmerer, 2011). In the process of organizational sense-making, members have discussions to generate common understanding about the planned strategies to consider proper actions for implementation (Daft & Weick, 1984; Jenkins & Johnson, 1997). In their extensive literature review on strategy cognition, Narayanan, Zane, and Kemmerer (2011) concluded that both the upper and lower echelon sense-making and sense-giving activities are needed for effective strategy implementation, suggesting that interpretation calls for open dialogue across organizational levels (Liedtka, 2000; Taylor, 1997). Thus, we believe that strategic knowledge interpretation enables the development of a shared cognitive framework about the needed actions that is required for the effective implementation of strategic plans.

However, to accomplish change, "the behavioral dynamics within the organization must realign to support new intent" (Liedtka, 2000, p. 200). In the process of strategic knowledge implementation, new knowledge is institutionalized in the routines, systems, structures and procedures of an organization, resulting in capabilities that facilitate the achievement of strategic objectives (Bontis et al., 2002; Walsh & Ungson, 1991). Furthermore, the implementation and use of new knowledge increases the firm´s knowledge base. The existing knowledge base may improve strategic analysis, as prior knowledge facilitates knowledge structuring that enables effective communication (Miller et al., 2004; Walsh & Ungson, 1991). Structured strategic ideas enable personnel to participate in discussions that facilitate strategy implementation (Liedtka, 2000). For instance, Miller, Wilson and Hickson (2004) found that access to an accumulated stock of experience resulted into successful implementation because prior experience enabled managers to assess objectives and specify key tasks and resource requirements appropriately. In addition, the stock of knowledge or organizational memory has been argued to facilitate problem definition, generation of alterna-

tives and evaluation of strategic choices (Walsh & Ungson, 1991), all important factors affecting the performance effects of strategic planning.

SL facilitates the effectiveness of strategic planning by enabling awareness and joint understanding about the realization of new strategies (Moorman, 1995). Moreover, SL decreases employees' resistance to the strategic changes resulting from strategic planning, as participation enables individuals to become more aware of the importance and reasoning behind planned strategic changes (Mantere & Vaara, 2008). In this study, we both build on this view in which SL complements strategic planning in firm performance and advance it by describing theoretical dilemmas in the use of SL in the planning process.

2.3. Reaching the limit: strategic learning as a nonlinear moderator

Although prior research has suggested several positive outcomes from SL, some studies suggest that there are limitations to the benefits for its strategy-performance relationship (Covin, Green, & Slevin, 2006; Mueller et al., 2012; Sirén et al., 2012). Deviating from the more traditional learning approach, in which learning is always considered beneficial, some organizational learning scholars suggest that learning capabilities are limited in their use as learning may entail tradeoffs, such as an adjustment between exploration and exploitation (March, 1991) or a compromise between learning outcomes and the invested resources (Deeds, DeCarolis, & Coombs, 2000; Wales, Parida, & Patel, 2013). Thus, going beyond the traditional organizational learning rationale, we believe that it is important to consider a new perspective on the planning-performance relationship, one that takes into account the possibility that learning capabilities, when fully exploited and stretched, are limited in their use and, thus, might not exert their key function in the implementation process.

With regard to strategic plans that are generated, personnel participation enables rich idea creation and increases personnel commitment to new plans (Collier et al., 2004; Kohtamäki et al., 2012), but extensive participation may also lead to inconsistencies and even to negative outcomes due to the bounded rationality caused by the limited cognitive abilities of and the knowledge asymmetries between organizational members (Sharma, 1997; Simon, 1963). Bounded rationality limits the organizational capability to interpret diverse information, suggesting that the organizational capability to interpret information is limited, as capabilities can be burdened with too much strategic information. This should caution organizations to consider how to use these capabilities for optimal outcomes (Prahalad & Bettis, 1986). Therefore, the consistency of strategic plans is an important characteristic of strategy, as structured strategies are easier to communicate and

implement than unstructured ones (Eisenhardt & Martin, 2000; Eisenhardt & Sull, 2001).

Moreover, although knowledge dissemination increases the positive effect of strategic planning on performance, as it equips personnel with necessary knowledge for executing the planned strategies, particularly high levels of knowledge dissemination may have disadvantages to this relationship. First, at high levels, knowledge sharing begins to increase knowledge diversity and variation within the organization, causing decreased effectiveness with regard to knowledge exploitation and resulting into low firm profit performance (Atuahene-Gima & Murray, 2007). Second, as suggested by the knowledge sharing paradox (Coff et al., 2006), at extensive levels, knowledge sharing may diminish its strategic value as widely shared knowledge is more vulnerable to spillover effects. For instance, an organization equipped with particular knowledge sharing culture is more likely to also spread knowledge beyond organizational boundaries, benefitting competitors and facilitating harmful imitation.

Managers should couple strategic planning activities with knowledge interpretation to make sense of strategic knowledge generated by the activities related to strategic planning and analysis. Although knowledge interpretation activities are critically important, they do not come without problems, particularly from moderate to high levels of interpretation. As joint knowledge interpretation takes place in various physical or virtual forums and requires time investments from personnel, joint interpretation is time consuming and costly. When optimized properly, such activities effectively create joint understanding, but after a certain threshold is reached, added time investments still generate costs but do not provide benefit with regard to productivity or profit increases. Research has also assumed that knowledge interpretation activities have a threshold, after which the interpretation activities may have negative effects on productivity. Moreover, studies on the information-processing view (Lechner, Frankenberger, & Floyd, 2010) suggest that organizations suffer from knowledge overload (O'Reilly, 1980; Phene, Fladmoe-Lindquist, & Marsh, 2006), indicating that an overload can occur when the amount of information available becomes greater than the organization is capable of interpreting (Sparrow, 1999). Because high knowledge variety may cause difficulties in knowledge structuring and interpretation, we argue that extensive idea generation may create excess knowledge variety and generate diverse interpretations that decrease the consistency of strategic thinking within the organization. Consistent strategic thinking is central to effective strategy implementation and, hence, is an important determinant for firm performance (Ahuja & Lampert, 2001; Sparrow, 1999). For instance, Sparrow (1999) identifies that in the case of

strategy implementation, knowledge overload may divert attention to irrelevant issues and generate potential for unjustified risk-taking and errors.

Finally, although knowledge implementation in organizational routines, systems, structures and procedures has been found to have considerable importance for organizational performance, exploitation that is too extensive has been found to distract organizational attention away from the recognition of new strategic opportunities and alternative ways of implementing business strategies. For instance, the existing organizational research has found routines helpful for tasks that do not require creativity, such as reporting work hours or travels (Adler & Borys, 1996; Adler, 1999). However, in cases where truly creative work is standardized, routines and structures may lead to alienation, causing core rigidities (Leonard-Barton, 1992) and competency traps (Levinthal & March, 1993; Levitt & March, 1988) by favoring exploitation over exploration. On the other hand, extensive planning efforts require stretching capabilities for knowledge implementation as the heavy information load produced by the complex task environment makes information recall and implementation particularly difficult (Eppler & Mengis, 2004). Complex task environments may cause knowledge overload, which interferes with the effective use of organizational memory and leads to a negative strategic planning-performance relationship at higher levels of planning.

This study suggests that SL plays a central role in the adaptation and implementation of planned strategies, but only to a limited extent. The implementation of planned strategies is limited due to the diminishing returns of SL at the higher levels of planning-performance relationship. From low to moderately high levels of strategic planning, SL facilitates the positive effects of planning on firm profit performance, but at higher levels of planning, the moderating influence of learning begins to diminish. In the highest levels of planning, the moderating effect of SL becomes negative, indicating that SL capabilities limit strategy implementation. Therefore, we expect SL to moderate the relationship between strategic planning and a firm's profitability in a nonlinear fashion by, demonstrating an inverted U-shaped pattern.

H1. *Strategic learning has an inverted U-shaped moderation effect on the relationship between strategic planning and the profit performance of a firm.*

3. Methods

3.1. Research setting and sample

We obtained the data for this study from the software industry in Finland between June and August of 2009. We chose to focus on the software industry because its high rate of change suggests the need for learning (Bingham & Davis, 2012; Davis & Eisenhardt, 2011) The Finnish software sector provided an attractive context for the study due to the growing importance of software companies for the Finnish economy, relatively small regional differences within the country context resulting in low culture-related variance (Autio, Sapienza, & Almeida, 2000), and a unified industry context as we concentrated on one main industry class, making the sample representative and manageable.

The official Statistics Finland database, which contains information on all Finnish software businesses registered for value-added tax, provided the sample of 1,161 businesses that had five or more employees. Researchers distributed a survey to these businesses in a web-based data collection process, then sent two e-mail reminders, and finally called non-respondents by telephone to invite them to complete the survey. We received 210 responses to our web-based survey, which constituted a response rate of 18%, an acceptable response for this type of survey (Baruch, 1999). After we excluded responses containing missing data, multiple answers, and companies that were large, listed companies and were therefore very different from the remaining sample, this study utilized information from 182 small- and medium-sized firms that employ less than 500 employees. We have based this study on the key respondent approach; using managing directors as the key respondents for the investigation. In the data collection year (2009), a typical respondent firm (median values) had an annual turnover of 1.2 million euros, generated an annual profit of 54 thousand euros, employed a staff of 17, served 50 customers and was 9 years old.

The *t*-test comparisons of the revenue, profit, and age of the responding firms with the same data for nonresponding firms (which were available from a secondary database) demonstrated no significant differences between nonresponders and responders in terms of revenue and profit but a small difference in terms of firm age ($p < 0.05$). We also tested for response bias by comparing the first third of the respondents with the last third of respondents with respect to the key study variables (Armstrong & Overton, 1977; Werner, Praxedes, & Kim, 2007) and found no statistically significant difference between these groups; this result suggested that the data were sufficiently free from non-response bias.

3.2. Measures

We used survey items adopted from prior studies and have recorded them in the Appendix. Strategic planning, strategic learning, environmental dynamism and hostility were measured on 5-point Likert scales (1 = fully disagree, 5 = fully agree). The main source of all other indicators was the Orbis database, which relies on official company-issued accounting statements.

