

Strategic agility of Korean small and medium enterprises and its influence on operational and firm performance

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ABSTRACT

This study explores the nature and role of agility as a strategic intent and its influence on operational and firm performance. Combining field interviews with the literature review, we develop theoretical connections between strategic agility of Korean small and medium enterprises (SMEs) and its underlying dimensions (technology capability, collaborative innovation, organizational learning, and internal alignment). Then, we propose a conceptual model for investigating the nomological network of influences among strategic agility, operational performance (responsiveness), and firm performance. Firm performance is measured as two alternative dimensions—customer retention and financial performance. Using structural equation modeling, we conduct a group of confirmatory analyses to test the empirical associations hypothesized in the structural models. The analysis results indicate that Korean SMEs' strategic intent toward agility has a positive influence on their operational performance and customer retention, but not on financial performance. Implications of the results are discussed in detail along with theoretical contributions and future research directions.

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1. Introduction

For decades, firms have devoted to improving the speed and efficiency of material and information flows in the supply chain, acknowledging the importance of time-based competitive advantage in the dynamic business environment. Success stories of Zara and QVC seem to confirm the proposition that speedier operations can be a source of competitive advantage. Not all firms, however, were able to convert their operational success into sustainable firm performance. Economic indicators show that the aggregate inventory-to-revenue ratios have escalated steadily in the wholesale and retail industries and the profit-to-sales ratio in the manufacturing industry has declined overall (Shah and Shin, 2007). Despite improved speed and operational performance, firms struggle as they cannot respond to unexpected challenges and environmental dynamics. Accordingly, firms should not just aim at faster speed, but must focus on building agility and adaptability (Lee, 2004).

Agility in business research is a new breed of term whose semantic usage varies by the domain of research (see Table 1). The studies on agility in general can be classified into two perspectives. One perspective is that agility is externally focused generic capability which enables a firm to quickly adjust its operations to cope with volatile market conditions and sudden changes in customers' requirements (Braunscheidel and Suresh, 2009). The other is that agility is not restrained as a capability, but an integrated strategy, paradigm, system or management practice built upon multi-faceted capabilities (Dyer and Shafer, 1998; Sharifi and Zhang, 1999; Yusuf et al., 1999; Cao and Dowlatsahi, 2005; Li et al., 2008; Brannen and Doz, 2012). According to this perspective, an agile firm should be not only flexible in its operations, but also nimble in reconfiguring its strategy to be responsive and adaptable to environmental changes.

The latter perspective on agility seems more appealing, since institutional innovation and transformation to survive in the dynamic business environment necessitates novel ideas and adaptive behaviors that must be embodied holistically in products, services, processes, technology, or management techniques (Daft, 1978, p. 197). Nonetheless, most of the extant empirical studies operationalize agility as a first-order capability, and adopt scales often used for flexibility such as manufacturing lead time, delivery speed, customization, and responsiveness as summarized in Table 1. The mixed use of scales can be attributed to ambiguity

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Table 1
Synopsis of the prior literature on agility.

Author	Year	Journal	Construct	Nature	Constituents or dimensions	Method
Roth	1996	S&L	Strategic agility	• Capability	• Competitive strength in combined generic capabilities	Conceptual
Dyer and Shafer	1998	WP	Organizational agility	• Capacity • Core competence to operate in dynamic environment	• Reading the market • Mobilizing rapid response • Embedding organizational learning	Conceptual
Sharifi and Zhang	1999	IJPE	Agility (manufacturing agility)	• Capability and character	• Responsiveness • Competency • Flexibility • Speed	Conceptual research framework
Yusuf et al.	1999	IJPE	Agility (manufacturing agility)	• System consisting of input, operationalization and output	• Elemental agility • Micro agility • Macro agility	Conceptual
Zhang and Sharifi	2000	IJOPM	Agility (manufacturing agility)	• Capability	• Responsiveness • Competency • Flexibility • Speed	Conceptual research framework
Sambamurthy et al.	2003	MISQ	Agility	• Ability	• Customer agility • Partnering agility • Operational agility	Conceptual
Cao and Dowlatsahi	2005	JOM	Manufacturing agility (agile manufacturing)	• Manufacturing paradigm	• Interaction between virtual enterprise and information technology (enablers for agile manufacturing)	Empirical
Narasimhan et al.	2006	JOM	Manufacturing agility	• Manufacturing paradigm • Performance capability	• Clustering (profiling) of agile performers using performance indicators such as TQM, JIT flow, supplier partnership etc.	Empirical
Overby et al.	2006	EJIS	Enterprise agility	• Capability	• Sensing & responding to environmental change	Conceptual
Swafford et al.	2006a	IJOPM	Value chain agility	• Operations based capability	• Product development flexibility • Procurement/sourcing flexibility • Manufacturing flexibility • Distribution/logistics flexibility	Empirical
Swafford et al.	2006b	JOM	Supply chain agility	• Externally focused capability	• Procurement/sourcing flexibility • Manufacturing flexibility • Distribution/logistics flexibility	Empirical
Doz and Kosonen	2008	CMR	Strategic agility	• Combination of meta-capabilities	• Strategic sensitivity • Leadership unity • Resource fluidity	Case study
Li et al.	2008	IJLM	Supply chain agility	• Trait or result of integrating alertness to changes	• Strategic design agility • Operational design agility • Episodic design agility	Conceptual
Braunscheidel and Suresh	2009	JOM	Supply chain agility	• Externally focused capability	• Joint planning • Demand response • Visibility • Customer responsiveness	Empirical
Charles et al.	2010	IJPDLM	Supply chain agility	• Capability	• Effectiveness and responsiveness built upon flexibility	Conceptual
Vickery et al.	2010	IJPR	Agility	• Capability	• Five indicators including new product introduction time, manufacturing lead time, delivery speed, modification flexibility, responsive to customers	Empirical
Chen and Chiang	2011	IMM	Network agility	• Capability • Driver for operational performance	• Customer Agility • Partnering Agility • Operational Agility	Conceptual Case study
Inman et al.	2011	JOM	Manufacturing agility	• Capability • Driver for financial, marketing, and operational performance	• Eight indicators including market sense capability, process flexibility, adaptability etc.	Empirical

Table 1 (continued)

Author	Year	Journal	Construct	Nature	Constituents or dimensions	Method
Jacobs et al.	2011	JPIM	Manufacturing agility	• Capability dependent upon product and process modularity	• Responsiveness to customers • Manufacturing lead time • Delivery speed	Empirical
Lu and Ramamurthy	2011	MISQ	Organizational agility	• Capability	• Market capitalizing agility • Operational adjustment agility	Empirical
Tallon and Pinsonneault	2011	MISQ	Organizational (firm) agility	• Capability	• Eight indicators including responsiveness, customization, reaction to competitors' new product launches, responsive pricing, market expansion etc.	Empirical
Brannen and Doz	2012	CMR	Strategic agility	• Ability to develop strategic alternatives	• Reflected by the dynamics between contextually specific and conceptually abstract languages.	Conceptual
Chiang et al.	2012	IJOPM	Supply chain agility	• Capability influenced by strategic sourcing and strategic flexibility	• Customer responsiveness • Demand response • Joint planning	Empirical
Roberts and Grover	2012	JBR	Customer agility	• Dynamic capability • Driver for firm performance	• Customer sensing capability • Customer responding capability	Empirical
Whitten et al.	2012	IJOPM	Supply chain agility	• Capability	• Six indicators including information flow, collaborative relationship with suppliers, contingency planning etc.	Empirical

List of Journals: CMR—California Management Review; EJS—European Journal of Information Systems; IJLM—International Journal of Logistics Management; IJOPM—International Journal of Operations & Production Management; IJPDLM—International Journal of Physical Distribution & Logistics Management. IJPE—International Journal of Production Economics; IJPR—International Journal of Production Research; IMM—Industrial Marketing Management; JBR—Journal of Business Research; JOM—Journal of Operations Management; MISQ—MIS Quarterly; S&L—Strategy & Leadership.

between agility and flexibility to a certain degree (Swafford et al., 2006b). For example, Gerwin (1993) views *flexibility responsiveness* as an adaptability to quickly adjust a firm's objectives to meet the new conditions.

In this context, the objective of the present research is twofold. The first objective is to shape multi-dimensional attributes of agility into general research constructs. In order to highlight unique and multi-dimensional attributes of agility, we adopt the term, “strategic agility,” and define it as a firm's strategic intent to achieve agile operations which are driven by the management emphasis on improving its time-based competitive advantage, namely responsiveness and adaptability to customers' needs and requirements. We operationalize this perspective by forming strategic agility as a second order factor, reflected on four underlying capabilities: technology capability, collaborative innovation, organizational learning, and internal alignment. The second is to establish the theoretical associations between strategic agility and the four capability dimensions and the nomological network of influences among strategic agility, operational performance, and firm performance.

To achieve the research objectives, we investigate small and medium enterprises in Korea (Korean SMEs hereafter) for the following reasons. First, much of anecdotal and empirical evidence reveals that a notable similarity exists between the notion of agility and the unique business culture of Korean manufacturing firms. Researchers acknowledge that Korean firms are evidently quick and responsive in management style and technology adoption (Bae and Lawler, 2000; Kirk, 2001; Lau et al., 2005). In the Korean *palli palli*⁴ business culture, top management pushes

forward new product development to shorten time to market (Blasi and Puig, 2002). Enhancing response speed is a key dimension of evolving Korean business strategies (Bae, 1997). Quick decision-making with aggressive investments of Korean conglomerates geared by government support is a crucial enabler of the fastest economic growth of Korea (Holstein and Nakarmi, 1995). From a series of interviews for construct development, we also found that a shared belief exists among the Korean practitioners that being quick and remaining flexible and versatile are critical to survive in the fierce global competition, confirming the findings in the literature. Second, empirical findings support that speed and responsiveness may be more essential to SMEs (Chen and Hambrick, 1995; Fiegenbaum and Karnani, 1991; Hitt et al., 1991), because they often lack market dominance, economies of scale, and brand awareness that many large size firms possess (Hambrick et al., 1982). In particular, Korean SMEs have pursued a key role for the Korean economy as suppliers for Korean conglomerates, and the importance of SMEs seems more apparent in Korea than in other developed nations with respect to the number of establishments and workforce size⁵. Therefore, Korean SMEs may be one of the best sample groups for a study on agility.

The rest of the paper is organized as follows. In Section 2 we provide a review of literature development on agility in various disciplines, including organizational agility, manufacturing agility, supply chain agility, and strategic agility. In Section 3 we propose a conceptual framework for the causal relationships among the research constructs and related hypotheses, followed by Section 4 which describes the details of field interviews, triangulation, data collection and statistical analysis. We present the results of the statistical analysis in Section 5 and discuss the findings in

⁴ ‘Palli Palli’ means ‘Quickly, Quickly’ in Korean. The term was once considered a negative connotation for perhaps too rapid economic growth of Korea, but recently reevaluated to represent fast information technology adoption and decision-making of Korean firms and society.

