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Measuring Strategic Thinking in Organizations

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Abstract: Strategic thinking is an important construct in management research, and the ability to measure it is necessary for empirical research in the area to thrive. The objective of this study is to develop, test, and validate an instrument that scholars can use to measure strategic thinking in an organizational context. A survey methodology is employed to develop the instrument, and to test its reliability and validity. The resulting fourteen-item scale displays robust convergent, discriminant, and nomological validity. The development of the instrument offers avenues for empirical research in multiple areas of management where the strategic thinking construct may be applied, including strategic management, organizational theory/design/change, organizational behavior, and human resource development, among others.
Keywords: Strategic thinking, measurement instrument, scale development

Competing in a constantly changing business environment brings with it a slew of challenges for organizations, and this has engendered much scholarly interest (Birkinshaw *et al*., 2016; Helfat and Martin, 2015; Schilke, 2014). One outcome of this stream of inquiry is the recognition that managerial action is increasingly governed by the quality of strategic thinking espoused by managers (Wilson, 1994; Dragoni *et al*., 2014; Zahra and Nambisan, 2012). Strategic thinking has generally been characterized as an organizational capability when the phenomena have been studied in the context of the strategic actions of the organization (Bernhut, 2009; Nuntamanop *et al*., 2013; Simester, 2016; Goldman, 2012). Further, scholars have used multiple theoretical lenses to explore the role of strategic thinking in organizational contexts. These include, but

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are not limited to, strategic management, organizational behavior, and human resource management (Goldfarb and Yang, 2009; Moon, 2013). For example, strategic thinking has been linked to effective strategic change (Tregoe and Zimmerman, 1980), strategic renewal (Zahra and Nambisan, 2012), organizational innovation (Dragoni *et al*., 2014; Graetz, 2002), opportunity recognition (Hanford, 1995), leadership development (Dragoni *et al*., 2014), team building, and team-based decision-making (Bates and Dillard Jr., 1993; Thomas and McDaniel Jr., 1990). These illustrative examples attest to Hickman and Silva's (2017) assertion that strategic thinking is one of the cornerstones of organizational excellence and that it warrants a thorough understanding.

Despite the widespread recognition of the critical role of strategic thinking in organizational research, there is limited consensus on a well-accepted measure of the construct (Steptoe-Warren *et al*., 2011). As a result, strategic thinking has failed to gain the level of inclusion it deserves in organizational research (Goldman *et al*., 2015; Nuntamanop *et al*., 2013; Simester, 2016). Existing measures have been found to either lack robustness of scale development or are idiosyncratic to the research context (Dragoni *et al*., 2014; Moon, 2013; Pisapia *et al*., 2005). As Goldman and Scott note, "Many of these measures were not based on a definition of strategic thinking found in the literature. In the few cases where weak correlations were established, different conclusions with respect to their significance were reported across studies" (2016: 261).

The objective of this study is to develop, test, and validate an instrument that can be used by management scholars to measure strategic thinking in an organizational context. The instrument development process starts with a review of scholarly discourse on strategic thinking. This stream of scholarly thought is then used to develop an instrument to measure the construct of strategic thinking.

SCHOLARLY DISCOURSE ON STRATEGIC THINKING

Several scholars have offered descriptions of the strategic thinking construct. For example, Struebing (1996: 22) describes strategic thinking as "a dynamic process that continually reviews missions, strategies, and operations relative to customers' needs and market forces." In the same vein, Graetz (2000: 457) suggested that strategic thinking is about "seeking innovation and imagining new and very different futures that may lead a company to redefine its core strategies and its industry." Recent efforts to integrate prior characterizations of strategic thinking have made good progress. An example of this is the competency-anchored description by Nuntamanop *et al*. (2013), where strategic thinking is described as, "a set of (managerial) competency that impacts strategy formulation and strategic actions leading to business performance."