The strategic planning scale (Bailey, Johnson, & Daniels, 2000; Collier et al., 2004) measures the degree to which available options are examined; detailed implementation plans are formulated; the environment is systematically analyzed; and monitoring and control procedures are used to achieve strategic objectives. We had to remove one item of the scale ("We evaluate potential strategic options against explicit strategic objectives") because it demonstrated significant cross loadings. For the six remaining items, the EFA results indicated that the construct exhibited a unidimensional factor structure, and the loadings of these items ranged from 0.45 to 0.89. The Cronbach's alpha was 0.87 and composite reliability 0.73. In the CFA, the approximate fit heuristics demonstrated that the model fit was satisfactory ($\chi 2[7]=7.85$, RMSEA = 0.03, NFI = 0.97, CFI = 1.00, GFI = 0.99, and IFI =1.00).

The strategic learning instrument (Sirén, 2012) employed 16 items to capture the theoretical dimensions of the creation, dissemination, interpretation and implementation of strategic knowledge (Crossan & Berdrow, 2003; Huber, 1991; Kuwada, 1998; Thomas et al., 2001). Based on our EFA results, we divided the total of 16 items into four parcels. The items' main loadings ranged from 0.49 to 0.94 and their cross loadings were all less than 0.3. All of the SL dimensions exhibited satisfactory Cronbach's alpha (0.76, 0.85, 0.76 and 0.73) and composite reliability (0.76, 0.88, 0.75, and 0.67) values. Furthermore, a CFA revealed an excellent fit for the second-order model ($\chi 2[100]=162.30$, RMSEA= 0.06, NFI = 0.91, CFI = 0.96, GFI = 0.90, and IFI=0.96). All items had significant loadings for their corresponding latent construct ($p<0.001$, $t>5.0$). In addition, the CFA result demonstrated that the SL dimensions exhibit roughly similar loading sizes, suggesting that the examined dimensions are equally important to the second-order construct. As a result, while our research questions focus on the overall moderating effect of SL, we used the average score of the dimensions for the SL construct in the subsequent analyses.

We used profit or loss before tax in 2010, measured in thousands of euros, and obtained from Orbis secondary database as our measure of profitability. The time lag between the collection of the independent variables in the survey and the observations of the dependent performance variables was 1.5 years and by including

past profitability as a control variable, we were able to examine the two-year period from 2008 to 2010.

We use the number of employees to control for *firm size* and the number of years that each firm had been in business to control for *firm age*. We also controlled for firms´ slack resources by using the firm's current ratio (the ratio of current assets to liabilities) (Bourgeois III, 1981). Furthermore, we controlled for the *number of patents* that a firm possesses to account for a firm's unique proprietary assets (Lee, Lee, & Pennings, 2001). We also controlled for a company's *past profitability* using profit or loss before tax (measured in thousands of euros) from the year 2008, which was the year that immediately preceded the data collection period. Finally, we included the environmental measures of *hostility* and *dynamism* (adapted from Green, Covin, & Slevin, 2008) as control variables in our models. With the exceptions of dynamism and hostility, that we measured using collected survey data, we obtained all of the other control variables from the Orbis secondary database.

3.3. Tests for common method bias

We tested the data for the existence of common method variance by analyzing whether the model fit improved after the complexity of the research model that included the self-reported variables was increased (Iverson & Maguire, 2000; Korsgaard & Roberson, 1995; McFarlin & Sweeney, 1992; Podsakoff et al., 2003). We compared the single-factor model with the more complicated research model and found that better goodness-of-fit indices were produced by the seven-factor research model ($\chi 2[356]= 551.88$, RMSEA = 0.06, GFI = 0.83, CFI = 0.89, and NFI = 0.74) than the single-factor model ($\chi 2[377]= 1107.36$, RMSEA = 0.10, GFI = 0.70, CFI = 0.67, and NFI = 0.56) suggesting that the research model is a better fit to the data than the single-factor model, indicating that common method variance is not an issue in the examined dataset.

4. Results

We tested the hypothesis by utilizing the Stata 12 software package to implement an ordinary least squares (OLS) regression. Table 1 summarizes the means, standard deviations and correlations of the study variables. The independent variable and interaction term, along with the control variables, were mean centered before entering to the regression analysis (Aiken & West, 1991). To test for the presence of multicollinearity, we calculated the variance inflation factors (VIFs) for the different regression models. All VIFs were well within the acceptable

range of less than 10 (Hair, Black, Babin, Anderson, & Tatham, 2006); the highest VIF was 1.90, confirming that multicollinearity is not influencing the results.

Table 1. Descriptive Statistics and Correlations[ab]

	Variable	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1)	Firm size	43.02	78.27	1.00									
(2)	Firm age	11.79	8.11	0.16*	1.00								
(3)	Slack resources	2.24	2.85	-0.09	0.15	1.00							
(4)	Number of patents	1.89	6.46	0.12	0.06	-0.00	1.00						
(5)	Environmental dynamism	2.77	0.87	-0.04	0.01	-0.02	0.04	1.00					
(6)	Environmental hostility	3.09	0.74	0.16*	0.00	-0.15	-0.11	0.33***	1.00				
(7)	Past profitability (n-1)[c]	354.59	1628.05	0.73***	0.18*	0.05	0.26**	-0.11	-0.03	1.00			
(8)	Strategic planning	2.89	0.82	0.21**	0.12	-0.09	0.22**	-0.22**	0.08	0.21**	1.00		
(9)	Strategic learning	3.84	0.49	-0.21**	0.02	-0.03	0.11	0.01	-0.10	-0.09	0.38***	1.00	
(10)	Profitability[c]	354.59	1628.05	0.47***	0.08	0.02	0.16	-0.17*	-0.08	0.47***	0.00	-0.10	1.00

Notes: [a] Pearson correlations; [b] Unstandardized values; [c]Measured in 1000s of euros; *, ** and *** indicate that $p < 0.05$, $p < 0.01$ and $p < 0.001$, respectively (in two-tailed tests)

Table 2 presents the results of the study. Model 1 includes control variables; Model 2 illustrates the results of the main effects regression; Model 3 tests the interaction between strategic planning and SL; and Model 4 tests whether this interaction is nonlinear in nature.

Table 2. The Results of Hierarchical Regression Analyses[a]

Dependent variable: Profitability	Model 1	Model 2	Model 3	Model 4
Control variables:				
Firm size	0.31*	0.39**	0.33**	0.26*
Firm age	-0.02	0.01	0.01	-0.01
Slack resources	0.02	0.01	-0.04	-0.05
Number of patents	0.10	0.17*	0.09	0.12
Environmental dynamism	-0.11	-0.19*	-0.16	-0.15*
Environmental hostility	-0.06	-0.02	-0.02	-0.06
Past profitability (n-1)	0.20	0.16	0.29*	0.36**
Main effects:				
Strategic planning		-0.23*	-0.21*	0.09
Strategic learning		0.02	0.04	0.12
Moderators:				
Strategic planning * Strategic learning			0.24**	0.13
Strategic learning squared				-0.04
Strategic planning * Strategic learning squared				-0.49***
ΔR^2		0.04*	0.04**	0.11***
R^2	0.28	0.32	0.36	0.47
Adjusted R^2	0.24	0.27	0.31	0.42
F	6.79	6.20	6.76	8.66

Notes: [a] Standardized coefficients are reported; *, ** and *** indicate that $p < 0.05$, $p < 0.01$ and $p < 0.001$, respectively (in two-tailed tests)

First, we estimated a model (Model 1) in which only the control variables are included as predictors of profitability. In Model 2, we included the main effects from strategic planning and SL to evaluate their possible direct effects on profitability. This model is statistically significantly different from the baseline model (ΔR^2 = 0.04, F=3.25, d.f.=2, 119, $p<0.05$), explaining 32% of the variation in profitability. Strategic planning has a statistically significant negative effect on firm profitability (β= -0.23, $p<0.05$), whereas SL shows no statistically significant effect on profitability. Model 3 shows that SL positively moderates (β= 0.24, $p<0.01$) the relationship between planning and profitability. Comparing the variation explained by Models 2 and 3 suggests that the R^2 significantly increases, which provides further evidence for the linear interaction (ΔR^2 = 0.04, F=8.37, d.f.=1, 118, $p<0.01$). In total, Model 3 explains 36% of the variation in profitability. To estimate this relationship, we computed the marginal effect of planning at the full range of values that SL takes at 0.4 intervals. The marginal effects, including the 95% confidence interval, suggest that the interaction between planning and learning is statistically significant and positive but becomes nonsignificant at the highest levels of SL.

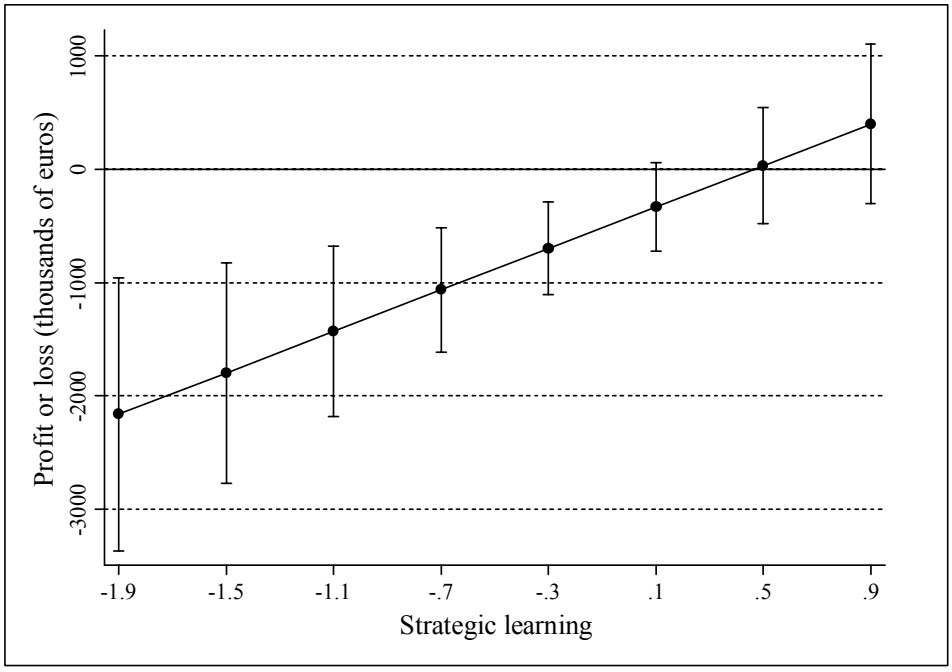

Figure 1. The Linear Interaction of Strategic Planning and Strategic Learning on Profit Performance (presented in terms of marginal effects with 95% confidence intervals)