⁵ Source: The Small and Medium Business Administration of Korea, Annual Report (2010), <http://www.smba.go.kr/smba/main/english/index.jsp>.

Section 6 to provide theoretical contributions and managerial implications along with limitations and future research directions. Finally, the paper concludes with a summary.

2. Literature review: Strategic agility defined

Due to the diverse perspectives on agility (see Table 1), it is necessary to explore the main research streams on agility: organizational agility, manufacturing agility, supply chain agility, and strategic agility.

2.1. Agility and organizational agility

The term, agility, first appeared in the business literature in association with flexible manufacturing systems (FMS) in which agility and flexibility were often used interchangeably (Li et al., 2008). The flexibility–agility association is similar to the competency–capability relationship. Agility is an externally focused capability, while flexibility is an internally focused competency, an antecedent of agility (Swafford et al., 2006b). In this sense, agility has a unique property as market-sensing capability to explore and exploit opportunities for market arbitrage (Overby et al., 2006; Roberts and Grover, 2012). This perspective is consistent with understanding of agility as a dynamic capability (Teece et al., 1997; Roberts and Grover, 2012). The other perspective is that agility is not only a capability, but also a paradigm or a trait of agile firms which may require a group of meta-capabilities (Dyer and Shafer, 1998; Doz and Kosonen, 2008). Agility-driven firms must be accustomed to effectively acquiring resources and harmonizing capabilities (Dyer and Shafer, 1998; Chen and Chiang, 2011) and to assembling requisite assets, knowledge, and relationships with speed (Sambamurthy et al., 2003). Lu and Ramamurthy (2011) state that organizational agility extends the concept of strategic flexibility and propose that organizational agility comprises two distinct concepts, market capitalizing agility and operational adjustment agility.

2.2. Manufacturing agility, supply chain agility, and strategic agility

The OM and SCM literatures synthesize the concept of agility with manufacturing and supply chain practices. Empirical studies on manufacturing agility originate from the inquiry, how agile manufacturing differs from lean manufacturing (Narasimhan et al., 2006). The growing awareness of FMS in the 1980s and 1990s contributed to rapid development of analytical studies on manufacturing agility; see Sanchez and Nagi (2001) for a taxonomy of the analytical studies. There are different viewpoints in defining manufacturing agility as well. For instance, Yusuf et al. (1999), Sharifi and Zhang (1999), Cao and Dowlatshahi (2005) define manufacturing agility (agile manufacturing) as a system that should be leveraged by capabilities such as responsiveness, flexibility and speed. In contrast, Roth (1996), Zhang and Sharifi (2000), Inman et al. (2011), and Jacobs et al. (2011) see manufacturing agility as a capability of the firm.

The tenet of supply chain agility is similar to that of organizational and manufacturing agility (e.g., Yang, 2014), but its scope is broader (e.g., Yusuf et al., 2014; Purvis et al., 2014). Supply chain agility emphasizes collaborative tactics and partnership in the supply chain, including partnering agility (Charles et al., 2010), joint planning (Braunscheidel and Suresh, 2009; Chiang et al., 2012), procurement and distribution flexibilities (Swafford et al., 2006a, 2006b), and information sharing (Whitten et al., 2012). For a comprehensive literature review on supply chain agility (see Gligor and Holcomb, 2010).

A few studies adopt the term, strategic agility (Roth, 1996; Doz and Kosonen, 2008; Brannen and Doz, 2012). Roth (1996) defines strategic agility as “the capability to produce the right products at the right time at the right place at the right price.” Although Roth (1996) uses the term, strategic agility, the content is rather close to manufacturing agility. Doz and Kosonen (2008), without defining strategic agility, argue that strategic agility is an outcome founded by strategic sensitivity, leadership unity, and resource fluidity. Brannen and Doz (2012) view strategic agility as an ability to develop strategic alternatives and make well-grounded, thoughtful decisions in a timely manner.

Although agility is dominantly understood as a capability as shown in Table 1, it has been also considered in the context of manufacturing paradigm, strategy, and business practice (Narasimhan et al., 2006). Given that agility is characterized ambiguously in the literature as strategic vision, operational capability, and attribute of empowered workforce, we believe that our use of “strategic agility” is more specific and clearer to represent a firm’s strategic intent to achieve agile operations. In the following section, we attempt to build theoretical foundation of strategic agility based upon the relevant literature and the inference from the field interviews.

3. A model of strategic agility: Theoretical foundation

To develop a theoretical foundation for strategic agility, we took a three step approach combining field interviews, triangulation for construct development, and empirical survey; see the methodology section for the detail. The schematic representation of the conceptual model is provided in Fig. 1. As shown, strategic agility is modeled as a governing factor founded upon four underlying capability dimensions (technology capability, collaborative innovation, organizational learning, and internal alignment). The model indicates that firms adopting an agility-oriented strategy demonstrate a higher level of capabilities in the four dimensions, and the collectively improved capabilities enhance operational efficacy, leading to better firm performance.

3.1. Strategic agility and technology capability

Most interviewees addressed that technology capability enables Korean SMEs to be operationally responsive to customers’ requirements. Agile firms must respond to emergence of new technologies in a cost and time efficient manner (Ramasesh et al., 2001). Both product and process technologies are often emphasized to pursue changeover flexibility, an ability to quickly replace obsolete products and processes with new ones (Gerwin, 1993). Advanced manufacturing processes and information technologies are essential for agile manufacturing (Yusuf et al., 1999; Sanchez and Nagi, 2001; Narasimhan et al., 2006).

The logical connection between agility and technology capability is also found in the information technology (IT) literature (Sambamurthy et al., 2003; Wade and Hulland, 2004; White et al., 2005; Lu and Ramamurthy, 2011; Tallon and Pinsonneault, 2001). The strategic value of IT emerges as it serves as a platform for agility (Sambamurthy et al., 2003) and enhances a firm’s alertness (i.e., proactive attentiveness to information about the environment and market) and responsiveness (Zaheer and Zaheer, 1997). Therefore, we hypothesize that technology capability is an underlying dimension of strategic agility and propose to test:

H1. Strategic agility has a positive influence on technology capability.

3.2. Strategic agility and collaborative innovation

Flexibility in process configuration without substantial capital investment is an essential capability dimension to achieve agility (Burgess, 1994; Narasimhan et al., 2006; Inman et al., 2011). Serving customers' diverse needs necessitates customer sensing and customer responding capabilities (Roberts and Grover, 2012) and frequent process changes internally and externally in the supply chain (Swafford et al., 2006b). This capability dimension is in line with collaborative innovation of processes. Collaborative innovation refers to all the relevant activities necessary to design and implement new processes or to improve the existing processes—a firm's ability to reconfigure an effective sequence of tasks to meet internal and external requirements (Lee et al., 2010).

Most SMEs in the manufacturing industry are the suppliers whose primary goal is to serve industrial customers. A supplier's responsiveness requires a close relationship and open communication with its buying firm (Liker and Choi, 2004). Thus, an agility-oriented supplier must find opportunities for customization in which products and processes are conceived and adjusted by cooperation with the customers (van Hoek et al., 2001). Therefore, we hypothesize that collaborative innovation is an underlying dimension of strategic agility and propose to test:

H2. Strategic agility has a positive influence on collaborative innovation.

3.3. Strategic agility and organizational learning

The interviewees stressed that organizational learning was considered the matter of life and death for the nation which lacked natural resources vital to economic development. Specifically, acquisition, assimilation, and improvement of foreign technologies imported from the U.S., Japan, and Germany was critical for Korean SMEs in the past. Many studies in the management literature have acknowledged Korean firms' unique emphasis on and style of organizational learning (e.g., Kim, 1998; Bae and Lawler, 2000; Mathews and Cho, 1999).

Organizational learning encompasses the creation, adaptation, and replication of knowledge (Dyer and Shafer, 1998) and leads to accumulation of knowledge over time (Senge, 1990; March, 1991). Integration of the internal (both individual and organizational) knowledge base and organizational learning enhances organizational effectiveness through experience-based improvement in task performance (Ranft and Lord, 2002; Braunscheidel and Suresh, 2009). Likewise, aiming at strategic agility requires economies of knowledge through enterprise-wide learning with skilled people

(Roth, 1996). Agile organizations rely on empowered employees with technical expertise, and the knowledge workers are alert to opportunities and challenges for their task adjustments in a timely and flexible manner (Li et al., 2008). Thus, the augmentation of organizational learning by empowering employees through flexible working conditions would be essential for strategic agility. Knowledge intensive organizations are the ones that are repeatedly creative, versatile, and excellent in problem-solving (Alvesson, 1995). In this regard, we consider organizational learning an underlying dimension of strategic agility and propose to test:

H3. Strategic agility has a positive influence on organizational learning.

3.4. Strategic agility and internal alignment

We found that Korean professionals' understanding of alignment is closely related to internal fit or "strategic consensus" (Boyer and McDermott, 1999) concerned with how to move fast and together in a harmonized fashion. Anecdotal evidence also indicates that Korean firms emphasize collective efforts among all the business units within the conventional hierarchy built upon loyalty (Edwards et al., 2005). Alignment in a broad sense can translate into the issue of strategic congruence, the degree to which a firm's goals, objectives, needs, and structure are consistent with one another (Nadler and Tushman, 1983, p. 119). Proper internal and external fits strengthen a firm's ability to understand the environment and react in time in order to permit necessary organizational adjustments (Luo and Park, 2001).

While a number of studies in the fields of strategy and organization theory primarily aim at external fit (Venkatraman and Prescott, 1990; Morrison and Roth, 1992), the studies in OM and operations strategy seem to focus more on internal alignment or alignment among supply chain participants (Boyer and McDermott, 1999; Lee, 2004). In IT literature, the issue of alignment between IT and business strategy raised controversies since a deep level of alignment may lead to an organization's rigidity that may hurt agility of the firm by limiting its strategic choices (Henderson and Clark, 1990; Tallon and Pinsonneault, 2001).

Strategic consensus as internal alignment aims for an idealistic state in which the leadership and the functional units demonstrate a high level of unity and agreement with respect to strategic importance of competitive priorities (Robinson and Stern, 1998; Boyer and McDermott, 1999; Doz and Kosonen, 2008). Internal alignment is imperative especially for SMEs because most SMEs are owner-controlled (Pett and Wolff, 2007) and usually managed by owners' interests or management policies closely aligned with those interests (Zahra and George, 1999). Thus, we view internal

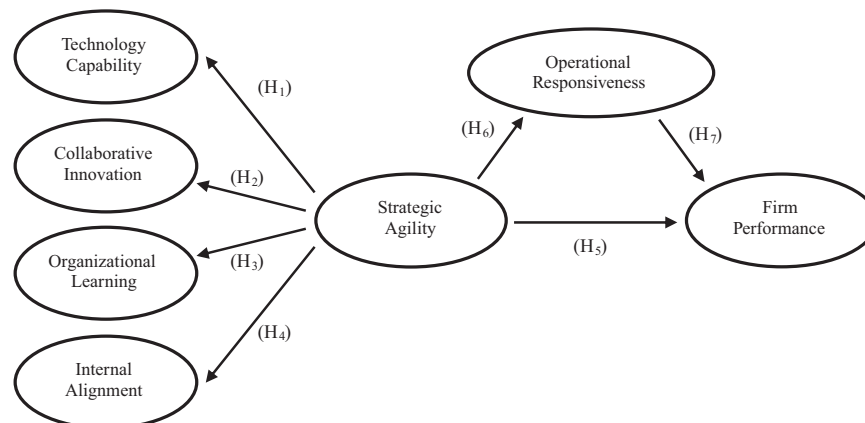


Fig. 1. Schematic illustration of the conceptual model.

alignments as an important underlying dimension of strategic agility and propose to test:

H4. Strategic agility has a positive influence on internal alignment.