Early literature used the concept of strategic thinking and strategic planning interchangeably. However, later discussions confirmed strategic thinking precedes strategic planning (Heracleous, 1998; Liedtka, 1998; Mintzberg, 1994; Graetz, 2002). The recent literature conceptualizes strategic thinking as a capability, and provides support that strategic thinking is comprised of various cognitive capabilities of individuals (e.g., Dhir *et al*., 2018; Goldman and Scott, 2016; Gross, 2017, 2016; Norzailan *et al*., 2016; Nuntamanop *et al*., 2013). Thinking, in general, is a cognitive ability that allows individuals to construct a mental frame around a specific context (Gottfredson, 1997). Thus, it is appropriate to conceptualize strategic thinking as a capability. The role of strategic thinking at the organizational level is critical because of

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its manifestation in strategic planning and strategic decision-making. Organizations, however, do not think but think through their managers/ leaders. Thus, managers represent the core of strategic thinking capability, while outcomes are portrayed at the organizational level (Argote and Ingram, 2000; Barnard, 1968).

Scholars agree that strategic thinking is a multidimensional construct, and a consensus on the underlying dimensions of the construct has emerged. Early research (see Rowe *et al*., 1986) suggested that strategic thinking may consist of four elements – vision, creativity, flexibility, and entrepreneurship. Later, Liedtka (1998) proposed a model of strategic thinking that included: a systems-thinking perspective, intent-focused, thinking-in-time, hypothesis-driven, and being intelligently opportunistic. About the same time, Heracleous (1998) characterized strategic thinking as creative thinking (i.e., divergent thought processing), and synthetic (i.e., recursive reflection on present and past experiences to envision/synthesize future options). Graetz (2002) viewed strategic thinking as creative/ intuitive/innovative thinking (that involves divergent thought processing). Bonn (2005) presented a model of strategic thinking that incorporated systems thinking, creative thinking (i.e., divergent thought processing), and vision orientation thinking (i.e., similar to Heracleous' (1998) notion of recursive reflection/synthesis to envision the future). At about the same time, Pisapia *et al*. (2005) described a model of strategic thinking also based on three similar dimensions – systems thinking, reframing (i.e., divergent thought processing), and reflection (i.e., recursive review and synthesis to envision the future).

Two recent studies help stitch together the elements of strategic thinking identified in prior research. Both studies used grounded-theory methodologies that provide the additional benefit of raw evidence obtained from practicing managers to support the appropriateness of a multi-dimensional operationalization of the strategic thinking construct. As will be argued below, both studies point to a three-dimensional operationalization of the strategic thinking construct in an organizational context.

The first study, by Nuntamanop *et al*. (2013), found managers in the field identified seven elements that best reflect their strategic thinking – conceptual thinking ability, visionary thinking, analytical thinking ability, synthesizing ability, objectivity, creativity, and learning ability. The authors then compared these items to the dimensional frameworks proposed by scholars. They concluded that the dimensional operationalization offered by Heracleous (1998), Graetz (2002), and Bonn (2005), together, best captured the elements of strategic thinking expressed by the practicing managers polled in their study. A fourth operationalization is added by Pisapia *et al*. (2005) to the list of three identified by Nuntamanop *et al*. (2013). A closer review of the four theoretically anchored operationalizations noted above suggests that they reflect three core dimensions. The first dimension is "systems thinking" that is noted by Bonn (2005) and Pisapia *et al*. (2005). The second is "divergent thought processing" that leads to creative outcomes as noted by Heracleous (1998), Graetz (2002), Bonn (2005), and Pisapia *et al*. (2005). The third is "reflection" that represents the recursive use of knowledge and experiences to synthesize a new vision for the future, as characterized by Heracleous (1998), Bonn (2005), and Pisapia *et al*. (2005).

The second study by Goldman and Scott (2016) found strategic thinking is represented in four types of mental sense-making processes of managers (conceptual, system-oriented, directional, and opportunistic thinking) that have four recursive characteristics (scanning, questioning, conceptualizing, and testing). These eight

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elements map well to the three dimensions of strategic thinking noted earlier. One of the three, systems thinking, is singled out as a mental sense-making component of strategic thinking in the Goldman and Scott (2016) study. Divergent thought processing maps to another mental sense-making component in the same study, i.e., opportunistic thinking that leads to the discovery of novel, imaginative organizational strategies. Finally, reflection is represented by several elements identified by managers in Goldman and Scott's (2016) study, including the conceptual and directional mental process developed over time, and the recursive processing characteristics of scanning, questioning, conceptualizing, and testing.

The Three Dimensions of Strategic Thinking

The literature review (above) suggests that strategic thinking is a multi-dimensional construct, and when operationalized in an organizational context, the construct can be represented along three dimensions – systems thinking, divergent thought processing, and reflection. A more detailed characterization of the three dimensions of strategic thinking is provided in this section. This information will be used in the subsequent section to develop the measurement instrument.