However, given that the interaction turns nonsignificant at the highest levels of SL, the result indicates the possibility of nonlinear moderation as suggested in Hypothesis 1, in which moderation would exhibit an inverted U-shape relation-

ship. Model 4 tests this hypothesis by including SL as a nonlinear moderator. As hypothesized, the interaction between planning and SL on profitability is nonlinear (β= -0.49, $p<0.001$). Comparing the variation explained by Models 3 and 4 suggests that R^2 significantly increases, which provides further evidence for the nonlinear interaction ($F=11.91$, d.f.=2, 116, $p<0.001$). Model 4 explains 47% of the variation in profitability. To make an accurate assessment of the nonlinear interaction, we computed the marginal effect of planning at the full range of values that learning takes at 0.4 intervals (Brambor, Clark, & Golder, 2006). The marginal effects, including the 95% confidence interval, suggest that the interaction effect of the nonlinear SL term on the planning-profitability relationship is statistically significant and positive at low and medium levels of learning but becomes nonsignificant and finally becomes negative and significant at the highest levels of learning. The pattern (Figure 2) indicates that the interaction between planning and SL has an inverse U-shaped form and, thus, provides additional support for Hypothesis 1 about the limited nature of dynamic capabilities.

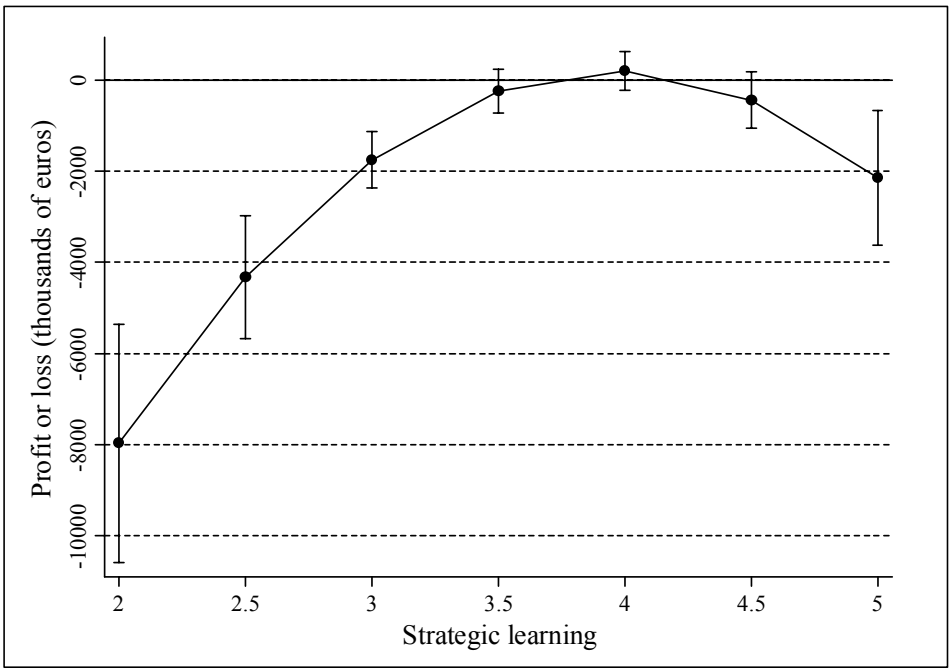

Figure 2. The Nonlinear Interaction of Strategic Planning and Strategic Learning on Profit Performance (presented in terms of marginal effects with 95% confidence intervals)

As robustness check we first tested whether SL by itself, when controlling for planning, affects profit nonlinearly. We found no support for this nonlinear relationship. Second, we tested whether planning by itself, when controlling for SL, affects profit nonlinearly. Although the regression coefficient indicates that the

relationship between planning and profitability is nonlinear ($\beta = 0.24$, $p<0.01$), the plotted relationship with the 95% confidence interval, revealed that the relationship is significant only at lower levels of planning and that this statistically significant part of the curve showed a negative linear form. Thus, the part of the parabola where the curve starts to turn positive is nonsignificant. Based on this analysis, we concluded that in our sample, the relationship between planning and profitability is linear and negative (as also suggested by Model 2). These additional analyses indicated that the direct relationships of both planning and learning on profitability are linear and, thus, further support our argument that it is the interaction between planning and learning that takes the curvilinear form.

5. Discussion

The main insights of this study are twofold. First, this study challenges the dichotomous debate between strategic planning and emergence perspectives by demonstrating that neither SL nor planning is sufficient for a profitable action, but when combined, they yield positive performance. Second, and more importantly, we challenge the linear assumption and argue that the effect of strategic planning on profitability varies as a nonlinear function of SL. Building on prior theorization of the limited nature of learning capabilities, we tested a novel, nonlinear (inverse U-shaped) interaction between strategic planning and SL on profitability.

As the first main contribution building on Mintzberg´s (1994, p. 111) notion that "all viable strategies have emergent and deliberate qualities", we tested the interaction between strategic planning and learning finding evidence that SL positively moderates the link between strategic planning and firm profit performance. Furthermore, as the results of this study demonstrate that neither strategic planning nor SL have positive direct effects on firm profit performance, and in fact, that the direct effect of strategic planning is negative, we can conclude that these capabilities alone are insufficient to explain firm performance. In light of these results, the dichotomous debate between planning and emergence perspectives does not seem particularly interesting. Instead, these results validate our assumption that SL enables the positive effect of strategic planning on firm performance, demonstrating empirical evidence of the concept of strategic planning as learning (De Geus, 1988). Strategic planning may facilitate improvements in a firm's ability to discover 'good strategies' (Rumelt, 2011), whereas SL allows organizations to adapt to selected strategies, thereby promoting effective strategy implementation (Mintzberg & Lampel, 1999). Thus, our results demonstrate the importance of integrating strategic planning and learning under a coherent view of strategy pro-

cess as dynamic capability as suggested by Hutzschenreuter and Kleindienst (2006).

As the second main contribution, the results of this study demonstrated that the performance effect of strategic planning varies as a nonlinear function of SL. Specifically, we found that SL has an inverted U-shaped moderation effect on the strategic planning-firm performance relationship. This study was able to locate an important threshold in the firm's learning capability, where the amount of decision information exceeds the firm's capability to adapt to new strategies and to comprehend new strategic knowledge. In our results, the threshold at which the moderation effect becomes negative is relatively high, indicating that some variety in strategic knowledge is beneficial and that the benefits derived from strategic planning are restricted only in the higher levels of the interaction between planning and learning. Thus, to benefit from an organization´s capability to bear the burden of varied information, planning activities should take place in a larger organizational context including groups, teams, and divisions. After this threshold (i.e., moderate levels of planning), the positive effect of firm's strategic planning becomes negative, and its ability to adapt to changing strategic circumstances becomes significantly reduced. We explain the existence of this threshold by limited firm-level learning capabilities.

The reasons for the nonlinear moderation of SL on the planning-performance relationship are well grounded in organizational learning theory. First, extensive strategic planning may generate a rich but inconsistent knowledge base, which, when combined with bounded rationality of decision makers (Sharma, 1997; Simon, 1963), is difficult to comprehend and interpret, leading to inconsistent decisions and mixed communication (Prahalad & Bettis, 1986). Studies suggest that knowledge overload may cause a serious threat to an organization's ability to learn (Lechner et al., 2010; Phene et al., 2006; Sparrow, 1999). Second, particularly in extensive levels, learning may lead to knowledge diversity, making knowledge exploitation difficult and resulting in low profit performance (Atuahene-Gima & Murray, 2007). Third, building on the knowledge sharing paradox (Coff et al., 2006), we argued that knowledge sharing may lead to spillover effects, diminishing the uniqueness of firm's knowledge assets. Fourth, whereas learning is a time consuming and costly activity, at the highest levels, the benefit of learning may become less valuable than the time and effort invested in learning, leading to low profit performance. Fifth, too extensive knowledge implementation (e.g., knowledge exploitation) can create a learning trap in which organizations exploit current knowledge at the cost of pursuing new knowledge, thereby sacrificing the future of the organization. Finally, we found evidence for an inverse U-shaped relationship in which the moderating effect of learning on

the planning-performance relationship is highest when planning is at moderate levels, which indicates the need to balance these activities. This result is in line with O'Reilly's (1980) notion that a failure to achieve a balance between the information-processing capabilities and the information load encountered can lead to negative outcomes. Thus, these results highlight the disadvantage of excessive planning and limited learning capabilities and offer a cautionary note to managers, suggesting the benefits of a selective and limited use of new strategic plans, projects and choices with which the firm engages.

While our empirical finding is consistent with prior theories, no prior research has empirically tested the aforementioned nonlinear interaction. Thus, this finding is new and substantive, and parallels the critique that has been proposed with respect to the traditional view of strategic planning, which considers planning as a rather complex exercise (Mintzberg & Lampel, 1999; Taylor, 1997). Contrary to complex strategy formation, scholars have suggested simple strategies to highlight the issue of personnel participation to enable strategy implementation, especially in a dynamic industry context such as the software industry (Eisenhardt & Martin, 2000; Eisenhardt & Sull, 2001). This study also contributes to the strategic planning literature by investigating the planning-performance relationship during a period of financial crisis and economic uncertainty. The timing of this study was particularly relevant, as SL might be expected to play an important role when firms face environmental shocks such as economic recessions (Mintzberg & Lampel, 1999; Volberda, 1996). Based on the results of this study, planning demonstrates a negative effect on future performance, but has a positive effect on past performance. This indicates that during the economic recession, which served as a context for the study, firms' previously functional strategic plans quickly become obsolete. In these circumstances, the ability to rapidly learn and adapt becomes extremely important for firm profit performance. Thus, the benefits derived from investing, planning, and learning capabilities might be environment dependent.