Technically, strategic agility will be operationalized as a second-order factor which is assumed to affect the first-order latent variables (technology capability, collaborative innovation, organizational learning, and internal alignment) in a recursive structure. The first-order factors are considered endogenous to the second-order factor (strategic agility) although the second-order factor is unobservable due to the lack of own indicators (Gorsuch, 1983; Byrne, 1995). This approach conforms to the strategic view of agility in which agility is understood as a collection of meta-capability constructs (Yusuf et al., 1999; Overby et al., 2006; Doz and Kosonen, 2008).

3.5. Strategic agility and firm performance

The empirical association between implementation of strategic decisions and operational and financial performance has been a classical research theme in the business literature regardless of disciplines (Capon et al., 1990). While most of agility studies are conceptual, a group of studies empirically test the association between agility and endogenous performance measures, but the results are mixed at best. Swafford et al. (2006a) indicate that value chain agility correlates positively with return on asset and negatively with time-to-market, using simple correlation analyses. Vickery et al. (2010) show that agility has a positive impact on firm (financial) performance. Tallon and Pinsonneault (2001) investigate the associations among IT alignment, agility, and performance, and show that agility has a positive effect on the firm's financial performance and the association is moderated by environmental volatility. In contrast, Jacobs et al. (2011) and Inman et al. (2011) fail to support any significant association between manufacturing agility and financial performance. Roberts and Grover (2012) test the association between agility (customer sensing and responding capabilities) and firm performance measured by marketing and finance related indicators. They find that while customer sensing capability has a positive influence on firm performance, customer responding capability does not. Given the mixed results in the literature, we propose to test the association between strategic agility and firm (financial) performance.

In addition to financial performance, customer retention is considered an important firm performance measure for Korean SMEs, mostly suppliers in the B2B market. Sustaining collaborative relationships with customers enables suppliers to meet the customers' requirements effectively (Goodman et al., 1995; Choi and Krause, 2006). Since a primary goal of strategic agility is to respond swiftly to unexpected changes in market and customer requirements, we also propose to test that strategic agility has a positive influence on customer retention for the SMEs.

H5. Strategic agility has a positive influence on firm performance.

H5_A. Strategic agility has a positive influence on customer retention.

H5_B. Strategic agility has a positive influence on financial performance.

3.6. Strategic agility and operational performance

We adopt *operational responsiveness* as a proxy for operational performance with a rationale that the management's pursuit of strategic agility is primarily concerned with improving the firm's responsiveness in operations (Swafford et al., 2006a; Braunscheidel and Suresh, 2009). Operational responsiveness is

an advanced level of flexibility to meet customer and market requirements (Gerwin, 1993; Goodman et al., 1995; Choi and Krause, 2006). Accordingly, operational responsiveness would be the most explicit outcome of pursuing strategic agility out of all possible operational performance measures. Inman et al. (2011) and Whitten et al. (2012) hypothesize a positive influence of agility on operational performance. Specifically, Inman et al. (2011) demonstrate that agile manufacturing of a firm has a positive association with operational performance which in turn improves the firm's marketing performance. Whitten et al. (2012) also show that a triple-A supply chain paradigm has a positive influence on supply chain performance, the mediator between triple-A supply chain and financial performance. Therefore, we hypothesize and propose to test:

H6. Strategic agility has a positive influence on operational responsiveness.

3.7. The mediation effect of operational performance

The conceptual model in Fig. 1 resides in the conventional industrial organization (IO) paradigm of structure – conduct – performance (Scherer and Ross, 1990). The IO paradigm in economics has several weaknesses in explaining the behavior and idiosyncratic attributes of individual firms which are heterogeneous in size, resources, and strategic choices (Barney, 1991; McWilliams and Smart, 1993). The scope of business research gradually evolved to the triad of *strategy – conduct – performance* (SCP). That is, a strategy may affect firm performance directly, and the impact of the strategy can also be mediated by the effectiveness of conduct and resources (Venkatraman, 1989; Barney, 1991).

Accordingly, strategic agility (reflected in the four dimensions of meta-capabilities) was constructed as the driver for firm performance in hypothesis 5 based on the SCP framework. Then, we hypothesize that operational responsiveness would improve firm performance, functioning as a mediator between strategic agility and firm performance (Baron and Kenny, 1986; LeBreton et al., 2008). Similar attempts were made in other agility research (Inman et al., 2011; Whitten et al., 2012), but no prior research (to the best of our knowledge) has identified both direct and indirect effects of agility on firm performance. Thus, we propose to test:

H7. Operational responsiveness has a positive influence on firm performance.

H7_A. Operational responsiveness has a positive influence on customer retention.

H7_B. Operational responsiveness has a positive influence on financial performance.

H8. Operational responsiveness mediates the effect of strategic agility on firm performance.

H8_A. Operational responsiveness mediates the effect of strategic agility on customer retention.

H8_B. Operational responsiveness mediates the effect of strategic agility on financial performance.

4. Methodology and construct development

We adopted a grounded theory approach for construct development and data collection (Edmondson, 1999; Ranft and Lord, 2002). The grounded approach is usually recommended in exploratory research in which theories arise as underlying abstraction of phenomena rather than the researcher's prior knowledge from the literature. Since little research has been conducted to

Table 2
Profiles of the sample firms and the survey respondents.

Profile	Number of respondents	Category	Frequency	Proportion (%)
Year of foundation	244	1990	1	0.4
		1998	4	1.6
		1999	22	9.0
		2000	49	20.1
		2001	47	19.3
		2002	58	23.8
		2003	46	18.9
Annual revenue (\$)	244	2004	17	7.0
		< 100,000	24	9.8
		100,000–300,000	45	18.4
		300,000–500,000	27	11.1
		500,000–750,000	17	7.0
		750,000–1,000,000	22	9.0
		1,000,000–1,500,000	20	8.2
		1,500,000–3,000,000	24	9.8
		3,000,000–5,000,000	14	5.7
		5,000,000–10,000,000	43	17.6
		> 10,000,000	6	2.5
		No response	2	0.8
Number of employees	244	< 10	164	67.2
		10–20	45	18.4
		20–30	15	6.1
		30–40	7	2.9
		40–50	5	2.0
		50–100	6	2.5
		> 100	2	0.8
Respondent position	244	Assistant Manager	29	11.9
		Manager	32	13.1
		General Manager	16	6.6
		Director or Vice President	18	7.4
		CEO	149	61.1

excavate common attributes in Korean firms' manufacturing strategy, the grounded approach was deemed appropriate for this study.

4.1. Field interviews and triangulation

At first, qualitative interviews were conducted to discover various dimensions of Korean manufacturing strategy. Two government officials and eleven executives from various industries, including electronics, automobile, steel refinery, and ceramics, agreed to participate. The interviews were held in casual places for about two to four hours, depending on the informant's willingness to continue. The interviews were organized in the form of open conversation and brainstorming so that the interviewees could generate freely their ideas, opinions, and experiences with the subject matter. To assist the informant's conceptualization of strategic emphasis in Korean manufacturing operations, he was asked to provide anecdotal or private success (or failure) stories based upon questions such as "How did your firm capture a considerable market share in Russia after the country's declaration of economic moratorium?" On occasion, the informant was reminded that we were searching for the strategic attributes of Korean firms and was asked to compare his firm's strategy with that of American or Japanese competitors.

The verbatim transcripts were evaluated through a series of decoding and coding processes through which verbal transcripts are sorted out, clustered and integrated to form researchable constructs (Strauss and Corbin, 1998). Two critical challenges arose as the research proceeded. One was of triangulation, how we articulate the Korean managers' conceptualization and perception in the theoretical underpinnings of the OM literature to create and validate constructs. The other was of the issue of translation of Korean vocabulary into English without losing their subtlety and delicacy. Due to these challenges, we implemented several rounds of refinement process in which major descriptions identified from the verbatim transcripts were matched with the constructs in the extant

Table 3
Principal component analysis for the measurement items.

Construct	Indicator	Cronbach's alpha	Rotated component matrix						
			TC	CI	OL	IA	OR	CR	FP
TC	TC1	0.811	0.801	0.255	0.151	0.039	0.142	0.160	−0.013
	TC2		0.812	0.111	0.175	0.099	0.158	0.106	−0.016
	TC3		0.793	0.139	0.357	0.301	0.078	−0.079	0.034
CI	CI1	0.739	0.159	0.753	0.241	0.067	0.201	0.132	−0.176
	CI2		0.179	0.763	0.418	0.237	0.177	0.183	−0.052
	CI3		0.306	0.715	0.377	0.232	0.143	0.204	0.173
OL	OL1	0.831	0.035	0.307	0.780	0.299	0.075	−0.009	0.043
	OL2		0.153	0.214	0.783	−0.004	−0.108	0.123	0.112
	OL3		0.102	0.384	0.793	0.118	−0.012	0.242	0.008
	OL4		0.157	0.374	0.817	0.080	−0.009	0.111	0.221
IA	IA1	0.849	0.065	−0.002	0.067	0.762	0.126	0.347	−0.148
	IA2		0.116	0.066	0.237	0.768	0.156	0.278	−0.122
	IA3		0.169	−0.085	0.232	0.806	0.088	0.247	−0.132
OR	OR1	0.796	0.183	0.106	0.048	0.012	0.815	−0.002	−0.032
	OR2		0.272	0.105	0.154	0.109	0.818	0.057	0.041
	OR3		−0.053	0.135	0.137	0.093	0.803	0.144	0.032
CR	CR1	0.840	0.044	0.200	0.343	0.219	0.088	0.830	0.014
	CR2		0.039	0.167	0.342	0.227	0.098	0.783	0.090
	CR3		0.134	0.139	0.409	0.301	0.025	0.764	0.038
FP	FP1	0.543	−0.116	0.026	−0.107	−0.151	0.096	0.247	0.523
	FP2		0.109	−0.093	0.050	0.059	−0.051	−0.101	0.801

Legend: TC—Technology capability, CI—Collaborative innovation, OL—Organizational learning, IA—Internal alignment, OR—Operational responsiveness, CR—Customer retention, FP—Financial performance.