The "Systems Thinking" Dimension. Systems thinking (Von Bertalanffy, 1950) reflects the holistic view of the organization that managers must adopt to understand complex interrelationships. In an organizational context, systems thinking enables a comprehensive understanding of interconnections among elements of the organizational system (Capra, 2002; Pisapia *et al*., 2005). As Liedtka suggests, a strategic thinker should have complete knowledge of the "end-to-end system of value creation and interdependencies within it" (1998: 122). However, managerial decision-making is also influenced by changes occurring in the external environment. Hence, a manager's ability to think strategically must also include his/her ability to think beyond the domain of the organization to a universe of interconnected and interdependent systems that are outside the organization (Moon, 2013; Fontaine, 2008; Bonn, 2005; Kaufman, 1991; Senge, 1990). Therefore, in the context of strategic thinking, systems thinking is defined as the ability to view the organization holistically by recognizing the interdependencies *within* the organization and *across* organizations.

The "Divergent Thought Processing" Dimension. Strategic thinking must enable managers to adopt and integrate divergent views in order to comprehend the complexities of organizational systems (Zahra and Nambisan, 2012). Divergent thought processing enables managers to think beyond existing conceptions and beliefs and connect events and issues that may otherwise seem unrelated (Robinson *et al*., 1997; De Bono, 1996) often leading to creative new insights and solutions (De Bono, 1996; Pisapia *et al*., 2005). Thus, divergent thought processing encompasses a broad skill-set that subsumes multiple thinking styles found in scholarly operationalizations of strategic thinking such as creative thinking, divergent thinking, intuitive thinking, innovative thinking, and hypothesis-driven thinking (Bonn, 2005; Rowe *et al*., 1986; Mintzberg, 1994; Heracleous, 1998; Graetz, 2002; Liedtka, 1998). Further, Pisapia *et al*. (2005) and Bolman and Deal (1991) note that divergent thought processes allow managers to be cognizant of the differences between competing perspectives and allow them to reframe a situation in the given context. Therefore, in the context of strategic thinking, divergent thought processing is defined as the ability to identify, differentiate, and use diverse perspectives to assess an organizational situation.

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The "Reflection" Dimension. Reconciling competing hypotheses is a necessary element of the strategic thinking process (Zahra and Nambisan, 2012). Reflection represents a recursive process used by managers to analyze a situation by referencing existing beliefs, perceptions, and experiences, and then using the knowledge to reconcile competing hypotheses and to arrive at a conclusion (Dewey, 1933). Scholars have noted that the process of reconciliation involves interactions of one's own experiences and perceptions with the experience and perceptions of other individuals (Argyris and Schon, 1996). Rodgers (2002) supported this notion and suggested that "an experience, then, is not experience unless it involves an interaction between the self and another individual" (p: 846). In an organizational context, Pisapia *et al*. (2005) note that reflection can be introspective and can also occur in a community with others, as multiple managers reflect on a given situation to make joint decisions. Reflection, therefore, consists of using not just own experience, perception, and knowledge but using others' interpretation of a situation as well. Hence, in the context of strategic thinking, reflection is defined as the ability to use *one's own* beliefs, perceptions, and experiences, *and those of others*, to assess an organizational situation.

METHOD

Instrument Development

The instrument development procedure employed in this study follows the recommendations of Hinkin (1998). This approach has been tested and used in prior instrument developments (see, for example, Holt *et al*., 2007; Oreg, 2003; Shaffer *et al*., 2016; Sieger *et al*., 2016). Further, a deductive approach is used to develop the instrument. Instead of developing items afresh, previous operationalization of strategic thinking were reviewed to select items (Pisapia *et al*., 2005) to seed the development process. It should be emphasized that these items only represent a starting point for the iterative item-development exercise. This approach is deemed appropriate because it leverages prior work and provides reasonable guide rails to kick-off the development process. The process is depicted in Figure I.

Two rounds of Q-sort exercises were undertaken to improve the face validity of items (Nahm *et al*., 2002). The first Q-sort exercise (panel consists of two business-school professors and three management Ph.D. students) resulted in a preliminary set of 28 items. These 28 items underwent a second Q-sort exercise (three Ph.D. students) to improve the dimension-item correlation.

