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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 statistical 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, Learning, Learning methods, Management research, Finland

Paper type Research paper

1. 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.*,

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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 unpredictable 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.

2. Conceptual framework

2.1 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). 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.

2.2 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.

2.2.1 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 (see 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

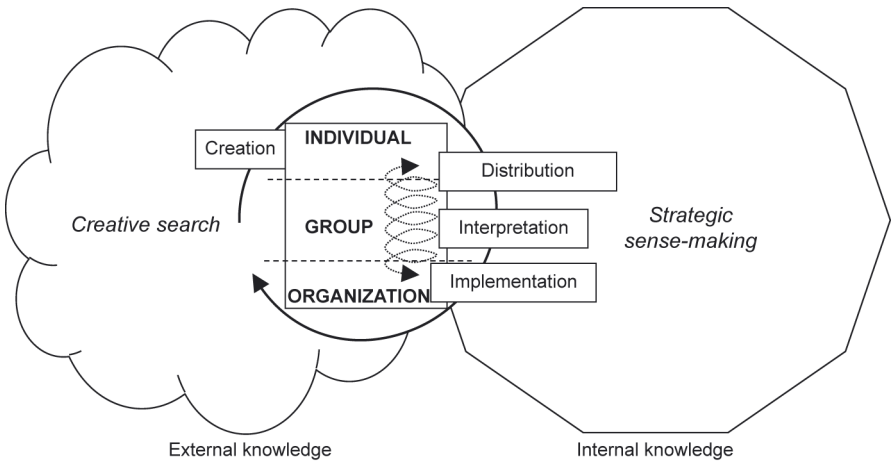

Figure 1.
The integrated strategic learning framework

(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.

2.2.2 The key knowledge processes that form strategic learning. Next, in a stepwise order (see 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, 1998). 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, 1988, 1991) 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 Ghoshal, 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 on 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 I 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.

3. Method

3.1 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 II 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

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 and Murray (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)

Table I.
Dimensions of strategic learning

Scale items		Factor loadings 1	2	3	4
Factor 1: Strategic knowledge creation (α: 0.77) (Atuahene-Gima and Murray, 2007; Tsai et al.*, 2008)*					
CR1	In information search, we focus on acquiring knowledge of strategies that involve experimentation and high market risks	0.492			
CR2	We prefer to collect market information with no identifiable strategic needs to ensure experimentation	0.564			
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	0.774			
CR4	We collect novel information and ideas that go beyond our current market and technological experiences	0.679			
CR5	Our aim is to collect new information that forces us to learn new things in product development	0.645			
Factor 2: Strategic knowledge distribution (α: 0.86) (Tippins and Sohi, 2003; Bontis et al.*, 2002)*					
DI1	Within our firm sharing strategic information is the norm		0.645		
DI2	Within our firm, strategically important information is easily accessible to those who need it most		0.709		
DI3	Representatives from different departments within our firm meet regularly to discuss new strategically important issues		0.623		
DI4	Within our firm, strategically important information is actively shared between different departments		0.926		
DI5	When one department obtains strategically important information, it is circulated to other departments		0.793		
Factor 3: Strategic knowledge interpretation (α: 0.80) (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			0.521	
IN2	In meetings, we seek to understand everyone's point of view concerning new strategic information			0.631	
IN3	Groups are prepared to rethink decisions when presented with new strategic information			0.612	
IN4	When confronting new strategic information, we are not afraid to reflect critically on the shared assumptions we have about our organisation			0.740	
IN5	We often collectively question our own biases about the way we interpret new strategic knowledge			0.633	
*Factor 4: Strategic knowledge implementation (α: 0.78) (*Bontis *et al.*, 2002*;* Crossan and Hulland, 1997*)*					
IM1	Strategic knowledge gained by working groups is used to improve products, services and processes				0.779
IM2	The decisions we make according to new strategic knowledge are reflected in changes to our organisational systems and procedures				0.648
IM3	Strategic knowledge gained by individuals is input into the organisation's strategy				0.600
IM4	Recommendations by groups concerning the use of strategic knowledge are adopted by the organisation				0.449
Extraction method: Principal Axis Factoring Rotation method: Promax with Kaiser Normalisation Rotation converged in five iterations					

Table II.
Exploratory factor analysis of strategic learning scale

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 (1,161) 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 five-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.