Table 4
The measurement model statistics.

Construct	Indicator	Standardized loading	Measurement error	Composite reliability	AVE
Strategic agility	Technology capability	TC1	0.76	0.814	0.593
		TC2	0.76		
		TC3	0.79		
	Collaborative innovation	CI1	0.72	0.770	0.536
		CI2	0.88		
		CI3	0.56		
	Organizational learning	OL1	0.71	0.836	0.562
		OL2	0.84		
		OL3	0.70		
		OL4	0.74		
	Internal alignment	IA1	0.91	0.867	0.692
		IA2	0.93		
		IA3	0.61		
Operational responsiveness		OR1	0.68	0.783	0.553
		OR2	0.90		
		OR3	0.62		
Firm Performance	Customer retention	CR1	0.94	0.846	0.650
		CR2	0.72		
		CR3	0.74		
	Financial performance	FP1	0.53	0.535	0.564
		FP2	0.92		

AVE—Average variance extracted.

Table 5
Construct correlations and discriminant validity.

Construct	Mean (s.d.)	TC	CI	OL	IA	OR	CR	FP
Technology capability	3.639 (1.234)	0.770						
Collaborative innovation	4.223 (0.735)	0.472**	0.732					
Organizational learning	4.270 (0.785)	0.380**	0.550**	0.750				
Internal alignment	3.434 (0.726)	0.295**	0.401**	0.612**	0.832			
Operational responsiveness	3.487 (0.918)	0.243**	0.240**	0.099	0.131	0.744		
Customer retention	3.708 (0.588)	0.104	0.094	0.196**	0.165**	0.171**	0.806	
Financial performance	0.039 (0.135)	0.067	0.060	0.098	0.100	0.029	0.157*	0.751

† $p < 0.10$.

The diagonal elements in bold are the square roots of the average variance extracted. The off-diagonal elements are the correlations between constructs.

* $p < 0.05$.

** $p < 0.01$.

literature. As a result, we initially classified underlying capability dimensions of strategic agility into five broad categories: technology capability, process orientation, collaborative improvement, knowledge management, and strategic alignment. The developed constructs and associated verbatim transcripts were further examined independently by two distinguished OM scholars who had not participated in the construct development process. Their suggestion was to collapse process orientation into others due to its overlapping nature. In the end, the four underlying dimensions for Korean firms' strategic agility were defined as technology capability, collaborative innovation, organizational learning, and internal alignment⁶.

4.2. Survey and data collection

The finalized survey instruments from the verbatim transcripts and the extant literature are summarized in [Appendix A](#). Backward translation techniques (translation into Korean first, then back into English) were used to ensure consistency between Korean and English versions of the survey instrument ([Singh, 1995](#)). The

Korean version of questionnaires was pretested by a few member firms of Korea Technology Transfer Center (KTTC) and by a selected group of part-time MBA students (mostly upper or middle level managers) at a leading university in Korea. Descriptive statistics and correlation coefficients of the measurement items are provided in [Appendix B](#).

The online survey was administered through KTTC, a government agency which provides Korean SMEs with financial support and monitors their progress. A total of 566 firms participated in the survey, resulting in an initial response rate of 49.5%. A number of the responses which miss important data such as return on sales (ROS) and return on equity (ROE) were excluded in the analysis. Finally, 244 responses were identified usable, yielding the effective response rate of 21.3%.

Each respondent rated one's perception of the firm's practice and performance on a five-point Likert scale. The only exceptions were financial performance measures—self-reported ratio scales. The use of self-reported financial measures was unavoidable because most SMEs in the sample group are private and hence not obligated to report their financial status publicly. Since this study adopted a single respondent approach, we conducted a *post hoc* test of common method variance, using Harman's single factor test proposed by [Podsakoff et al. \(2003\)](#). We found that common

⁶ We acknowledge the anonymous reviewers and the AE who contributed to refining the names of constructs.

method bias is not of significant concern. We also checked for non-responder bias (Dillman, 2000), using the two key organizational features: total sales volume and number of employees. A total of randomly selected 50 companies from the non-responder group were tested, and no significant difference between the respondents and non-respondents was detected.

Table 2 summarizes the demographics of the sample firms and survey respondents. A majority of the SMEs, registered in the database of KTTC, are tier-one suppliers for large size Korean manufacturing firms. The sample firms had an age of establishment in the range of 3 to 17 years, and most of their sales volumes are in the range of US\$100,000 to 10 million per year. A majority of the sample firms has less than 100 employees (99.2%), and positions of the respondents were diverse from assistant managers to CEOs with the largest proportion by CEOs, comprising about 61%.

4.3. Convergent validity and discriminant validity of measurements

The conventional two-stage approach was adopted for structural equation modeling (Anderson and Gerbing, 1988). The measurement model was created to secure convergent and discriminant validity of the constructs. The finalized measurement model was used in the second stage where the path coefficients of structural models were determined. All scales were standardized, and their directions were adjusted if reverse coded in order to maintain the

unidimensionality of scales in each construct. We tested for the linearity of relationships and the normality of data for all manifest variables (Hair et al., 1995; Jöreskog and Sörbom, 1993). No significant violation of the linearity and normality was detected, but some of data showed a moderate level of kurtosis and skewness. The variance inflation factors (VIFs) for all the latent variables are acceptable, ranging from 1.403 to 1.731. The result indicates that multicollinearity is not significant in the measurement model.

Convergent validity was assessed by investigating factor loadings, Cronbach's alpha, composite reliability, and the average variance extracted from the indicators (Hair et al., 1995). As shown in Table 3, the exploratory principal component analysis with the finalized set of measurement items indicates an appropriate level of factor loadings (0.7 or higher) in each construct, except for ROS (0.523). The values of Cronbach's alpha in Table 3 and composite reliability in Table 4 also indicate the presence of convergent validity overall. The values for financial performance are relatively low as 0.543 and 0.535 respectively, raising a concern. Nonetheless, these values exceeded the minimum value of 0.5 (Hair et al., 1995), so we decided to continue further analyses. The average variances extracted (AVE) for each construct ranged from 0.536 to 0.692, which are above an acceptable level of 0.5 (Fornell and Larcker, 1981), confirming that convergent validity is secured. Discriminant validity was evaluated by comparing the AVE's and the corresponding factor correlations (Fornell and Larcker, 1981). As shown in Table 5, the square root of the AVE for each construct (the diagonal elements in Table 5) is greater than the corresponding inter-construct correlations (factor correlations in the same column or the same row in Table 5). The result indicates that each construct shares a larger variance with its own measures than with those of other constructs, supporting for discriminant validity of the measurement model.

The goodness of fit of the measurement model was evaluated, using various fit indices such as goodness-of-fit index (GFI=0.91), root mean square error of approximation (RMSEA=0.042), normed fit index (NFI=0.93), non-normed fit index (NNFI=0.97), and comparative fit index (CFI=0.98). All fit indices satisfy the recommended cutoff values and demonstrate that the measurement model is reliable and strongly supported by the data collected, meriting further analysis.

Table 6
Testing results of two structural models.

Comparison criteria	Recommended	Customer retention	Financial performance
Absolute fit measures			
Chi-square test statistic (χ^2)		63.74	59.13
Degrees of freedom p -value		32.00	24.00
Goodness-of fit index (GFI)	< 0.05	0.001	0.001
Root mean square error of app.	> 0.90	0.95	0.95
(RMSEA)	< 0.08	0.064	0.078
Incremental fit measures			
Adjusted goodness-of-fit index (AGFI)	> 0.90	0.91	0.90
Normed fit index (NFI)	> 0.90	0.94	0.91
Non-normed fit index (NNFI)	> 0.90	0.96	0.92
Comparative fit index (CFI)	> 0.90	0.97	0.95
Parsimonious fit measure			
Normed chi-square	1.00–3.00	1.99	1.92

5. Analysis and hypothesis test results

The structural equation models were finalized upon the standard maximum likelihood estimates (Jöreskog and Sörbom, 1993).

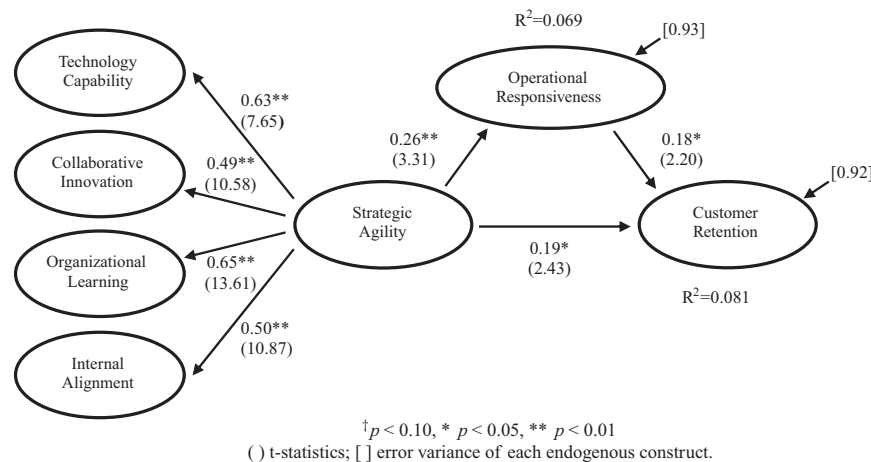


Fig. 2. Structural model for customer retention.

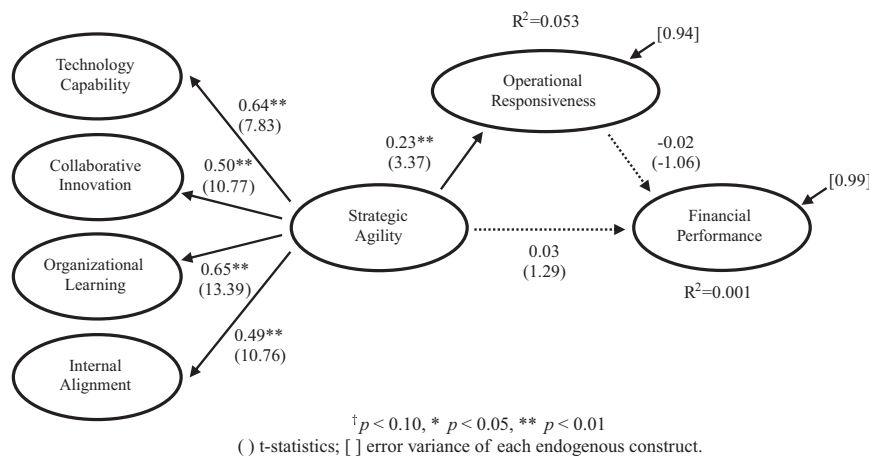


Fig. 3. Structural model for financial performance.

Table 7
Summary of the hypothesis test results.