Next, the items were presented to an individual with extensive industry experience in the C-suite at a large US corporation. Feedback from and discussions with the panelist resulted in a reduced set of 21 items with language better suited for practitioners. Finally, two more panelists (whose native language was English) were used to polish the syntax, style, and structure of the items.

Item Generation

The item generation process began by classifying the un-stratified pool of items from the selected scale at the dimensional and the sub-dimensional levels. For example, the definition of the system's thinking dimension (noted earlier in the paper) suggests two sub-dimensions – interdependencies *within* the system, and interdependencies *across*

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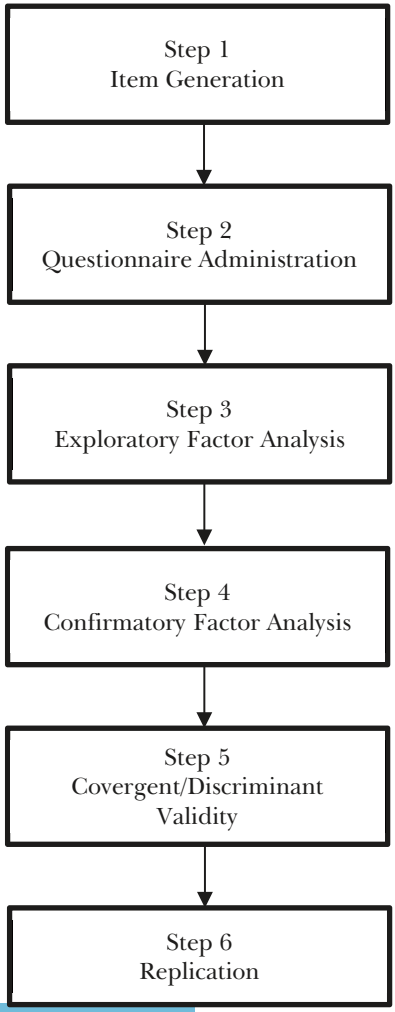
systems. Hence, items were selected from the pool that best represented these two sub-dimensions. A similar approach was undertaken to select items associated with the three sub-dimensions of divergent thought processing (i.e., ability to "*identify*, *differentiate*, and *use*" diverse perspectives) and the two sub-dimensions of reflection (i.e., ability to use "*one's own perception, experience, and knowledge*" and "*the perspectives, experiences, and knowledge of others*"). This resulted in seven (2 + 3 + 2) baskets of items to seed the subsequent Q-sort exercises.

Figure I
Scale Development Process



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Questionnaire Administration

Sample. The target respondents in the pilot test were senior to middle-level managers with five or more years of experience. The context of this study is firms operating in high technology (hi-tech) industries since they are constantly adapting to change (Cruz-González *et al*., 2015; Thornhill, 2006), making strategic thinking particularly relevant. Industries with SIC codes 7371 (computer programming services), 7372 (pre-packaged software), and 7373 (computer integrated system design) were selected as the fastest growing sectors based on past and projected future output growth from 2012-2022 (U.S. Bureau of Labor Statistics, 2013).

Sampling technique. Panel data was obtained using services provided by Qualtrics (Long *et al*., 2011). They invited only pre-screened respondents to ensure the legitimacy of respondents (Hagtvedt, 2011). In addition to Qualtrics own screening algorithms, the authors embedded another screening question in the survey instrument. The context required to select a key informant from each firm. Previous studies have supported the key-informant approach because such respondents have been shown to provide a valid representation of organizational phenomenon (Garg *et al.*, 2003; Li and Atuahene-Gima, 2002).