There are two primary managerial implications of this research. First, to maximize the efficiency of learning capabilities and to avoid knowledge overload, managers are advised to invest in the decision-making quality in the organization (Hahn, Lawson, & Lee, 1992; Hwang & Lin, 1999). In particular, firms should be critical in terms of the development projects they begin and limit their strategic changes to those of particular relevance. Unnecessary, loosely grounded and poorly argued strategic changes may disengage personnel, decrease commitment and increase the risk of reduced or even negative effects of learning on the planning-performance relationship. It appears that critical aspects of a firm's success include the firm's ability to define ideal strategies and to subsequently transform

these strategies into simple guidelines that steer and energize organizational activities (Eisenhardt & Sull, 2001). Alternatively, our results suggest the need for a more careful dissemination of information available within the organization, with particular attention to information-dependent jobs or units (O'Reilly, 1980). Second, due to the limited nature of SL it requires development to function in the desired way. A firm might address this challenge by stretching SL capabilities to support the adaptation of new strategies. Yet, as knowledge sharing is complex and time consuming and is neither simple nor easy by any means, managers should consider how to facilitate knowledge dissemination by influencing an individual´s motivation to share knowledge by creating an organizational culture that highlights the sense of psychological safety through active listening and dialogue (Dutton, Ashford, O'Neill, Hayes, & Wierba, 1997).

Despite the contributions of this investigation, this study has certain limitations. First, strategic planning and SL are context-dependent phenomena. Although we studied the impact of these two constructs in a dynamic industry context, future studies could provide comparative knowledge from stable contexts. Second, as our measures capture the complexity of the examined phenomena to a limited extent, case studies are needed for more detailed knowledge. Third, as we tested only one of many potential interactions between formal planning and profitability, formation processes for complex strategies might incorporate additional dimensions, such as symbolic, rational, and transactive strategy-making modes; this prospect has been suggested by the mixed models approach (Hart & Banbury, 1994; Hart, 1992). Further studies on these interactions are encouraged.

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Appendix

Measurement Scales

Constructs and items

Strategic planning (Bailey et al., 2000; Collier et al., 2004)

When we formulate a strategy, it is planned in detail.
We have precise procedures for achieving strategic objectives.
We have well-defined planning procedures to search for solutions to strategic problems.
Our strategy is made explicit in the form of precise plans.
We meticulously assess many alternatives before deciding on a strategy.
We have definite and precise strategic objectives.

Strategic learning (Sirén, 2012)

Strategic knowledge creation
We prefer to collect market information before determining strategic needs to ensure that experimentation will occur.
Our aim is to acquire knowledge to develop projects that lead us into new areas of learning, such as new markets and technological areas.
We collect novel information and ideas that extend beyond our current market and technological experiences.
Our aim is to collect new information that forces us to acquire new knowledge during product development.

Strategic knowledge dissemination
Within our firm, the sharing of strategic information is the norm.
Within our firm, strategically important information is easily accessible to those who need it most.
Representatives from different departments meet regularly to discuss new strategically important issues.
Within our firm, strategically important information is actively shared among different departments.
When one department obtains strategically important information, this information is circulated to other departments.

Strategic knowledge interpretation
When faced with new strategically important information, our managers typically agree on how the information will impact our firm.
In meetings, we seek to understand everyone's point of view regarding new strategic information.
Groups are prepared to re-think decisions when presented with new strategic information.
When confronting new strategic information, we are not afraid to critically reflect on the shared assumptions that we have about our organization.

Strategic knowledge implementation
Strategic knowledge gained by working groups is used to improve products, services and processes.
The decisions we make according to any new strategic knowledge are reflected in changes to our organizational systems and procedures.
Strategic knowledge gained by individuals has an effect on the organization's strategy.

Environmental dynamism (Green et al., 2008)

How would you assess your firm's business environment with respect to the following statements?
Product demand is hard to forecast.
Customer requirements and preferences are hard to forecast.
My industry is very unstable and subject to huge changes as a result of major economic, technological, social, or political forces.

Environmental hostility (Green et al., 2008)

How would you assess your firm's business environment with respect to the following statements?
Competitive intensity is high in my industry.
Customer loyalty is low in my industry.
Severe price wars are characteristic of my industry.
Low profit margins are characteristic of my industry.

STRATEGIC LEARNING FOR AGILE MANEUVERING IN HIGH TECHNOLOGY SMES

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Abstract

This chapter illustrates four interrelated strategic learning processes, namely knowledge creation, dissemination, interpretation, and implementation, that are critical in ensuring the effective and rapid renewal of the core capabilities of technology-based small and medium-sized enterprises (SMEs). Based on a cluster analysis of 182 Finnish software companies and information from illustrative case examples, the chapter highlights success factors related to strategic learning practices necessary for survival and prosperity in the highly dynamic IT industry. By offering a consistent strategic learning framework and multiple practical examples, the chapter provides SME leadership teams with practical suggestions to facilitate strategic learning. In addition, the chapter considers learning traps that prevent firms from renewing their capabilities and highlights practices to avoid those traps to facilitate strategic learning in technology-based SMEs.

Introduction

How do organizations survive in the face of rapid technological and market change? This question has become central across industries where technological and competitive landscapes undergo constant and rapid change. In this environment, firms need dynamic capabilities, such as strategic agility, for rapid renewal (Doz & Kosonen, 2008; 2010). An agile firm is able to rapidly renew and transform its core capabilities and adapt to changes in technologies, ecosystems, and competitor behaviors. Recent studies have suggested that for firms to be agile they need strategic learning capabilities to effectively absorb, evaluate, distribute, and integrate new knowledge to foster accelerated innovation and renewal (e.g.,

Berghman, Matthyssens, Streukens & Vandenbempt, 2013; Kuwada, 1998; Mintzberg & Waters, 1985; Thomas, Sussman & Henderson, 2001). We define strategic learning as an organization's dynamic capability that consists of the four sub-processes of knowledge creation, dissemination, interpretation, and implementation. Unlike other forms of organizational learning, the concept of strategic learning is commonly used in reference to learning behaviors and processes that facilitate a firm's long-term adaptive capability (e.g., Kuwada, 1998; Mueller, Titus, Covin & Slevin, 2012).

One of the central arguments for strategic learning capability is a firm's ability to avoid exploitation traps (e.g., Berghman et al., 2013; March, 1991; Sirén, Kohtamäki & Kuckertz, 2012) that emerge from historical success and blind the firm to developments taking place around it. The firm becomes satisfied with its present state and disregards the need for continuous strategic maneuvers necessary when competitors commoditize their products, services, and ecosystems (Doz & Kosonen, 2010). This happened to Nokia, once the world's leading mobile phone manufacturer[i]; the firm rapidly became commoditized, first by Apple and the IOS operating system, and later by Samsung and the Android operating system. Trapped by its investment in the Symbian operating system and lacking the ability to create a new platform for touchscreen smartphones, Nokia lost its competitive edge against Apple and Samsung. The reasons for Nokia's failure are multitude, but at the core, as industry analysts and researchers suggest, Nokia became trapped by not only its investments in Symbian, but also its path dependent capabilities and historical success. This example illustrates how companies accustomed to effectively exploiting their existing resource base may sacrifice their future due to exploitation traps (Kuckertz, Kohtamäki & Körber, 2010). Exploitation traps have mostly been considered a problem of larger and well-established firms, yet the problem is particularly evident in SMEs that lack finance and other resources to accelerate renewal of their business models.

The existing research on dynamic capabilities has ignored new ventures and SMEs, and as a result, researchers (e.g. Zahra, Sapienza & Davidsson, 2006) have called for studies on learning capabilities of SMEs. Moreover, recent studies (e.g., Berghman et al., 2013, p. 40) highlight that the *"*insights into the specific organizational mechanisms that enhance strategic learning is still limited*"*. Through the application of emerging strategic learning literature, supported by cluster analysis of 182 Finnish software companies accompanied by four innovation-intensive SME cases, we provide insights on strategic learning practices in a highly dynamic IT industry characterized by intense global competition, short product lifecycles, and continually changing customer needs. Although they comprise a small proportion of the total population, these innovative and agile SMEs offer interest-

ing examples from which others can learn. By offering a consistent framework and multiple examples, this chapter provides practical suggestions of means to manage strategic learning in SMEs.

Background

At the heart of strategic management research is the finding that firms compete with core competencies and strategic capabilities embedded in the organization that develop over time through organizational learning processes (Levinthal & March, 1993). An organization's ability to learn has been argued to be the most important and perhaps the only source of a firm's sustainable competitive advantage (Levinthal & March, 1993; Mintzberg & Lampel, 1999). The role organizational learning plays in a firm´s survival is particularly evident in dynamic environments such as high technology settings where the value of knowledge rapidly diminishes and new capabilities needs to be acquired. For growth-oriented SMEs, the importance of strategic learning capabilities is particularly evident. SME competencies and capabilities require continual upgrading to ensure successful adaptation for firm growth (Zahra et al., 2006).

Interest in strategic learning emerges from criticism of traditional strategic planning research (i.e., The Planning School of strategic management) (Mintzberg & Waters, 1985). A purely planned strategy involves formally-expressed intentions about the future, commonality of intentions among actors, and exact execution of intentions as planned (Mintzberg & Waters, 1985; Titus, Covin & Slevin, 2011). In questioning the formality of planned strategy processes; researchers from the learning school have underlined the emergent nature of the strategy process. A purely emergent strategy is an ongoing social learning process where strategy is born and shaped by actions initiated by actors without any formal plan and intention for the strategy (Burgelman, 1991; Mintzberg & Waters, 1985). The recognition that important strategic initiatives can emerge from within an organization in the form of learning separates the learning school from prior mainstream strategic thinking (Mintzberg & Lampel, 1999). Researchers have advised that planning and emergence should be conceived as complementary strategy-making modes (Andersen, 2004). For instance, Mintzberg and Waters (1985) emphasized that *"*strategy formation walks on two feet, one deliberate the other emergent*"* (p. 271). In the spirit of previous studies, we also highlight the coalition between strategic planning and strategic learning by agreeing that both processes are necessary for a firm (Andersen, 2004; Hart & Bardbury, 1994; Mintzberg & Waters, 1985). Thus, we consider an organization as a learning and interaction platform that enables creation, sharing, sense-making, and implementation of strategic

knowledge to de-commoditize business models and to create competitive advantage (Thomas et al., 2001).