3.1.1 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 III), 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.

4. Analysis and results

4.1 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 organisation 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.

Models	df	$\chi 2$	p-value	$\chi 2$/df	RMSEA	GFI	NFI	CFI	IFI	RFI
M1: one dimensional	152	742.36*	0.00000	4.88	0.138	0.69	0.79	0.82	0.82	0.76
M2: two 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: two 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: two 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: two 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: two 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: two 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: two 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: three 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: three 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: three 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: three 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: three 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: three 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: four 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

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

Notes: *$p < 0.01$. df = degree of freedom; $\chi 2$ = 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

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 II 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.

4.2 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 and Sörbom (1993), 15 competing models were analysed to validate the structure 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) (see Table III). 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.

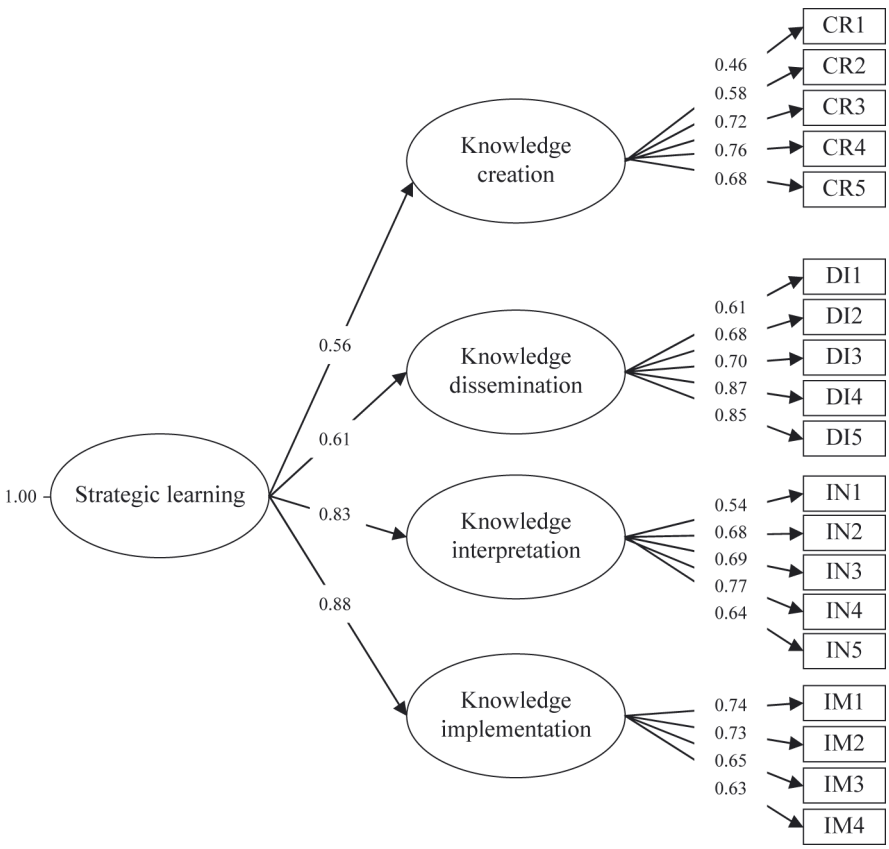

Figure 2.
Second-order confirmatory factor model (standardised loadings)

4.3 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 IV, 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.

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

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.

5. 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 information 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

Item	Mean	SD	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*

Notes: CR= knowledge creation; DI=knowledge dissemination; IN=knowledge interpretation; IM= knowledge implementation. $^{*}p \leq 0.01$; $^{**}p \leq 0.05$ (two-tailed)

Table IV.
Descriptive statistics and correlation matrix

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.

5.1 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 assumptions 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.

Table V.
Correlations among strategic learning capability 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

Notes: *$p \leq 0.01$; **$p \leq 0.05$ (two-sided test)

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).

5.2 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.

6. 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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