Exploratory Factor Analysis

Pilot sample. A total of 158 responses were collected. Data were subjected to principal component analysis with direct oblimin rotation. The initial factor structure resulted in only two components with Eigenvalues of 10.93 and 1.81. The respective variance explained was 52.07% and 8.64%. Because of the initial factor structure, targeted items were reworded and refined across all dimensions. Items were modified and worded to simplify them. The focus was to present the items in practitioner parlance and with a capability perspective. Since strategic thinking is characterized as a capability, items are reworded to reflect the underlying ability associated with a specific activity. In addition, the organizational context was incorporated into the items so that it would be more meaningful to the target audience (organizational managers). For example, the original scale item "consider how one thing seems to lead to the next in a nonlinear way" does not adequately reflect a context and can be interpreted in multiple ways. This item was modified to "we recognize that actions of a department can influence the action of another department within our organization." This was done to highlight the specific context that respondents should consider when answering the question. In this case, the interconnection between different departments of an organization. Further, all "double-barreled" items were appropriately modified. For example, the item "Track trends by asking everyone what is new or what is changing" was appropriately modified, contextualized, and presented as an ability instead of an activity, "We recognize that change in market trends require adjustments in our business activities." The new item appropriately represents the ability to identify the relationship between market trends and business activities and focuses on change rather than both "what is new" and "what is changing." One item was added to the reflection dimension making for a total of 22 items in the instrument. The new item, "we seek help from individuals across the organization to reflect on past organizational actions" deemed necessary as the existing item "We seek help from individuals within our department to reflect on the effectiveness of past organizational actions" seemed narrow in scope.

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Table 1
Rotated Pattern Matrix of 14-Item Scale for Strategic Thinking

	STRATEGIC THINKING	Factors Loadings 1	2	3
	SYSTEMS THINKING (Cronbach's alpha = 0.80)			
ST1.1	We recognize the importance of collaborative actions among employees within our organisation.	-0.07	0.10	**0.79**
ST1.2	We recognize that actions of a department can influence action of another department within our organisation.	0.02	0.14	**0.76**
ST2.1	We recognize that change in customer needs can drive change in our product/service offerings.	0.22	0.06	**0.67**
ST2.2	We recognize that change in market trends require adjustments in our business activities.	0.30	-0.05	**0.62**
	DIVERGENT THOUGHT PROCESSING (Cronbach's alpha = 0.85)			
DTP1.1	We are aware that there are multiple approaches to evaluate a business problem.	**0.60**	-0.05	0.16
DTP1.2	We are aware that there are multiple approaches to resolve a business problem.	**0.81**	-0.20	0.14
DTP2.1	Discussion with others helps us differentiate among different approaches used to describe a business problem.	**0.69**	0.07	0.07
DTP2.2	Discussion with others helps us differentiate among different approaches used to evaluate a business problem.	**0.71**	0.00	0.18
DTP3.1	We use multiple approaches to describe a business problem.	**0.74**	0.32	-0.24
DTP3.2	We use multiple approaches to evaluate a business problem.	**0.68**	0.24	-0.07
	REFLECTION (Cronbach's alpha = 0.81)			
RFN1.1	We reflect on how we could have handled past organisational actions differently.	0.18	**0.68**	-0.07
RFN1.2	We reflect on why some organisational actions worked and why other organisational actions did not work.	0.09	**0.71**	0.15
RFN2.1	We seek help from individuals within our department to reflect on the effectiveness of past organisational actions.	-0.06	**0.85**	0.07
RFN2.2	We seek help from individuals across the organisation to reflect on past organisational actions.	-0.06	**0.78**	0.11
Eigenvalue		6.02	1.67	1.09
Variance Explained		43.01	11.96	7.82
Cumulative		43.01	54.97	62.79

ST = Systems Thinking; DTP = Divergent thought processing; RFN = Reflection

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These changes necessitated another investigation of the factor structure with a new data set. A slightly smaller sample of 101 responses was collected, and 86 responses were retained and analyzed. All 22 items were subjected to principal component analysis with direct oblimin rotation. Sample adequate for the factor analysis was maintained (Kaiser-Meyer-Olkin (KMO): 0.883, and a significant Bartlett's test of sphericity: chi-square = 1283.65, df = 231, $p < 0.001$). The results indicated an improved factor structure displaying three components with Eigenvalues of 10.45, 2.63, and 1.28 (respective variance explained was 47.53%, 11.98%, and 5.81%).

Full sample. A sample of 324 responses was now used (out of a total of 436 responses received) for instrument validation purposes. However, to make the sample more representative of senior management, the selection criteria was raised to ten years of experience. A split-sample approach was adopted to complete this task. The sample was randomly split into two sub-samples using the SPSS "select cases" option. The random splitting generated two subsamples: Sample 1 (n = 169) was used to examine the factor structure, and sample 2 (n = 155) was used to perform a confirmatory factor analysis (DeVellis, 2003), and to conduct nomological validation.