Strategic learning framework

Previous studies posit that long-term survival requires mechanisms for identifying, acquiring, and exploiting new knowledge (Oswald & Macpherson, 2006). However, very little is known about the internal processes associated with organizational learning and strategic renewal in smaller firms (Sadler-Smith, Spiecer & Chaston, 2001). The strategic learning framework presented here suggests that the SMEs capable of developing an effective strategic learning process are those firms that are capable of rapidly renewing their strategies and capabilities. The strategic learning framework builds on the knowledge-based view of a firm (Grant, 1996) by application of an information processing view of organizational learning (Huber, 1991) to understand strategic renewal. Strategic learning includes core processes of strategic knowledge creation, dissemination, interpretation, and implementation. Building on the idea of emergent strategies, studies suggest that strategic learning takes place at different levels of an organization, such as upper and lower echelons, marketing, product development, and production, and involves individuals, groups, and the entire organization (Crossan, Lane & White, 1999; Nonaka, 1994). It has been argued that in SMEs lacking formal systems and procedures for knowledge distribution and implementation, building and implementing efficient strategic learning models may be more difficult than in more established organizations (Oswald & Macpherson, 2006). In the next section, we theoretically explore how SMEs acquire, disseminate, interpret, and implement knowledge to foster strategic change.

Creating knowledge for strategic purposes

Strategic renewal requires that firms need to break from their current paths and shift from knowledge exploitation to knowledge exploration (Crossan & Berdrow, 2003; March, 1991). Knowledge exploration requires platforms and ways of working that facilitate the recognition of new knowledge with strategic value. Radical innovation strategies often require firms to investigate more distant environmental areas to find new market opportunities (Berghman et al., 2013). The process through which individuals engage in strategic knowledge creation activities is called creative search (Adler & Obstfeld, 2007; Crossan et al., 1999). Creative search is a future-oriented and uncertainty-enhancing cognitive process revolving around the deliberate search for and recognition of opportunities (Atuahene-Gima & Murray, 2007; Pandza & Thorpe, 2009). The aim of this process is

to lead the individual, the team, and finally, the firm, to novel information to provide an important feed for the knowledge creation processes of the organization. For instance, a growing stream of research advocates the use of network relations (Hite & Hesterly, 2001; Huikkola, Ylimäki & Kohtamäki, 2013) as a means for young and small firms to search for and acquire knowledge expending fewer internal resources than would generally be needed for knowledge creation implemented entirely within the firm, such as by an internal R&D function. In fact, Oswald and Macpherson (2006) highlighted that for SMEs, access to external knowledge providers (e.g., customers, suppliers, and competitors) is particularly important. In such circumstances, knowledge is created by the boundary actors and then absorbed and developed in interaction with the rest of the organization.

Disseminating new knowledge throughout the organization

Firms' ability to distribute acquired and created knowledge is of primary importance for organizational renewal. According to Nonaka (1994), personal knowledge can be brought into a social context through knowledge dissemination. Knowledge dissemination refers to the internal spread of knowledge acquired at an individual level through conversations and interactions between individuals and groups within the organization (Jerez-Gómez, Céspedes-Lorente & Valle-Cabrera, 2005; Nicolini & Meznar, 1995). The organization, with its formal and informal systems, practices, and activities, creates a platform for communication, dialogue, and debate (Bontis, Crossan & Hulland, 2002), enabling effective knowledge distribution (Jerez-Gómez et al., 2005; Thomas et al., 2001). Although SMEs may lack sophisticated knowledge sharing systems, their smaller size enables effective informal interactions and knowledge transfer, signaling the importance of a knowledge sharing culture. In fact, larger and more hierarchical firms may suffer from excessive coordination costs associated with rigid functional boundaries between departments that prevent active dialogue and sharing (Real, Roland & Leal, in press). Strategic knowledge dissemination activates knowledge interpretation and is therefore an important phase in the development of shared organizational knowledge.

Interpreting and making sense of the knowledge

In the process of strategic knowledge interpretation organizational members interpret new information about potential opportunities through a mutual process of interaction (Daft & Weick, 1984). Interpretation of strategic knowledge allows a firm's personnel to make sense of relevant knowledge and jointly develop cognition that could enable more collective actions that, in turn, enhance the effective-

ness of strategy implementation (Daft & Weick, 1984; Tippins & Sohi, 2003). Collective sense-making requires engagement in an open dialogue among organizational members that often have diverse backgrounds and perspectives (Kuwada, 1998; Liedtka, 2000; Slater & Narver, 1995). In the process of sense-making, conflicting assumptions and alternative interpretations are considered and, if needed, acted upon to change behaviors, as well as the organization's ways of interpreting information. Particularly if the new knowledge is radically new and it does not fit with the existing cognitive schemas, organization needs effective knowledge interpretation (Berghman et al., 2013). To avoid strategic mistakes, or to analyze and learn from mistakes already made, it is essential that in the sense-making process wrongly perceived signals are collectively interpreted to find appropriate shared interpretations of the existing reality and opportunities (Cegarra-Navarro & Sánchez-Polo, 2011). This may be particularly challenging for smaller owner-managed SMEs, where the owner-manager´s influence is pervasive, but could be enriched by careful listening and dialogue within the organization. Thus, organizational norms that enable dialogue by facilitating collaboration may decrease potential authoritarian influence of any organizational member or harmful competition between organizational members, and in this way foster collective thinking and strategic learning (Adler, 2001).

Implementing knowledge

Strategic renewal requires that new knowledge is embedded in organizational routines, systems, and structures (Huber, 1991). Organizational memory (Walsh & Ungson, 1991) has been used to reference the stock of knowledge every member of an organization can access. Organizational memory can be divided into hard (semantic) and soft (episodic) memory (Walsh & Ungson, 1991). Whereas hard memory comprises general, explicit, and articulated knowledge (e.g., organizational files, documentary records, transactional records, or annual reports), soft memory includes context-specific and situated knowledge. Examples of soft memory include organizational culture, transformations (production processes and work procedures), structure (formal organizational roles), ecology (physical work settings), and information archives both within and outside the organization (Cegarra-Navarro & Sánchez-Polo, 2011). In the process of strategic knowledge implementation, new knowledge will be institutionalized and saved in organizational memory where it will influence the firm´s future activities. Thus, this is the phase in which strategies become implemented, new targets are set, and new products or services are introduced.

Whereas many prior studies analyze strategic learning in the context of larger companies and presuppose the existence of formal structures that enable effective knowledge implementation (e.g., Crossan et al., 1999; Crossan & Berdrow, 2003), this is not the case in smaller SMEs (Oswald & Macpherson, 2006). Although SMEs may lack formal structures and systems for effective knowledge implementation, they can gain advantage through committed teams and individuals that effectively implement new knowledge in their everyday practices. However, the change from informal to formal knowledge development practices may be one of the biggest challenges when SMEs grow. Where larger companies may struggle with path dependency, SMEs encounter challenges of knowledge formalization.

Strategic learning traps and the costs related to developing learning capabilities

Researchers have recently suggested that developing learning capabilities involves serious costs (e.g., Schilke, in press), generating a critical challenge for SMEs, which often lack development resources. In fact, Dalley and Hamilton (2000) found that due to resource scarcity, a great number of SMEs do not devote any resources to improving their organizational learning processes. In addition, Wales, Parida, and Patel (2013) recently found that in the context of high-tech Swedish SMEs developing learning capabilities has diminishing and even harmful performance effects beyond intermediate levels of absorptive capacity (i.e., a firm's ability to access and absorb external R&D-related knowledge). Scholars apply the concept of learning traps to reflect the factors that constrain learning and innovation to suggest that firms are path dependent and bound by their previous success (Levinthal & March, 1993), existing competencies (Levitt & March, 1988), inclination to exploit rather than to explore (Sirén et al., 2012), and propinquity (Ahuja & Lampert, 2001).

Scholars have noted several underlying reasons for the occurrence of learning traps, such as the presence of path dependencies and specialization (Levinthal & March, 1993; Tripsas & Gavetti, 2000) that generate core rigidities (Leonard-Barton, 1992), organizational inertia (Hannan & Freeman, 1984; Kelly & Amburgey, 1991), firms' limited ability to observe signals from a complex and dynamic environment (Lant & Mezias, 1990), and tendency to ignore distant times, places, and past failures (Levinthal & March, 1993). A common aspect of learning traps is that they represent a conflict between routines that enable an organization to perform well in the short run, but position the organization unfavorably for the future (Ahuja & Lampert, 2001). According to inertia theory, organizations

are path dependent with regards to their development and trapped by their historical core capabilities, which may turn into core rigidities (Leonard-Barton, 1992) if existing technologies or product lines are commoditized by market competition (Tripsas & Gavetti 2000). This capability-related path dependency is often strengthened by the historical success of a firm. Prior success may cause firms to ignore technological developments that occur within a sector, resulting in commoditization (Tripsas & Gavetti, 2000). The experiences of a firm play an important role in the development of path dependencies (Michael & Palandjian, 2004). In a discussion of primacy effects, Michael and Palandjian (2004) suggest that organizations place too much weight on prior experiences relative to recent events, and in that case, a reliance on prior experience begins to shape the current actions of the firm. The utilization of previously acquired knowledge can be particularly disastrous if a firm experiences a novel and dynamic market context (Mueller et al., 2012). In addition, Schilke (in press) suggests that if a firm rarely has a need to change, its performance may suffer if it devotes significant resources to developing strategic learning capabilities. Thus, strategic learning can be seen as an investment that has costs and firms should carefully consider whether they need to invest in such capabilities.

Strategic learning in practice

We began the exploration of the strategic learning practices by first analyzing questionnaire data obtained from Finnish software companies. We deepened our analysis by reviewing four cases to highlight success factors related to strategic learning practices in highly innovative Finnish SMEs operating in the software industry. SMEs are particularly important for the Finnish economy; in 2010, 99.4% of all firms in Finland were SMEs and they employed approximately 60% of the labor force (OECD, 2012).