Model	Hypothesis	Causal path	Path coefficients	t-Value	Hypothesis supported
Customer retention	H1	SA→TC	0.63 ^{**}	7.56	Yes
	H2	SA→CI	0.49 ^{**}	10.58	Yes
	H3	SA→OL	0.65 ^{**}	13.61	Yes
	H4	SA→IA	0.50 ^{**}	10.87	Yes
	H5 _A	SA→CR	0.19 [*]	2.43	Yes
	H6	SA→OR	0.26 ^{**}	3.31	Yes
	H7 _A	OR→CR	0.18 [*]	2.20	Yes
	H8 _A	SA→OR→CR	N/A	N/A	Yes
Financial performance	H1	SA→TC	0.64 ^{**}	7.83	Yes
	H2	SA→CI	0.50 ^{**}	10.77	Yes
	H3	SA→OL	0.65 ^{**}	13.39	Yes
	H4	SA→IA	0.49 ^{**}	10.76	Yes
	H5 _B	SA→FP	0.03	1.29	No
	H6	SA→OR	0.23 ^{**}	3.37	Yes
	H7 _B	OR→FP	-0.02	-1.06	No
	H8 _B	SA→OR→FP	N/A	N/A	No

[†] $p < 0.10$.

SA—Strategic agility; TC—Technology capability; CI—Collaborative innovation; OL—Organizational learning; IA—Internal alignment; CR—Customer retention; OR—Operational responsiveness; FP—Financial performance.

* $p < 0.05$.

** $p < 0.01$.

Table 8
Summary of the MANOVA results.

Dependent variables	Group means		Contrast estimate	Standard error	F stat.
	High	Low			
Operational responsiveness	3.767	3.325	0.505 ^{**}	0.149	11.446
Customer retention	4.442	4.193	0.362 [*]	0.154	5.521
ROS	0.402	0.329	0.088 [†]	0.047	3.571
ROE	0.140	0.052	0.073	0.046	2.555

[†] $p < 0.10$.

* $p < 0.05$.

** $p < 0.01$.

order model (Marsh and Hocevar, 1985), and (4) significance of the structural associations that link measurement models to such criterion variable of interest as *customer retention* or *financial performance* (Venkatraman, 1990).

The proposed second-order factor models in general met the above four criteria. Specifically, the estimated target coefficient values (T) are 0.83 and 0.73 for the customer retention and financial performance models respectively, indicating that the second-order factor (strategic agility) accounts for a large amount of the covariance among the first-order factors. Fit indices of the first-order and the second-order models do not demonstrate significant differences, confirming that the second-order factor does not harm the overall model fit. In addition, structural associations among the factors were found relatively stronger in the second-order model, particularly in association with customer retention. Given these results, the second-order model is preferred for its richness in explanation and consistency to our theory of strategic agility.

5.1. Structural models for customer retention and financial performance

First, the impact of strategic agility is examined on customer retention as a dependent variable. In a recursive structure the second-order construct (strategic agility) was well formed by the statistically significant loadings of its four dimensions, supporting hypotheses H1 through H4. The results imply that Korean SMEs' strategic agility is a factor that influences the firms' meta-

Before finalizing our statistical analysis, we examined whether the proposed second-order model can be justified in comparison with the counterpart first-order model which eliminates the need for the second-order factor. The second-order factor approach is adopted to broaden the theoretical scope of a construct (Gorsuch, 1983), despite the possibility that empirical models with second-order factors may cause higher measurement errors, lower degrees of freedom, and weaken the model fit (Bagozzi and Heatherton, 1994). The test is to technically verify our theoretical proposition that strategic agility (the second-order factor) is a governing factor for its underlying dimensions. Four major criteria were evaluated to compare the first-order and second-order factor models. These are (1) goodness of fit statistics (Grover et al., 2002), (2) significance of the second-order factor loadings (Tippins and Sohi, 2003), (3) target coefficient statistics (T)—the ratio of chi-squares of the first-order model to the more restrictive higher-

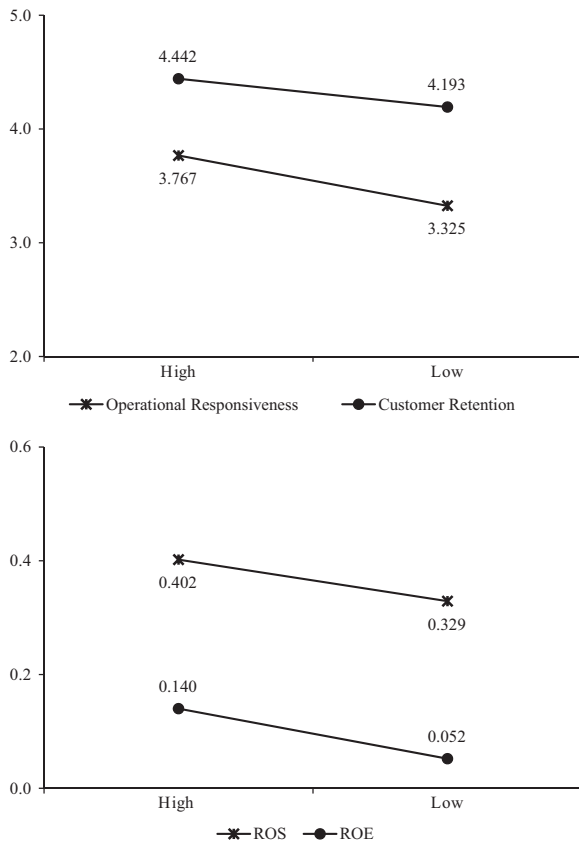


Fig. 4. Comparison between firms with high and low levels of strategic agility.

capabilities called for agile operations. The overall fit statistics for the customer retention model are reported in Table 6, with its path coefficients and error variances depicted in Fig. 2. All the absolute fit measures (GFI=0.95; RMSEA=0.064) and the incremental fit measures (AGFI=0.91; NFI=0.94; NNFI=0.96; CFI=0.97) meet the suggested cutoff criteria (Browne and Cudeck, 1993). Also, the parsimonious fit (normed chi-square=1.99) appears to represent an acceptable model fit (Segars and Grover, 1998).

The hypothetical relations among strategic agility, operational responsiveness and customer retention are all supported by the three significant path coefficients given in Fig. 2. Specifically, strategic agility demonstrates a significantly positive association with both customer retention ($\beta=0.19$, $p < 0.05$) and operational responsiveness ($\beta=0.26$, $p < 0.01$), supporting hypotheses H5A and H6, respectively. Operational responsiveness also has a significantly positive influence on customer retention ($\beta=0.18$, $p < 0.05$), supporting hypothesis H7A. Thus, we conducted a four-step mediation analysis (Baron and Kenny, 1986). The correlation coefficients from the analysis indicate that the effect of strategic agility on customer retention is clearly mediated by operational responsiveness, supporting hypothesis H8A. The direct effect of strategic agility on customer retention ($\beta=0.535$, $p < 0.01$) is greater than the effect of strategic agility ($\beta=0.510$, $p < 0.01$) obtained by controlling for operational responsiveness, showing a sign of mediation.

The effect size (R^2) for operational responsiveness and customer retention indicates respectively that 6.9% of the variance in operational responsiveness is explained by strategic agility and that 8.1% of the variance in customer retention is accounted for by the combined effect of strategic agility and operational responsiveness.

Overall, the customer retention model is a statistically sound model in the sense of confirmatory analysis (Bollen and Long, 1993; Hair et al., 1995; Hoyle, 1995). The result confirms that the four underlying dimensions of strategic agility are the meaningful indicators of strategic agility, helping improve operational responsiveness and customer retention.

Second, the impact of strategic agility is examined on financial performance as a dependent variable, considering the mediation effect of operational responsiveness. The fit statistics are reported in Table 6, with the path coefficients and error variances illustrated in Fig. 3. The absolute fit measures (GFI=0.95; RMSEA=0.078), the incremental fit measures (AGFI=0.90; NFI=0.91; NNFI=0.92; CFI=0.95), and the parsimonious fit measure (normed chi-square=1.92) represent an acceptable model fit.

As illustrated in Fig. 3, strategic agility is properly loaded by its four dimensions, supporting hypotheses H1 through H4. Also, strategic agility has a significantly positive impact on operational responsiveness ($\beta=0.23$, $p < 0.01$), supporting hypothesis H6. However, neither the direct effect of strategic agility nor the mediation effect of operational responsiveness on financial performance is found significant, not supporting hypotheses H5B and H7B. Despite the positive effect of strategic agility on operational responsiveness, the financial performance model could not be accepted in the convention of confirmatory analysis, and thus no mediation test was conducted accordingly. Table 7 summarizes the hypothesis test results based on the reported path coefficients (β) for both customer retention and financial performance models.

5.2. Performance comparison of firms with high and low strategic agility: Post hoc analysis

A set of supplementary analysis was conducted not only to validate the results from the two structural equation models, but also to generate additional insights. First, the degree of strategic agility was divided into three groups based on their factor score values (Lastovicka and Thamodaram, 1991), i.e., firms with low ($n=81$), middle ($n=80$), and high ($n=83$) levels of strategic agility. Second, the firms in the middle group were removed from the analysis to highlight the differences between the firms that demonstrated a high level of strategic agility and those with a low level of strategic agility. Finally, the firms with high and low levels of strategic agility were compared in terms of operational responsiveness, customer retention, ROS, and ROE, using MANOVA.

MANOVA results are summarized in Table 8, and Fig. 4 graphically represents between-group monotonic comparisons for the four dependent variables used in the MANOVA. As indicated, the group of firms with a higher level of strategic agility demonstrates better performance than that with a lower level of strategic agility in all performance measures. The result is statistically significant for operational responsiveness ($F=11.446$, $p < 0.01$), customer retention ($F=5.521$, $p < 0.05$), and ROS ($F=3.571$, $p < 0.10$), but not for ROE ($F=2.555$, $p > 0.10$). These results provide additional support for the results obtained from the SEM analysis. Moreover, the *post hoc* analysis reveals an interesting fact that the firms with a higher level of strategic agility demonstrate a higher level of ROS, partially implying that strategic agility may help firms improve profitability.

6. Discussion and managerial implications

6.1. Strategic agility and its underlying dimensions

A number of studies empirically investigated agility as a generic capability. In contrast, many conceptual and case studies on agility suggest that agility is not a simple capability, but rather an

integrated system of multi-faceted capabilities. Based upon the conceptual development, we proposed a second-order structural equation model to prove that strategic agility can be considered a strategic paradigm. To the best of our knowledge, the present study is the first to empirically show that strategic agility is recursive and reflective on multi-faceted capabilities: technology capability, collaborative innovation, organizational learning, and internal alignment. The four capability dimensions are not only grounded in managerial practices of Korean SMEs, but also unique in comparison with the scales and constructs utilized in the existing studies (see Table 1).

The capability dimensions were initially identified from the field interviews with Korean professionals, and their logical connections to strategic agility were supported by literature review. In this context, our grounded approach to define the nature of Korean manufacturing with strategic agility – a multi-dimensional strategic intent – has contributed to extending the scope of agility and may play a role of steppingstone for future research. The result manifests that the Korean SMEs' strategic agility, influenced by the country's cultural heritage is indeed a driver for their operational responsiveness and firm performance.