Confirmatory Factor Analysis

After the first round of EFAs and item reductions based on cross-loadings, fourteen items were retained. The second factor analysis with fourteen items showed sampling adequacy (KMO: 0.859 and Bartlett's test of sphericity: chi-square = 1120.79, df = 91, $p < 0.001$). The results using the fourteen items indicated a three-factor solution with Eigenvalues of 6.02, 1.67, and 1.09. The respective variance explained were 43.01%, 11.96%, and 7.82%. Total explained variance was 62.79%, exceeding the minimum level of explained variance (60%) suggested by Hinkin (2005). The pattern matrix is displayed in Table 1.

The final instrument contained four systems thinking items (Cronbach's alpha: 0.8), six divergent thought processing items (Cronbach's alpha: 0.85), and four reflection items (Cronbach's alpha: 0.81).

Convergent, Discriminant, and Nomological Validity

Convergent and discriminant validity of the measurement instrument were assessed using the holdout sample (n = 155). Ashill and Jobber's (2010) recommendation was followed to use SEM-based PLS methodology to perform the confirmatory factor analysis because of the small sample size (Barclay *et al*., 1995). Convergent validity was assessed using three criteria: item reliability, composite reliability (CR), and average variance explained (AVE). As shown in Table 2, item reliability was adequate with all items exhibiting loadings above 0.7 (Bagozzi, 1979; Fornell and Larcker, 1981) and significant t-statistics. The CR statistics for systems thinking, divergent thought processing, and reflection (0.88, 0.86, and 0.89 respectively) were above the 0.7 cut-off point, which suggests good composite reliability (Chin, 1998). Finally, AVE values for systems thinking, divergent thought processing, and reflection (0.65, 0.52, and 0.69 respectively) were all above the threshold of 0.50, providing support for convergent validity (Fornell and Larcker, 1981).

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Table 2
The Measurement Model

	Items	Loading	t-stats	CR	AVE
	STRATEGIC THINKING				
	SYSTEMS THINKING			0.88	0.65
ST1.1	We recognize that actions of a department can influence action of another department within our organization.	0.71	6.94		
ST1.2	We recognize the importance of collaborative actions among employees within our organization.	0.85	10.15		
ST2.1	We recognize that change in customer needs can drive change in our product/service offerings.	0.77	6.83		
ST2.2	We recognize that change in market trends require adjustments in our business activities.	0.87	10.61		
	DIVERGENT THOUGHT PROCESSING			0.86	0.52
DTP1.1	We are aware that there are multiple approaches to evaluate a business problem.	0.73	12.29		
DTP1.2	We are aware that there are multiple approaches to resolve a business problem.	0.63	6.98		
DTP2.1	Discussion with others helps us differentiate among different approaches used to describe a business problem.	0.72	11.19		
DTP2.2	Discussion with others helps us differentiate among different approaches used to evaluate a business problem.	0.74	12.44		
DTP3.1	We use multiple approaches to describe a business problem.	0.74	15.38		
DTP3.2	We use multiple approaches to evaluate a business problem.	0.76	17.19		
	REFLECTION			0.89	0.69
RFN1.1	We reflect on how we could have handled past organizational actions differently.	0.86	35.5		
RFN1.2	We reflect on why some organizational actions worked and why other organizational actions did not work.	0.82	17.37		
RFN2.1	We seek help from individuals across the organisation to reflect on past organizational actions.	0.79	18.53		
RFN2.2	We seek help from individuals within our department to reflect on the effectiveness of past organizational actions.	0.84	25.12		

ST = Systems Thinking; DTP = Divergent thought processing; RFN = Reflection; CR = Composite Reliability; AVE = Average Variance

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Table 2 (Contd.)
The Measurement Model