Strategic learning in the Finnish software industry

Nokia's recent downfall, exemplified by the firm making 10,000 employees redundant worldwide during the last few years, has led to the creation of numerous interesting start-ups in Finland that provide compelling examples of strategic learning. The Finnish IT industry is an important growth driver in the economy; EuroStat estimates that the software industry grew by 5% in 2010 and 8% in 2011, while Finland's overall GDP growth in 2010 was 3.1% and 2.9% in 2011. Moreover, the positive impact of the IT industry, with its rapid innovation and short product lifecycles, is argued to extend well beyond IT industry boundaries

(Mendelson & Whang, 2000). The Finnish software sector, which forms a crucial part of the IT industry, was selected as the target industry for this study. Scholars have identified the need for learning in the software industry due to its high rate of change (Bingham & Davis, 2012). Knowledge creation and application are especially important in high-tech sectors (Autio, Sapienza, & Almeida, 2000; Eisenhardt & Schoonhoven, 1990) as strategic learning is believed to play an important role in knowledge-intensive, dynamic, and uncertain business environments (Mintzberg & Lampel, 1999; Volberda, 1996). Thus, in these sectors it is central to understand how the acquisition and internalization of new knowledge influences firms' internal knowledge and learning (Matusik & Heeley, 2005).

Strategic learning and firm performance: highlights from cluster analysis

To illustrate the variation in strategic learning capabilities within high-tech SMEs, we conducted a cluster analysis with data from 182 SMEs. The quantitative survey data was collected from Finnish software-industry SMEs in 2009. The sample is representative and generalizable, providing a good snapshot of strategic learning in Finnish software firms (see Sirén 2012 for more detailed description of the data collection). To capture data on strategic learning, we utilized a total of 16 items from a previous study (Sirén, 2012) divided into two main theoretical dimensions of exploratory and exploitative learning, each with two sub-dimensions: exploratory learning with sub-dimensions of knowledge creation and dissemination, and exploitative learning with sub-dimensions of knowledge interpretation and implementation. We measured firm performance through four items adapted from Gibson and Birkinshaw (2004) that captured the CEOs' satisfaction with their firm´s overall performance. The average of the scores against these four items was used as the performance measure. A subjective measure of performance based on CEOs' perceptions was chosen over objective data as SMEs are often very reluctant to provide *"*hard*"* financial data (e.g., Covin, Prescott, & Slevin, 1990). It was therefore felt that more complete financial information could be obtained with a subjective measure that did not directly ask respondents to report their financial figures but instead measured their satisfaction with performance. Furthermore, financial data on small firms are difficult to interpret and are affected by industry-related factors (e.g., Covin et al., 1990). Last, several studies (e.g., Dess & Robinson, 1984; Venkatraman & Ramanujam, 1987) have found that perceptual and objectively determined measures are highly correlated, signaling the reliability of self-reported performance measures. On the basis of these arguments, we followed on the common agreement that it is appropriate to use subjective measures when measuring SME performance. The survey items used were measured on 5-point Likert scales (1 = fully disagree, 5 = fully agree) and

are reported in the Appendix. Prior to their use in the analysis, all the items were tested for validity and reliability. The correlation matrix (Table 1) illustrates that all the constructs correlate statistically significantly, but the correlations remain well below the multicollinearity threshold value of 0.90 (Hair et al., 2006, p. 227).

Table 1. Descriptive statistics and correlation matrix

	Variable	Mean	SD	(1)	(2)	(3)
(1)	Exploratory learning	3.79	0.56	1.00		
(2)	Exploitative learning	3.91	0.53	0.56***	1.00	
(3)	Performance	3.56	0.63	0.34***	0.39***	1.00

**Correlation is significant at the 0.01 level (2-tailed)

The study applies non-hierarchical k-means cluster analysis to identify and compare groups of companies with different strategic learning levels. To determine whether the identified strategic learning clusters vary in terms of performance, a one-way ANOVA test was conducted. Tukey's post hoc analysis was used to test which clusters statistically significantly differ from each other in terms of performance. Cluster analysis revealed three different types of software companies, depicted in Figure 1. These three clusters vary statistically significantly ($p < 0.05$) with regard to exploratory (knowledge creation and dissemination) and exploitative learning (knowledge interpretation, and implementation). Based on the cluster analysis, we designated firms with high strategic learning capabilities as *"*strategic learners,*"* whereas we labeled SMEs with mediocre strategic learning capabilities *"*incrementalists,*"* referring to the incremental learning that takes place in such organizations. Finally, we labeled firms with the lowest strategic learning capability levels *"*trapped,*"* referencing the learning trap these firms have encountered. Strategic learners displayed the highest performance scores (3.86), the trapped illustrated the lowest scores (3.21), and the incrementalists' scores fell between those extremes (3.59). Hence, the results demonstrate how strategic learning positively influences firm performance by enabling effective adaptation and renewal.

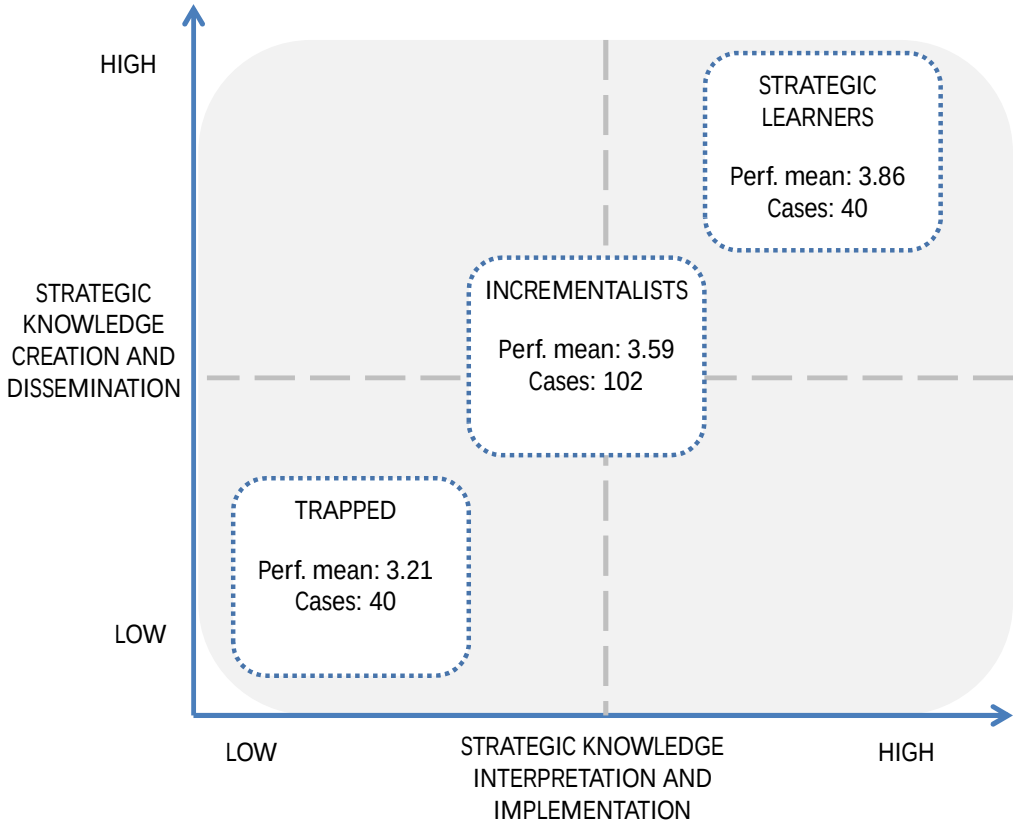

Figure 1. The three company types of the Finnish software industry, in terms of their differing mixes of strategic learning and performance.

How to facilitate strategic learning in SMEs: Illustrative cases from the Finnish software industry

In this section, we use multiple examples such as the smartphone operating system developer, smartphone designer and vendor *Jolla*, and game developing companies such as *Rovio Entertainment*, *Supercell,* and *Ovelin,* to illustrate practices that these promising high-tech SMEs utilize to foster strategic learning. These companies were not included in the cluster analysis as three of them were founded after the initial data collection, however, we chose to investigate the learning practices developed by these companies because they represent highly innovative startups that have already shown great potential to learn and to become leading companies in the Finnish IT-sector. For example, in June 2013, Business Insider listed Supercell, Jolla, and Rovio among the most promising Finnish startups. *Rovio,* a Finnish mobile game developer and inventor of the game *Angry Birds*, has grown in two years from a game development firm with 24 employees

to an *entertainment* media firm employing nearly 500 people and valued at US$9 billion. *Supercell* is a Finnish tablet game development firm founded in June 2010 that, by November 2012, had become the largest publisher, measured by sales revenues, in the Apple App Store. At the beginning of 2013, Supercell´s daily revenue exceeded US$2 million and the firm was at a run-rate of more than US$800 million for 2013 and could even reach $1 billion (Strauss, 2013). *Ovelin,* a Finnish producer of guitar tuition apps, was founded in December 2010. Ovelin´s most popular guitar tuition game *WildChords* was the most downloaded music application in 34 countries in the Apple App Store, and provides evidence of the firm's potential.

When collecting the data on these four companies, we relied on three data sources: (1) qualitative data from semi-structured interviews, (2) quantitative data on companies' descriptive statistics, from company and public sources, and (3) archival data, including company websites, business publications, news, and other materials produced inside the firms.