6.2. Strategic agility, operational responsiveness, and customer retention

Establishing the empirical association between operational performance and firm performance is an important research domain in OM. In our triad model of strategic agility, operational performance (operational responsiveness) and firm performance (customer retention), the effect of strategic agility was found to be not only direct on customer retention, but also mediated through the enhanced operational responsiveness. Specifically, the result implies that strategic agility coupled with the enhanced operational responsiveness has been one of the driving forces for Korean SMEs to uphold their relationship with business customers, primarily large Korean conglomerates that compete globally (Kirk, 2001).

From a theoretical standpoint, the result provides a clear support to the mediation perspective in strategy research that accentuates the efficacy of firms' operations as a mediator (Venkatraman, 1989; McWilliams and Smart, 1993; Mankins and Steele, 2005). The improved operational responsiveness synergizes the positive influence of strategic agility on customer retention. The result is also consistent with the recent theoretical development that has endeavored to avoid an early tautological problem in explaining the linkage between dynamic capability and firm performance (Helfat and Peteraf, 2003; Cepeda and Vera, 2007). According to the perspective, operational effectiveness (how the firm earns its living) is a mediator embedded in the operational functions which can be distinguished from dynamic capabilities as a strategic conduct (how the firm can change its operational routines).

6.3. Customer retention vs. financial performance

The investigation of Korean SMEs has led to a mixed result between customer retention and financial performance models. There are plausible explanations for the contrasting results. One possibility is the scaling difference that might have altered the outcome of the two structural models. That is, all the indicators for the latent constructs including customer retention were measured as Likert scales except for the financial performance indicators (self-reported ratio scales). However, the result does not necessarily mean that our financial performance measures are unreliable. Our ROS and ROE correlate positively with firms' sales and exports and negatively with R&D expenditure and percentage of defective items. In addition, the *post hoc* analysis reveals that Korean SMEs with a higher level of strategic agility tend to achieve a higher level of ROS.

A more plausible explanation is related to the uniqueness of our sample group. Because the sample firms are SMEs that are mainly suppliers for large size Korean conglomerates, strategic agility and operational responsiveness may have been more important to retain customers than to improve short-term financial performance. Under the export-drive policy of Korea, the Korean conglomerates such as Samsung and Hyundai have become powerful economic entities with multinational presence. Since most Korean SMEs maintain their business under the umbrella of Korean conglomerates, significant power asymmetry exists between conglomerates and SMEs. Therefore, competent Korean SMEs might have chosen to become agile suppliers in order to fulfill the needs of powerful customers and that these agile suppliers in turn gained a larger amount of orders from their customers, showing better ROS as indicated by the *post hoc* analysis. In Japanese buyer–supplier relationships which tend to be long term and have been benchmarked by many Korean firms, it is imperative for the suppliers to meet target costs and quality specifications suggested by the customer. Meeting industrial customers' requirements and maintaining long-term relationships with them may not return immediate financial benefits, but may guarantee economies of scale, business longevity, capability-based single-sourcing opportunities and stability for the suppliers (Hahn et al., 1986; Shin et al., 2000; Anderson and Narus, 2003; Chen and Paulraj, 2004; Liker and Choi, 2004). The findings from this study demonstrate that the Korean SMEs' strategic agility and operational responsiveness to what customers value may have helped them retain their large size business customers.

6.4. Theoretical contribution, limitations, and future research directions

To our best knowledge, the present study is the first attempt to define agility using both qualitative and statistical approaches and to identify the theoretical underpinnings of the Korean manufacturing practice. From the voice of Korean professionals, we were able to amalgamate specific capability dimensions and tested them with parametric analysis. Specifically, Korean firms' strategic agility is found a second-order latent factor which must be leveraged by the firms' technology capability, collaborative innovation, organizational learning, and internal alignment. In fact, the Korean firms and their OM practices have been remote from attention under the shadow of Japanese manufacturing firms although many of them have grown as global players. Recently, a group of scholars and practitioners have recognized the notable differences in Korean firms' management style and operations from others, particularly with respect to agility.

The present study makes an important theoretical contribution to the domain of cross-cultural research and proposes guiding directions for future studies. According to the tenet of the institutional theory, certain management principles and practices can transcend beyond organizational, cultural and national boundaries (DiMaggio and Powell, 1983). The traditional view of the institutional theory has led to the idea of isomorphism that firms may benchmark superior organizations' established norms, structure, and infrastructure to improve their organizational legitimacy and performance. In this context, the potential of strategic agility as generic and universal construct may be tested across national and cultural boundaries to strengthen or challenge our findings from Korean SMEs.

There are also some limitations in the present study which can provide a guideline for future research. First, we analyzed the data collected only from the Korean SMEs, and capability dimensions of strategic agility were identified from the interviews with Korean professionals. Thus, future research may verify the findings of this study by investigating the firms in different size and nations. Second, we employed a cross-sectional survey method, so we could

not investigate the longitudinal effect of strategic agility. If one can monitor financial performance at different stages of strategic agility implementation, it is likely to detect the potential lagged effect of strategic agility on financial performance. Finally, although we proposed a recursive association between strategic agility and its four dimensions, we admit that the reciprocity of influences may exist between strategic agility and its dimensions, following the principle of falsifiability. Any empirical attempt to duplicate the present study may enrich the generality of our findings.

7. Conclusion

As an attempt to offer a new strategic and operational perspective on agility-driven Korean manufacturing practices, this study examined what underlying factors constitute strategic agility of Korean SMEs and how this construct influences operational and firm performance. To address these research questions, we conducted extensive interviews with Korean professionals, given that the nature and construct of strategic agility have been less explored in the prior research. Four latent factors (technology capability, collaborative innovation, organizational learning, and internal alignment) emerged as the dimensions of strategic agility. We established logical and theoretical ties between strategic agility and its four dimensions through an extensive review of the literature in various disciplines. Then, we hypothesized the causal relations among strategic agility, operational responsiveness, and firm performance (customer retention and financial performance).

Within the convention of structural equation modeling, we empirically tested the proposed structural models for the Korean SMEs, one of the best sample groups for this research, given that they are the cornerstone of the Korean manufacturing economy under the agile nature of business. The four dimensions were properly loaded as the indicators for the second-order construct, strategic agility, in a recursive and reflective manner. The confirmatory analysis results provided important managerial implications from the empirical associations discovered among strategic agility, operational responsiveness, and firm performance. Strategic agility showed not only the direct effect but also the stronger indirect (mediation) effect through operational responsiveness on customer retention. In contrast, strategic agility did not influence financial performance either directly or indirectly through operational responsiveness, warranting new directions for future research.

Acknowledgments

This work was supported by KUBS Faculty Research Grant.

Appendix A

See [Table A1](#).

Table A1
Survey instrument.

Construct		Item	Question	Literature base
Strategic agility	Technology capability	TC1	Our firm adopts technology-driven production systems such as Just-in-time	Choi and Hartley (1996) Lee et al. (2001) Sambamurthy et al. (2003) Liker and Choi (2004) Choi and Krause (2006) Burgess (1994) Ahuja (2000) Liker and Choi (2004) Narasimhan et al. (2006) Swafford et al. (2006a) Inman et al. (2011) Senge (1990) Alvesson (1995) Gold et al. (2001) Fugate et al. (2008) Braunscheidel and Suresh (2009) Boyer and McDermott (1999) Pett and Wolff (2007) Robinson and Stern (1998) Zahra and George (1999) Gerwin (1993) Goodman et al. (1995) Choi and Krause (2006) Swafford et al. (2006a, 2006b) Braunscheidel and Suresh (2009) Goodman et al. (1995) Anderson and Narus (2003) Choi and Krause (2006) Inman et al. (2011) Chen and Paulraj (2004) Capon et al. (1990)
		TC2	Our firm adopts advanced production techniques such as value analysis, concurrent engineering, and modular design systems	
		TC3	Our firm invests in upgrading production, information, and inventory management systems	
	Collaborative innovation	CI1	Our firm upgrades process/product design by investigating customer needs in the product development process	
		CI2	Our firm promotes collaboration among major functions from the planning stage	
		CI3	Our firm collaborates with customers for process development and improvement	
	Organizational learning	OL1	Our firm provides an optimal working environment in which best performance practices can be disseminated	
		OL2	Our firm promotes interdisciplinary training and team-based activities	
		OL3	Our firm empowers employees for individual learning to manage customer contact services effectively	
	Internal alignment	OL4	Our firm promotes individual and organizational learning for business environment adaptation	
		IA1	Our firm aligns functional strategies with business strategy well	
		IA2	Our firm aligns operations strategy with other functional strategies well	
		IA3	Our firm aligns its goals and objective measures with strategic task performance well	
Operational responsiveness	OR1	Our firm has been highly flexible in product mix or variety		
	OR2	Our firm has maintained short cycles in product design and innovation		
	OR3	Our firm has been responsive to external market requirements and environmental regulations		
Firm performance	Customer retention	CR1	Our customer defection rate is low	
		CR2	Our customer retention rate is high	
		CR3	Our customer acquisition rate is high	
	Financial performance	FP1	Return on sales (ROS)	
		FP2	Return on equity (ROE)	

Appendix B

See Table B1.

Table B1
Correlation matrix for the measurement items.