	Items	Loading	t-stats	CR	AVE
	ABSORPTIVE CAPACITY				
	ACQUISITION			0.86	0.62
AQ1	Our employees frequently visit with suppliers to acquire new information.	0.84	38.6		
AQ2	Our employees frequently monitor competitors to acquire new information.	0.82	25.11		
AQ3	Our employees frequently meet with customers to acquire new information.	0.79	19.6		
AQ4	Our employees frequently collect industry information through informal channels.	0.67	8.65		
	ASSIMILATION			0.95	0.77
AS1	We quickly analyse shifts in the market.	0.86	31.7		
AS2	We quickly analyse changes in market demand.	0.84	22.09		
AS3	We quickly analyse the changing competitive dynamics of the market.	0.91	46.71		
AS4	We quickly interpret shifts in the market.	0.87	34.38		
AS5	We quickly interpret changes in market demand.	0.88	40.44		
AS6	We quickly interpret the changing competitive dynamics of the market.	0.90	55.19		
	TRANSFORMATION			0.9	0.65
TR1	Our employees efficiently generate new business plans.	0.83	24.36		
TR2	Our organisation is efficient at designing new value-creation processes.	0.85	30.21		
TR3	Our organisation is efficient at redesigning organisational policies and procedures.	0.85	35.88		
TR4	Our employees share practical experiences to weed out poor business ideas.	0.73	16.25		
TR5	Our organisation has well-established business processes to disseminate new ideas across the organisation.	0.76	20.02		
	EXPLOITATION			0.82	0.60
EX1	Customer complaints are quickly addressed.	0.78	16.37		
EX2	Customer needs are addressed through delivering new solutions.	0.78	16.06		
EX3	We rarely experience difficulty in delivering value to our customers.	0.76	9.14		

AQ = Acquisition; AS = Assimilation; TR = Transformation; EX = Exploitation;
CR = Composite Reliability; AVE = Average Variance Explained

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Discriminant validity was assessed using criteria suggested by Fornell and Larcker (1981). As shown in Table 3, the square root of AVE for each latent construct was higher than its correlation with the other construct. Hence, discriminant validity is inferred.

To assess the nomological validity of the measurement instrument, the relationship between strategic thinking and absorptive capacity was examined. Absorptive capacity is characterized as a dynamic capability of the organization (Zahra and George, 2002). Scholars have demonstrated the existence of a relationship between strategic thinking and absorptive capacity. For example, Boal and Hooijberg (2001) suggested that a key outcome of strategic thinking is the development of absorptive capacity that contributes to organizational performance. Other scholarly works also support this contention (see, for example, Daspit *et al*., 2016; Lanza and Passarelli, 2014). Table 4 shows a strong correlation between strategic thinking and absorptive capacity.

Daspit and D'Souza's (2013) modified instrument was used to operationalize absorptive capacity. Linear regression from SPSS was employed to test the relationship. As shown in Table 5, the beta coefficient of the regression between strategic thinking and absorptive capacity is 0.56, with a p-value of 0.000. This demonstrates that strategic thinking is significantly related to absorptive capacity, and it establishes the nomological validity of the measurement instrument.

Because of the data collection method, there is potential for common method bias in the data. Harman's Single-Factor test is used to investigate common method variance. All 32 items representing strategic thinking and absorptive capacity were subjected to factor analysis to see whether a single factor emerges with more than 50% of the variance explained. Harman's Single-Factor test result (36%) confirmed that common method bias is less likely (Podsakoff *et al*., 2003).

Table 3
Discriminant Validity

	1	2	3	4	5	6	7
1. Acquisition	0.79*						
2. Assimilation	0.65	0.88*					
3. Transformation	0.61	0.66	0.81*				
4. Exploitation	0.45	0.53	0.56	0.78*			
5. Reflection	0.62	0.53	0.67	0.45	0.83*		
6. Divergent Thought Processing	0.43	0.47	0.54	0.38	0.55	0.72*	
7. Systems Thinking	0.22	0.26	0.22	0.21	0.34	0.64	0.81*

*Square root of AVE shown diagonally

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Table 4
Correlation Between Study Variables

	1	2	3	4	5	6	7	8	9	10	11
1. Strategic Thinking	–										
2. Absorptive Capacity	0.63**	–									
3. Systems Thinking	0.73**	0.24**	–								
4. Divergent Thought Processing	0.88**	0.52**	0.67**	–							
5. Reflection	0.76**	0.67**	0.30**	0.51**	–						
6. Acquisition	0.49**	0.80**	0.15	0.38**	0.57**	–					
7. Assimilation	0.51**	0.89**	0.21**	0.44**	0.51**	0.66**	–				
8. Transformation	0.58**	0.86**	0.17*	0.49**	0.65**	0.61**	0.66**	–			
9. Exploitation	0.41**	0.68**	0.19*	0.35**	0.43**	0.43**	0.53**	0.56**	–		
10. Firm Age	0.02	0.00	0.07	-0.05	-0.01	-0.06	-0.02	0.04	0.03	–	
11. Annual Revenue	0.13	0.05	0.12	0.11	0.05	0.04	0.03	0.08	-0.05	0.34**	–