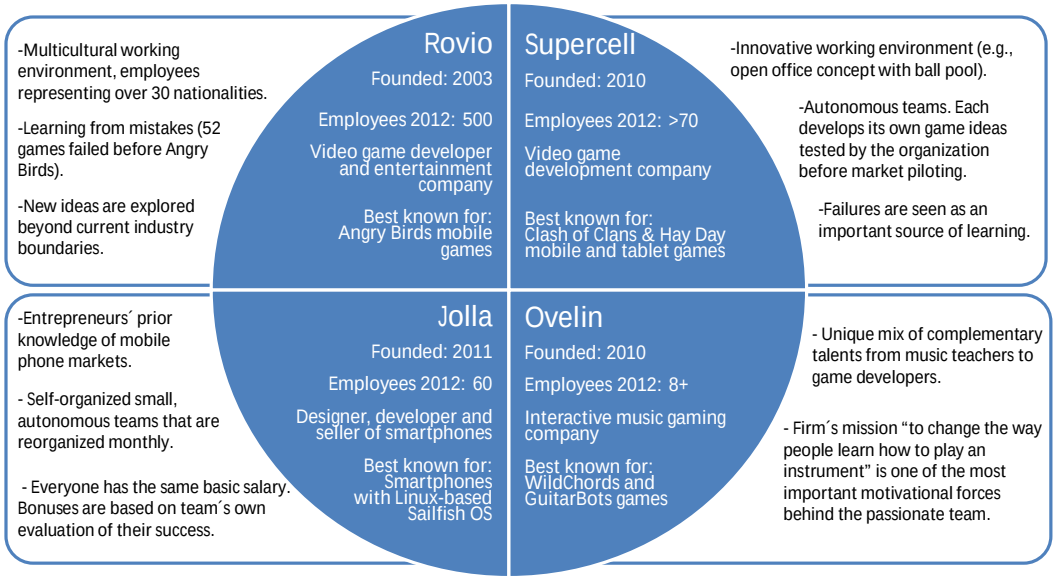

Figure 2. Summary of characteristics of case companies.

Knowledge creation in practice

To learn and renew, a firm has to be continuously exposed to new ideas. This becomes particularly evident in the case of the software business, where the innovation cycle is short and new software products are introduced at a rapid rate. For instance, approximately 200–300 new games are introduced weekly to the Apple

App Store. Hence, if a firm wants to learn faster than the markets are changing, it must think differently about the source of new ideas.

At *Supercell*, strategic knowledge creation is fostered by encouraging employees to systematically look at new trends in other related industries. For instance, employees are urged to explore and recognize new ideas from popular culture such as comics, movies, music, etc. *Rovio* has utilized a comparable practice and built a movie theater in its headquarters for employees to play video games and watch movies so they can find new ideas and enrich their thinking. These companies are integrating R&D as a part of every member´s work. Rovio's CEO, Peter Vesterbacka encourages looking outside the box: "*It is important to stand out and not do what everybody else does. Do not think that you can do what Google is doing, only a little better, because it is probably not going to be good enough. Do something that completely changes your landscape… Get out of your territory and comfort zone*" (Profile, 2011). Google provides an important example of a larger firm that systematically invests in knowledge creation by giving its engineers 20% of their time to work on projects that are not directly connected to its core business, known as the Innovation Time Off (ITO) model (Levy, 2011). This has been proven to be an effective way to create new explorative knowledge, as 50 % of Google´s newly launched features (e.g., Gmail, Google News, and AdSense) have been reported to have originated from this *"*exploration time*"* (Bharat & Bick, 2007). Google takes a negative view towards micro-management and trusts that employees use their time wisely; they feel it is a sense of purpose and vision that guides employees' work. Jolla holds a similar view and their former CEO Mark Dillon (CEO until May 2013, after which he was appointed Head of Software at Jolla) said, *"*I wanted to create a company where you don´t need to tell people what to do*"* (Nykänen, 2013). The Jolla management team has invested a lot of effort into building an organizational culture that supports opportunity recognition and knowledge creation.

Shane (2000) emphasizes that a team of founders, equipped with prior market and technological knowledge, provides an enhanced means of evaluating and developing viable opportunities. Kuwada (1998) adds that knowledge variety is needed and suggests that heterogeneous teams and variation in employees' prior knowledge and background improve strategic knowledge creation. At Jolla, the entrepreneurial team´s background and prior knowledge of mobile phone markets enable effective identification of strategically important knowledge; four out of five founders are former Nokia employees and half of all the employees previously worked for Nokia. Ovelin's co-founder and COO Mikko Kaipainen says the firm has built a team to develop its online guitar learning game with complementary skills from different fields, absorbing contributions from music teachers,

musicians, game developers, visual designers, and marketing experts. According to Kaipainen, the unique mix of talents is one of the central factors behind Ovelin´s success, as it enables the firm to recognize important signals from markets and to handle problems in a comprehensive manner. In addition to an entrepreneur's social networks and prior knowledge, the entrepreneur's personality traits including optimism, self-efficacy (optimism about one's ability to achieve specific, difficult goals), and creativity are important antecedents of the entrepreneur's alertness to business opportunities (Ardichvili, Cardozo, & Ray, 2003). These attributes are particularly evident in the CEO of Rovio (Vesterbacka) who, despite Rovio's near fatal difficulties in its early growth phase, never doubted its ultimate success.

Knowledge dissemination in action

Creation of an organizational climate in which employees share their tacit and explicit knowledge is central for the management of high-tech firms (Nonaka, 1994). To facilitate strategic learning, organizations are advised to apply practices related to knowledge sharing across teams and departments. Therefore, firms may apply different practices to improve openness of their organizational culture and lower interaction boundaries. The world´s most profitable mobile games are developed in particularly open atmosphere, where dress-codes do not exist; for example, Supercell employees change their shoes into comfortable slippers or just wear socks at work. This practice generates an informal organizational culture that encourages ease of discussion and free-flowing dialogue. At the same firm, despite its increasing number of employees, all facilities are designed using the open office concept to increase interaction. As evidence of their adherence to this design, Supercell´s headquarters has only four internal doors; three lead to negotiation rooms and one to a ball pool providing an experience that seeks to separate workers from conservatism and facilitate creative thinking. In contrast to most game studios ruled over by an autocratic executive producer judging the work of designers and programmers, Supercell's developers work in autonomous groups of five to seven people. Each cell comes up with its own game ideas that they present first to the CEO (who hardly ever rejects ideas), and then to the whole organization. Supercell´s CEO Ilkka Paananen says, *"*Small is beautiful. I believe in super small, independent teams. This keeps everyone passionate about what they do…The teams have the decision making power. It brings along both freedom and responsibility. At the same time, the whole team is constantly in touch with players and everyone is building the game by taking into consideration the user experience*"* (Mäntylä, 2013). Supercell's organizational practices enable it to provide more opportunities for team members to share their ideas and voice

their opinions, and to encourage teams to express their suggestions. According to Srivastava, Bartol, and Locke (2006), team members feel their contributions influence decision making under such circumstances, facilitating commitment towards the work done within the firm. Jolla also has a similar practice, where the firm organizes a shared strategy meeting in which employees jointly consider the firm strategy and strategic targets.

Knowledge interpretation practices

Interpretation requires organizations promote reflective discussions to facilitate the emergence of shared interpretations of entrepreneurial opportunity among personnel, which may then lead to implementation. Strategic change requires a firm´s current cognitive framework to break down (Berghman et al., 2013). The usual assumption is that the firm must face unusual experiences such as failures or smaller mistakes that contribute to breaking the current set of basic assumptions so that new interpretations can be formed and implemented (Kuwada, 1998). Thus, one of the key management issues is to build an organizational culture that not only encourages the challenging of current cognitive frameworks and assumptions, but also promotes open discussion and reflection on mistakes and failures. At Supercell, employees toast failures with champagne. *"*We really want to celebrate, maybe not the failure itself, but the learning that comes out of the failure,*"* says Paananen, CEO of Supercell (Strauss, 2013).

Rovio produced 52 unsuccessful games and almost went bankrupt before Angry Birds. Vesterbacka (CEO of Rovio) emphasizes, *"*People can make mistakes but again we learn from our mistakes. I cannot emphasize that too much. A learning organization … we learn new things every day*"* (Indrasafitri, 2012). At Supercell the strategy has already been changed drastically in its few years of existence. After the first year Paananen (CEO of Supercell) realized that the firm's initial strategy (producing games for multiple devices) was going to be a mistake and that not to radically change it (by focusing on producing games mainly for tablets) would rule out any chance of success. Thus, as the case examples of Rovio and Supercell illustrate, the initial strategies of both Supercell and Rovio required revision along the way. These types of rapid changes in direction can be considered as reflections of strategic learning. At Ovelin, Kaipainen (COO) sees that it is extremely important to be able to *"*understand the importance of failures to the firm's development*"* and to *"*respect failures and to know how to handle failures.*"* When mistakes are properly analyzed and interpreted through collective conversations, they provide valuable lessons. In the context of SMEs, the correct interpretation of failures (i.e., reviewing their origin, consequences, and actions

needed) is particularly important, as the firms may not be able to absorb many consecutive failures because of scarce resources.

Approaches to facilitate knowledge implementation

Implementation refers to the development of organizational culture, work procedures, and structure to enable project, product, or service developments that seize a recognized opportunity. The existence of an open-minded culture and loosely-coupled organizational structure are important factors facilitating knowledge implementation in SMEs (Flores, Zheng, Devaki & Thomas, 2012; Ravasi & Verona, 2001). Jolla has a very dynamic structure and its CEO describes it as *"*a completely flat organization without fixed teams. With the help of executives, employees organize themselves into teams on a monthly basis. We call this an iteration round. Iterations enable us to fully react to change.*"* (Nykänen, 2013). The continuous reformation of teams enables Jolla to quickly implement new knowledge and align the organization with current targets.

Despite the growth of Supercell, the organizational structure is kept as flat as possible and redundant processes and harmful bureaucracy are eliminated. At Jolla, employee compensation is based on contribution in the previous business iterations. Every member in the organization has the same basic salary. Once a month teams evaluate their own success and are accordingly paid bonuses. According to Dillon, the former CEO of Jolla, *"*The salary system has worked perfectly...after the last iteration round we were able to say that every single task was done. This is very unusual in a software firm.*"* (Nykänen, 2013). The dynamic structure enables quick implementation, as the salary politics facilitate an organizational culture where every employee is equal. At Ovelin, the practices related to knowledge documentation and storing such as meeting minutes are becoming increasingly more important as the firm grows (at the moment they have offices in three locations; two in Finland and one in the USA). The quick implementation of knowledge is also important, as it reduces the risk of losing valuable information when an employee leaves the company.