Item	Mean (s.d.)	TC1	TC2	TC3	CI1	CI2	CI3	OL1	OL2	OL3	OL4	IA1	IA2	IA3	OR1	OR2	OR3	CR1	CR2	CR3	FP1	FP2
TC1	3.61 (1.468)	1.000																				
TC2	3.65 (1.518)	0.588**	1.000																			
TC3	3.66 (1.350)	0.590**	0.593**	1.000																		
CI1	4.37 (0.878)	0.366**	0.268**	0.244**	1.000																	
CI2	4.23 (0.824)	0.318**	0.277**	0.259**	0.381**	1.000																
CI3	4.05 (1.007)	0.398**	0.295**	0.377**	0.381**	0.659**	1.000															
OL1	3.86 (0.830)	0.148*	0.180**	0.354**	0.260**	0.384**	0.300**	1.000														
OL2	3.80 (0.928)	0.266**	0.251**	0.368**	0.287**	0.459**	0.408**	0.610**	1.000													
OL3	4.02 (0.829)	0.247**	0.271**	0.278**	0.319**	0.469**	0.383**	0.495**	0.567**	1.000												
OL4	3.89 (0.863)	0.267**	0.230**	0.337**	0.250**	0.408**	0.443**	0.484**	0.634**	0.510**	1.000											
IA1	3.86 (0.915)	0.192**	0.160*	0.228**	0.277**	0.321**	0.312**	0.473**	0.491**	0.378**	0.418**	1.000										
IA2	3.81 (0.887)	0.228**	0.233**	0.299**	0.316**	0.380**	0.329**	0.495**	0.431**	0.466**	0.850**	1.000										
IA3	3.80 (0.953)	0.213**	0.234**	0.257**	0.140*	0.304**	0.191**	0.423**	0.449**	0.375**	0.398**	0.573**	0.545**	1.000								
OR1	3.51 (1.174)	0.278**	0.284**	0.190**	0.262**	0.269**	0.221**	0.095	−0.007	0.108	0.075	0.140*	0.140*	0.124	1.000							
OR2	3.61 (1.062)	0.366**	0.322**	0.333**	0.287**	0.282**	0.301**	0.166**	0.124	0.126*	0.198**	0.206**	0.240**	0.155*	0.614**	1.000						
OR3	3.66 (1.048)	0.144*	0.173**	0.094	0.201**	0.243**	0.212**	0.201**	0.090	0.188**	0.134*	0.118	0.179**	0.126*	0.497**	0.593**	1.000					
CR1	4.37 (0.777)	0.202**	0.198**	0.086	0.283**	0.349**	0.332**	0.278**	0.377**	0.384**	0.443**	0.376**	0.443**	0.304**	0.108	0.211**	0.231**	1.000				
CR2	4.42 (0.730)	0.179**	0.171**	0.113	0.218**	0.332**	0.356**	0.239**	0.343**	0.401**	0.332**	0.396**	0.383**	0.332**	0.114	0.187**	0.235**	0.663**	1.000			
CR3	4.14 (0.859)	0.288**	0.189**	0.176**	0.240**	0.332**	0.320**	0.333**	0.366**	0.418**	0.449**	0.418**	0.449**	0.371**	0.076	0.146*	0.213**	0.687**	0.570**	1.000		
FP1	0.58 (0.068)	−0.005	−0.040	−0.068	−0.009	0.033	0.020	−0.056	−0.018	−0.028	−0.009	−0.050	−0.025	−0.048	0.022	0.041	0.053	0.101	0.139*	0.075	1.000	
FP2	0.26 (0.058)	0.026	0.044	0.041	−0.081	−0.041	0.070	0.002	0.025	−0.045	0.094	−0.042	−0.042	−0.055	−0.027	−0.010	−0.060	−0.040	−0.004	0.011	0.167**	1.000

† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

References

- Ahuja, G., 2000. Collaboration networks, structural holes, and innovation: a longitudinal study. *Adm. Sci. Q.* 45 (3), 425–455.
- Alvesson, M., 1995. *Management of Knowledge-Intensive Firms*. Walter De Gruyter, Berlin.
- Anderson, J.C., Gerbing, D.W., 1988. Structural equation modeling in practice: a review and recommended two-step approach. *Psychol. Bull.* 103 (3), 411–423.
- Anderson, J.C., Narus, J., 2003. Selectively pursuing more of your buying firm's business. *Sloan Manage. Rev.* Spring, 42–49.
- Bae, J., 1997. Beyond seniority-based systems: a paradigm shift in Korean HRM? *Asia Pac. Bus. Rev.* 3 (4), 82–110.
- Bae, J., Lawler, J.J., 2000. Organizational and HRM strategies in Korea: impact on firm performance in an emerging economy. *Acad. Manage. J.* 43 (3), 502–517.
- Bagozzi, R.P., Heatherton, T.F., 1994. A general approach to representing multi-faceted personality constructs: application to state self-esteem. *Struct. Equ. Model.* 1 (1), 35–67.
- Barney, J., 1991. Firm resources and sustained competitive advantage. *J. Manage.* 17 (1), 99–120.
- Baron, R.M., Kenny, D.A., 1986. The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J. Pers. Soc. Psychol.* 51, 1173–1182.
- Blasi, A.D., Puig, F.V., 2002. Conditions for successful automation in industrial applications: a point of view. In: *IFAC 15th Triennial World Congress Proceedings 15 (1)*, Online Publication.
- Bollen, K.A., Long, J.S., 1993. *Testing Structural Equation Models*. Sage Publications, Thousand Oaks, CA.
- Boyer, K.K., McDermott, C., 1999. Strategic consensus in operations strategy. *J. Oper. Manage.* 17 (3), 289–305.
- Brannen, M.Y., Doz, Y.L., 2012. Corporate languages and strategic agility: trapped in your jargon or lost in translation? *Calif. Manage. Rev.* 54 (3), 77–97.
- Braunscheidel, M.J., Suresh, N.C., 2009. The organizational antecedents of a firm's supply chain agility for risk mitigation and response. *J. Oper. Manage.* 27 (2), 119–140.
- Browne, M.W., Cudeck, R., 1993. Alternative ways of assessing model fit. In: Bollen, K.A., Long, J.S. (Eds.), *Testing Structural Equation Models*. Sage Publications, Thousand Oaks, CA, pp. 136–162.
- Burgess, T.F., 1994. Making the leap to agility: defining and achieving agile manufacturing through business process redesign and business network design. *Int. J. Oper. Prod. Manage.* 14 (11), 23–34.
- Byrne, B.M., 1995. One application of structural equation modeling from two perspectives: exploring the EQS and LISREL strategies. In: Hoyle, R.H. (Ed.), *Structural Equation Modeling: Concepts, Issues, and Applications*. Sage Publications, Thousand Oaks, CA, pp. 138–157.
- Cao, Q., Dowlatabadi, S., 2005. The impact of alignment between virtual enterprise and information technology on business performance in an agile manufacturing environment. *J. Oper. Manage.* 23 (5), 531–550.
- Capon, N., Farley, J.U., Hoening, S., 1990. Determinants of financial performance: a meta analysis. *Manage. Sci.* 36 (10), 1143–1159.
- Cepeda, G., Vera, D., 2007. Dynamic capabilities and operational capabilities: a knowledge management perspective. *J. Bus. Res.* 60 (5), 426–437.
- Charles, A., Laurus, M., Van Wassenhove, L., 2010. A model to define and assess the agility of supply chains: building on humanitarian experience. *Int. J. Phys. Distrib. Logist. Manage.* 40 (8/9), 711–741.
- Chen, I.J., Paulraj, A., 2004. Towards a theory of supply chain management: the constructs and measurements. *J. Oper. Manage.* 22 (2), 119–150.
- Chen, M.J., Hambrick, D.C., 1995. Speed, stealth, and selective attack: how small firms differ from large firms in competitive behavior. *Acad. Manage. J.* 38 (2), 453–482.
- Chen, W.H., Chiang, A.H., 2011. Network agility as a trigger for enhancing firm performance: a case study of a high-tech firm implementing the mixed channel strategy. *Ind. Mark. Manage.* 40 (4), 643–651.
- Chiang, C.Y., Kocabasoglu-Hillmer, C., Suresh, N., 2012. An empirical investigation of the impact of strategic sourcing and flexibility on firm's supply chain agility. *Int. J. Oper. Prod. Manage.* 32 (1), 49–78.
- Choi, T.Y., Hartley, J.L., 1996. An exploration of supplier selection practices across the supply chain. *J. Oper. Manage.* 14 (4), 333–343.
- Choi, T.Y., Krause, D.R., 2006. The supply base and its complexity: implications for transaction costs, risks, responsiveness, and innovation. *J. Oper. Manage.* 24 (5), 637–652.
- Daft, R.L., 1978. A dual-core model of organizational innovation. *Acad. Manage. J.* 21 (2), 193–210.
- Dillman, D.A., 2000. *Mail and Internet Surveys: the Tailored Design Method*. John Wiley & Sons, New York, NY.
- DiMaggio, P.J., Powell, W., 1983. The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. *Am. Sociol. Rev.* 48 (2), 147–160.
- Doz, Y.L., Kosonen, M., 2008. The dynamics of strategic agility: Nokia's rollercoaster experience. *Calif. Manage. Rev.* 50 (3), 95–118.
- Dyer, L., Shafer, R.A., 1998. From human resource strategy to organizational effectiveness: lessons from research on organizational agility. In: *CAHRS Working Paper Series*, 6 (2).
- Edmondson, A., 1999. Psychological safety and learning behavior in work teams. *Adm. Sci. Q.* 44 (2), 350–382–3.
- Edwards, C., Lowry, T., Moon, I., Hall, K., 2005. The lessons for Sony at Samsung. *Bus. Week October 10, 35*.