Resolving the paradox: Long-term planning vs. strategic learning

Although strategic learning has clear benefits in the software industry, it has to be acknowledged that an appropriate strategy for any particular firm depends on its environment, developmental state, and resources. For instance, Mintzberg and Waters (1985) emphasize that strategic learning is more beneficial in dynamic environments. When operating in a more predictable environment, a firm may for

a certain period apply a more traditional strategic planning approach intended to predict, choose, and implement long-term goals, instead of continuous adjustments. Thus, depending on the characteristics of the environment, it may be beneficial for a firm to sequentially switch between formal strategic planning and strategic learning (Chen & Katila, 2008).

Strategic learning may be nurtured more effectively by leaders whose leadership style is characterized by transformational leadership that appeals to their followers' intrinsic motivations, that challenges and inspires those followers with a sense of purpose and vision, and shapes conditions that are important for the success of new ventures, including fostering employees' creativity (Ensley, Pearce, and Hmieleski, 2006; Mumford, Scott, Gaddis, and Strange, 2002). In contrast, strategic planning may be executed most effectively in an organization whose leader follows a more transactional style characterized by control, goal setting, productivity, and efficiency (Bass, 1990). Thus, leadership can be considered as a central tool in the transition from traditional planning to strategic learning. This practice is exemplified by Jolla, which has already changed its CEO three times as the firm transitioned through its various growth phases. The former CEO, Dillon, with his charismatic leadership style, was well suited when the focus was on finalizing the development of the operating software. In contrast, the current CEO, Tomi Pienimäki, whose leadership experience derives from large technology organizations, is a more business-centric leader bringing expertise on distribution, lean production, and logistics, that are important when entering the markets. Thus, rotating between different leadership styles may enable software companies to sequentially switch the emphasis between learning and planning as appropriate for their developmental phase. Finally, a CEO's business-related connections, his/her standing in the social network and timely and comprehensive communication with the rest of the leadership team are factors that enable the CEO to access the rich and reliable information essential to decide when a focus on planning in a given situation outweighs the benefits of learning and vice versa (Cao, Simsek & Zhang, 2010).

Future research directions

A recent literature review by Zahra et al., (2006) revealed that existing research on dynamic capabilities has focused mainly on established and larger companies and has ignored new ventures and SMEs. This is surprising since SMEs need learning capabilities that allow them to survive, grow, achieve legitimacy, and reap the rewards of innovation (Sapienza, Autio, George & Zahra, 2006). Although this study sheds some light on strategic learning in SMEs, future research

should continue exploring the role and nature of dynamic capabilities in SMEs. Furthermore, the scarce literature on SME´s strategic learning capabilities has mostly been conceptual and case-based. Thus, future research could benefit from analyzing how age- and size-related factors affect the usefulness of learning capabilities in broader empirical settings. In addition, relatively little attention has been afforded to the process by which learning capabilities develop, emerge, and evolve, especially in SMEs with limited resources, knowledge bases, and expertise in building and integrating diverse capabilities (Zahra et al., 2006). This suggests a need for research that either uses specifically-designed questionnaires administered over time and/or longitudinal case studies capturing the evolutionary nature of dynamic capabilities (Helfat & Peteraf, 2003). As noted in this chapter, strategic learning sub-processes are interrelated and necessary for effects to occur (Berghman et al., 2013). In this sense, a particularly salient path for future research could be to study the antecedent factors of strategic learning and to consider whether different factors influence strategic learning sub-processes differently. In this regard, the recent study by Flores et al. (2012) provides a fertile starting point demonstrating both the joint and unique antecedents that facilitate different learning dimensions.

The global and innovative nature of the software industry, its special characteristics, and the presence of many young firms are factors that may limit the generalizability of our results. Thus, exciting opportunities exist for future comparative research—covering multiple industries that differ in life cycle, technological intensity, or institutional context—that could reveal how particular industry conditions influence strategic learning. Going beyond firm-specific differences, future research could also engage with context-specific differences, such as environmental or competitive dynamics that may influence the effectiveness of learning capabilities. In this vein, we encourage future researchers to pay greater attention to the factors that moderate the impact of strategic learning on a particular outcome, thereby revealing unique conditions that might enhance or weaken the impact of each.

Furthermore, most learning studies have ignored the role of the owner, entrepreneur, and entrepreneurial team in the organizational learning process. However, there may be important behavioral and learning differences between experienced and more novice entrepreneurs, for example, that are reflected in the learning of the whole organization. Entrepreneurs with denser information, more industry specific knowledge, larger contact networks, and management expertise might be better able to foster strategic learning in their organizations than those without these knowledge resources. In addition, an entrepreneur's individual attributes such as tenacity, risk aversion, proactivity, and a passion for work can affect

many aspects of a newly created venture, including the learning processes prevalent in it (Dutta & Crossan, 2005). However, although prior studies have recognized the need to incorporate these individual-level demographic and psychological factors identified in entrepreneurship models in the organizational learning context, details of their application and empirical testing are extremely scarce (Dutta & Crossan, 2005). Thus, future studies exploring these issues should consider a multilevel approach to strategic learning that covers learning at different levels of an organization (those of the entrepreneur, individual employees, teams, departments, etc.). One promising avenue for future research is to explore the "dark side" of strategic learning such as sunk costs without innovation or performance benefits. This line of research is needed to provide a more realistic approach to learning processes by considering that learning may entail tradeoffs, such as the adjustment between exploration and exploitation (March, 1991), or compromise between learning outcomes and invested resources (Deeds, DeCarolis, & Coombs, 2000). In this regard, researchers may want to adopt cross-disciplinary approaches by combining psychology and entrepreneurship research to shed light on the factors that give rise to learning traps.

Conclusions

Our conceptualization of strategic learning, with its four constituent sub-processes of knowledge creation, dissemination, interpretation, and implementation, offers organizational leaders a comprehensive overview with which to assess and manage organizational learning. In order to illustrate whether or not SMEs operating in the highly dynamic software industry differ in terms of strategic learning and whether the level of learning is associated with higher perceptions of firm performance, we conducted a cluster analysis including 182 Finnish software SMEs. The analysis revealed three clusters; strategic learners, incrementalists, and firms that have encountered a learning trap. These clusters indicate that learning is associated with better performance in SMEs, alerting firms to learning traps and resulting poor performance. We conclude the chapter by presenting some practical, actionable steps that CEOs and leadership teams can take to foster strategic learning and escape learning traps, making successful adaptation and strategic change possible and more likely. The actions suggested are summarized under five main thoughts that encapsulate the determinants of strategic learning. In particular, high-tech SME management can consider these thoughts when facilitating strategic learning in their organizations.

Five thoughts for SME leaders wishing to facilitate strategic learning

1. Organize work around small and autonomous entrepreneurial teams.

2. Encourage employees to break free from their comfort zones and explore new fields to add new knowledge.

3. Value and exploit failures as learning opportunities and promote the idea of rapid trial-and-error learning.

4. Utilize the participative leadership style, minimize bureaucracy, and build an organic organizational structure.

5. Co-create a sense of shared purpose and lead by simple guidelines.

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Notes

[i] Nokia was the world's largest vendor of mobile phones as measured by quantity from 1998 to early 2012. However, Samsung Electronics overtook Nokia in the first quarter of 2012 and became the world's largest producer of mobile phones.

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Key terms and definitions

Cluster analysis: An exploratory data analysis tool used to divide data into groups (clusters) that are meaningful and useful.

Dynamic capability: Organizational routines that affect change in a firm´s existing resource base competences to address rapidly changing environments.

Exploitation trap: The tendency of learning processes to favor the assimilation of exploitative knowledge for commercial ends at the expense of explorative knowledge.

Learning trap: A situation in which a firm´s routines equip the firm to perform well in the short run, but position the firm unfavorably for future conflict by constraining learning and innovation.

Organizational memory: A stock of knowledge accumulated by the organization over its history to which every member of the organization has access.

Strategic agility: The ability to continuously adjust and adapt strategic direction in the core business, as a function of strategic ambitions and changing circumstances, to create new products and services, business models and innovative ways to create value for a firm.

Strategic learning: An organization's dynamic capability, consisting of intra-organizational processes for the creation, dissemination, interpretation, and implementation of strategic knowledge that together contribute to the long-term survival of a firm.

APPENDIX

Measurement scales

Constructs and items

Strategic learning (Sirén, 2012)

How would you assess your firm's learning practices with the following statements?

Strategic knowledge creation (Atuahene-Gima & Murray, 2007)

- We prefer to collect market information before determining strategic needs to ensure experimentation
- Our aim is to acquire knowledge to develop projects that led us into new areas of learning such as new markets and technological areas
- We collect novel information and ideas that go beyond our current market and technological experiences
- Our aim is to collect new information that forces us to learn new things during product development

Strategic knowledge dissemination (Bontis *et al*., 2002; Tippins & Sohi, 2003)

- Within our firm, sharing strategic information is the norm
- Within our firm, strategically important information is easily accessible to those who need it most
- Representatives from different departments meet regularly to discuss new strategically important issues
- Within our firm, strategically important information is actively shared between different departments
- When one department obtains strategically important information, it is circulated to other departments

Strategic knowledge interpretation (Bontis *et al*., 2002; Sinkula, Baker, & Noordewier,1997; Tippins & Sohi, 2003)

- When faced with new strategically important information, our managers usually agree on how the information will impact our firm
- In meetings, we seek to understand everyone's point of view on new strategic information
- Groups are prepared to re-think decisions when presented with new strategic information
- When confronting new strategic information, we are not afraid to critically reflect on the shared assumptions we have about our organization

Strategic knowledge implementation (Bontis *et al*., 2002)

- Strategic knowledge gained by working groups is used to improve products, services and processes
- The decisions we make according to any new strategic knowledge are reflected in changes to our organizational systems and procedures
- Strategic knowledge gained by individuals has an effect on the organization's strategy

Performance (Gibson & Birkinshaw, 2004)

How would you assess your firm's performance with the following statements?

- People at my level are satisfied with the level of firm´s performance
- Our company does a good job of satisfying our customers
- This business unit is achieving its full potential
- This business unit gives me the opportunity and encouragement to do the best work I am capable of