- Feigenbaum, A., Karnani, A., 1991. Output flexibility—a competitive advantage for small firms. *Strateg. Manage. J.* 12 (2), 101–114.
- Fornell, C., Larcker, D.F., 1981. Structural equation models with unobservable variables and measurement errors. *J. Mark. Res.* 18 (2), 39–50.
- Fugate, B.S., Stank, T.P., Mentzer, J.T., 2008. Linking improved knowledge management to operational and organizational performance. *J. Oper. Manage.* 27 (3), 247–264.
- Gerwin, D., 1993. Manufacturing flexibility: a strategic perspective. *Manage. Sci.* 39 (4), 395–410.
- Gligor, D.M., Holcomb, M.C., 2010. Understanding the role of logistics capabilities in achieving supply chain agility: a systematic literature review. *An International Journal. Supply Chain Manage.* 17 (4), 438–453.
- Gold, A.H., Malhotra, A., Segars, A.H., 2001. Knowledge management: an organizational perspective. *J. Manage. Inf. Syst.* 18 (1), 185–214.
- Goodman, P., Fichman, M., Lerch, F., Snyder, P., 1995. Customer-firm relationships, involvement, and customer satisfaction. *Acad. Manage. J.* 38 (5), 1310–1324.
- Gorsuch, R.L., 1983. *Factor Analysis*, second ed. Lawrence Erlbaum Associates, New Jersey.
- Grover, V., Teng, J., Fiedler, K., 2002. Investigating the role of information technology in building buyer-supplier relationships. *J. Assoc. Inf. Syst.* 3, 217–245.
- Hahn, C.K., Kim, K.H., Kim, J.S., 1986. Costs of competition: implications for purchasing strategy. *J. Purch. Mater. Manage.* 22 (3), 2–7.
- Hair, J.F., Anderson, R.E., Tatham, R.L., Black, W.C., 1995. *Multivariate Data Analysis with Readings*, fourth ed. Prentice Hall, New Jersey.
- Hambrick, D.C., MacMillan, I.C., Day, D.L., 1982. Strategic attributes and performance in the BCG matrix: a CIMS-based analysis of industrial product businesses. *Acad. Manage. J.* 25, 510–531.
- Helfat, C.E., Peteraf, M.A., 2003. The dynamic resource-based view: capability lifecycles. *Strateg. Manage. J.* 14, 607–618.
- Hitt, M.A., Hoskisson, R.E., Harrison, J.S., 1991. Strategic competitiveness in the 1990s: challenges and opportunities for U.S. executives. *Acad. Manage. Exec.* 5 (2), 7–22.
- Holstein, W.J., Nakarmi, L., 1995. Korea. *Business Week* July 31, Cover Story (Online Version).
- Hoyle, R.H., 1995. *Structural Equation Modeling: Concepts, Issues, and Applications*. Sage Publications, Thousand Oaks, CA.
- Inman, R.A., Sale, R.S., Green Jr., K.W., Whitten, D., 2011. Agile manufacturing: relation to JIT, operational performance and firm performance. *J. Oper. Manage.* 29 (4), 343–355.
- Jacobs, M., Droge, C., Vickery, S.K., Calantone, R., 2011. Product and process modularity's effects on manufacturing agility and firm growth performance. *J. Prod. Innov. Manage.* 28 (1), 123–137.
- Jöreskog, K.G., Sörbom, D., 1993. *LISREL 8 User's Reference Guide*. Scientific Software, Chicago, IL.
- Kim, L., 1998. Crisis construction and organizational learning: capability building in catching-up at Hyundai Motor. *Organ. Sci.* 9 (4), 506–521.
- Kirk, D., 2001. Technology; in Korea, Broadband is Part of the Culture. *The New York Times*, October 29 (online version).
- Lastovicka, J.L., Thamodaram, K., 1991. Common factor score estimates in multiple regression problems. *J. Mark. Res.* 28 (1), 105–112.
- Lau, T.Y., Kim, S.W., Atkin, D., 2005. An examination of factors contributing to South Korea's global leadership in broadband adoption. *Telemat. Inf.* 22 (4), 349–359.
- Lee, C., Lee, K., Pennings, J.M., 2001. Internal capabilities, external networks, and performance: a study on technology-based ventures. *Strateg. Manage. J.* 22 (6), 615–640.
- Lee, H.L., 2004. The triple-A supply chain. *Harv. Bus. Rev.*, 2–11, October.
- Lee, J.Y., Swink, M., Pandepong, T., 2010. The roles of worker expertise, information sharing quality, and psychological safety in manufacturing process innovation: an intellectual capital perspective. *Prod. Oper. Manage.* 20 (4), 556–570.
- LeBreton, J.M., Wu, J., Bing, M.N., 2008. The truth(s) on testing for mediation in the social and organizational sciences. In: Lance, C.E., Vandenberg, R.J. (Eds.), *In: Statistical and Methodological Myths and Urban Legends: Doctrine, Verity, and Fable in the Organizational and Social Sciences*. Routledge, New York, NY, pp. 107–141.
- Li, X., Chung, C., Goldsby, T.J., Clyde, W.H., 2008. A unified model of supply chain agility: the work design perspective. *Int. J. Logist. Manage.* 19 (3), 408–435.
- Liker, J.K., Choi, T.Y., 2004. Building deep supplier relationships. *Harv. Bus. Rev.* 82 (12), 104–113.
- Lu, Y., Ramamurthy, K., 2011. Understanding the link between information technology capability and organizational agility: an empirical examination. *MIS Q.* 35 (4), 931–954.
- Luo, Y., Park, S.H., 2001. Strategic alignment and performance of market-seeking MNCs in China. *Strateg. Manage. J.* 22 (2), 141–155.
- Mankins, M.C., Steele, R., 2005. Turning great strategy into great performance. *Harv. Bus. Rev.* 83 (7/8), 64–72.
- March, J.G., 1991. Exploration and exploitation in organizational learning. *Organ. Sci.* 2 (1), 71–87.
- Marsh, H.W., Hocevar, D., 1985. Application of confirmatory factor analysis to the study of self-concept: first- and higher order factor models and their invariance across groups. *Psychol. Bull.* 97, 562–582.
- Mathews, J.A., Cho, D.S., 1999. Combinative capabilities and organizational learning in latecomer firms: the case of the Korean semiconductor industry. *J. World Bus.* 34 (2), 139–156.
- McWilliams, A., Smart, D.L., 1993. Efficiency v. structure-conduct-performance: implications for strategy research and practice. *J. Manage.* 19 (1), 63–78.
- Morrison, A.J., Roth, K., 1992. A taxonomy of business-level strategies in global industries. *Strateg. Manage. J.* 13 (6), 399–417.
- Nadler, D., Tushman, M., 1983. A general diagnostic model for organizational behavior: applying a congruence perspective. In: Hackman, J.R., Lawler, E.E., Porter, L.W. (Eds.), *In: Perspectives on Behavior in Organizations*. McGraw-Hill, New York, NY.
- Narasimhan, R., Swink, M., Kim, S.W., 2006. Disentangling leanness and agility: an empirical investigation. *J. Oper. Manage.* 24 (5), 440–457.
- Overby, E., Bharadwaj, A., Sambamurthy, V., 2006. Enterprise agility and the enabling role of information technology. *Eur. J. Inf. Syst.* 15 (2), 120–131.
- Pett, T.L., Wolff, J.A., 2007. SME performance: a case for internal consistency. *J. Small Bus. Strategy* 18 (1), 1–16.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y., Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J. Appl. Psychol.* 88 (5), 879–903.
- Purvis, L., Gosling, J., Naim, M.M., 2014. The development of a lean, agile and leagile supply network taxonomy based on differing types of flexibility. *Int. J. Prod. Econ.* 151, 100–111.
- Ramasesh, R., Kulkarni, S., Jayakumar, M., 2001. Agility in manufacturing systems: an exploratory modeling framework and simulation. *Integr. Manuf. Syst.* 12 (7), 534–548.
- Ranft, A.L., Lord, M.D., 2002. Acquiring new technologies and capabilities: a grounded model of acquisition implementation. *Organ. Sci.* 13 (4), 420–441.
- Roberts, N., Grover, V., 2012. Investigating firm's customer agility and firm performance: the importance of aligning sense and respond capabilities. *J. Bus. Res.* 65 (5), 579–585.
- Robinson, A.G., Stern, S., 1998. *Corporate Creativity: How Innovation and Improvement Actually Happen*. Berrett-Koehler Publishers, San Francisco, CA.
- Roth, A., 1996. Achieving strategic agility through economies of knowledge. *Strategy Leadersh.* 24 (2), 30–37.
- Sambamurthy, V., Bharadwaj, A., Grover, V., 2003. Shaping agility through digital options: reconceptualizing the role of information technology in contemporary firms. *MIS Q.* 27 (2), 237–263.
- Sanchez, L.M., Nagi, R., 2001. A review of agile manufacturing systems. *Int. J. Prod. Res.* 39 (16), 3561–3600.
- Segars, A.H., Grover, V., 1998. Strategic information systems planning success: an investigation of the construct and its measurement. *MIS Q.* 22 (2), 139–163.
- Senge, P.M., 1990. The leader's new work: building learning organizations. *Sloan Manage. Rev.* 32 (1), 7–23.
- Scherer, F.M., Ross, D., 1990. *Industrial Market Structure and Economic Performance*, third ed. Houghton Mifflin, Boston.
- Sharifi, H., Zhang, Z., 1999. A methodology for achieving agility in manufacturing organisations: an introduction. *Int. J. Prod. Econ.* 62 (1), 7–22.
- Shin, H., Collier, D.A., Wilson, D.D., 2000. Supply management orientation and supplier/buyer performance. *J. Oper. Manage.* 18 (3), 317–333.
- Shah, R., Shin, H., 2007. Relationships among information technology, inventory, and profitability: an investigation of level invariance using sector level data. *J. Oper. Manage.* 25 (4), 768–784.
- Singh, J., 1995. Measurement issues in cross-national research. *J. Int. Bus. Stud.* 26 (3), 597–619.
- Strauss, A.L., Corbin, J., 1998. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, second ed. Sage Publications, Thousand Oaks, CA.
- Swafford, P.M., Ghosh, S., Murthy, N., 2006a. A framework for assessing value chain agility. *Int. J. Oper. Prod. Manage.* 26 (2), 118–140.
- Swafford, P.M., Ghosh, S., Murthy, N., 2006b. The antecedents of supply chain agility of a firm: scale development and model testing. *J. Oper. Manage.* 24 (2), 170–188.
- Tallon, P.P., Pinsonneault, A., 2001. Competing perspectives on the link between strategic information technology alignment and organizational agility: insights from a mediation model. *MIS Q.* 35 (2), 463–486.
- Teece, D.J., Pisano, G., Shuen, A., 1997. Dynamic capabilities and strategic management. *Strateg. Manage. J.* 18 (7), 509–533.
- Tippins, M.J., Sohi, R.S., 2003. IT competency and firm performance: is organizational learning a missing link? *Strateg. Manage. J.* 24 (8), 745–761.
- van Hoek, R.I., Harrison, A., Christopher, M., 2001. Measuring agile capabilities in the supply chain. *Int. J. Oper. Prod. Manage.* 21 (1/2), 126–147.
- Venkatraman, N., 1989. The concept of fit in strategy research: toward verbal and statistical correspondence. *Acad. Manage. Rev.* 14 (3), 423–444.
- Venkatraman, N., 1990. Performance implications of strategic co-alignment: a methodological perspective. *J. Manage. Stud.* 27 (1), 19–41.
- Venkatraman, N., Prescott, J.E., 1990. Environment-strategy coalignment: an empirical test of its performance implications. *Strateg. Manage. J.* 11 (1), 1–23.
- Vickery, S.K., Droge, C., Setia, P., Sambamurthy, V., 2010. Supply chain information technologies and organizational initiatives: complementary versus independent effects on agility and firm performance. *Int. J. Prod. Res.* 48 (23), 7025–7042.
- Wade, M., Hulland, J., 2004. The resource-based view and information systems research: review, extension, and suggestions for future research. *MIS Quarterly* 28 (1), 107–142.
- Whitten, G.D., Green Jr., K.W., Zelbst, P.J., 2012. Triple-A supply chain performance. *Int. J. Oper. Prod. Manage.* 32 (1), 28–48.
- White, A., Daniel, E.M., Mohdazain, M., 2005. The role of emergent information technologies and systems in enabling supply chain agility. *Int. J. Inf. Manage.* 25 (5), 396–410.

- Yang, J., 2014. Supply chain agility: securing performance for Chinese manufacturers. *Int. J. Prod. Econ.* 150, 104–113.
- Yusuf, Y.Y., Gunasekaran, A., Musa, A., Dauda, M., El-Berishy, N.M., Cang, S., 2014. A relational study of supply chain agility, competitiveness and business performance in the oil and gas industry. *Int. J. Prod. Econ.* 147, 531–543.
- Yusuf, Y.Y., Sarhadi, M., Gunasekaran, A., 1999. Agile manufacturing: the drivers, concepts and attributes. *Int. J. Prod. Econ.* 62 (1–2), 33–43.
- Zaheer, A., Zaheer, S., 1997. Catching the waves: alertness, responsiveness and market influence in global electronic networks. *Manage. Sci.* 43 (11), 1493–1509.
- Zahra, S.A., George, G., 1999. Manufacturing strategy and new venture performance: a comparison of independent and corporate ventures in the biotechnology industry. *J. High Technol. Manage. Res.* 10 (2), 313–345.
- Zhang, Z., Sharifi, H., 2000. A methodology for achieving agility in manufacturing organisations. *Int. J. Oper. Prod. Manage.* 20 (4), 496–512.