Table 5
Regression of Strategic Thinking on Absorptive Capacity

	Beta*	t-stats	Significance
Control Variables			
Firm Age	-0.29	-0.06	0.54
Firm Revenue	0.05	1.19	0.23
Independent Var.			
Strategic Thinking	0.56	12.26	0.000
Test Results			
R-Sq	0.32		
F-stats	51.82		

Dependent Variable: Absorptive Capacity
*Standardized beta coefficient shown

DISCUSSION

Scholars have noted that a construct should be defined on "its own merits" rather than what it does in terms of its consequences or outcomes (Dalal *et al*., 2008). Prior measures of strategic thinking have been found to be lacking on this criterion (see, for example, Graetz, 2002; Goldman, 2007; Heracleous, 1998; Nasi, 1991; Nuntamanop *et al*., 2013; Struebing, 1996). In this study, the scale development began by defining strategic thinking as a phenomenon that is represented by three cognitive abilities (systems thinking, divergent thought processing, and reflection), and not the consequences/outcomes of these abilities. Accordingly, this approach to instrument development addresses scholarly criticisms of existing operationalizations of the phenomenon.

The Relevance of the Instrument

Despite the importance of strategic thinking in management research, there is limited consensus on a well-accepted measure of the strategic thinking construct (Steptoe-Warren *et al*., 2011). Existing measures have been found to either lack robustness of scale development or are idiosyncratic to the research context (Goldman and Scott, 2016; Dragoni *et al*., 2014; Moon, 2013). This study developed and validated a 14-item scale that can be used by management scholars to measure strategic thinking in an organizational context. The increasing evidence of the importance of strategic thinking to achieving organizational goals makes this scale development relevant, valuable, and timely.

Robustness of the Instrument Development Process

Hair *et al*. (2010) note that fine-grained characterizations help translate a latent construct into quantifiable events (item) that appropriately represent the theoretical phenomenon. Hence, the identification of multiple sub-dimensions for each of the three dimensions of strategic thinking serves to improve the operational specificity of the

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higher-level construct and provides richer anchors for item development. Further, the systematic approach to the scale development process generated items that, when grouped together, adequately represent strategic thinking at the dimensional level, while simultaneously exhibiting nuanced differences at the sub-dimensional level. Because of the fine-grained articulation at the sub-dimensional level, strategic thinking construct as operationalized in this study is less likely to suffer from definitional reification over time.

A robust operationalization of a construct should be demonstrated through an assessment of construct validity (i.e., does the instrument measure what it is supposed to measure?) (Hair *et al*., 2010). To achieve appropriate construct validity, a well-accepted procedure is followed to create the measurement instrument.[1] The exercise resulted in a parsimonious 14-item instrument that shows good convergent and discriminant validity. In addition, Hinkin's (1998) cautionary note was followed to confirm the nomological validity of the strategic thinking instrument.

Multi-Field Applicability of the Instrument

Scholars have used several theoretical lenses to explore the role of strategic thinking in organizational contexts. Thus, the measurement scale developed in this study has the potential to impact and extend multiple streams of management research. Because the development of the instrument is anchored in the capabilities of the organization, it offers the potential to support management research that incorporates the direct or indirect influence of strategic thinking on any value-creating action, process, or resource of the organization, and delivers competitive advantage in the marketplace. Some scholars (e.g., Bonn, 2001; Goldman, 2007) have offered theoretical arguments to suggest that in an organizational context, strategic thinking is important enough to be viewed as a core capability of the organization. The capability-centric operationalization of the strategic thinking measurement scale makes it ideal for empirical research aimed at confirming such scholarly contentions. Another direct application of the measurement scale would be in research that links strategic thinking with the actions of managers themselves. For example, the measurement scale could be used in empirical research to support/confirm scholarly characterizations of the relationship between strategic thinking and strategic planning (e.g., Bryson *et al*., 2018; Phillips and Moutinho, 2018; Nickols, 2016; Graetz, 2002).

Other areas of scholarship that can employ this measurement scale include entrepreneurship, creativity, and organizational innovation. For example, the measurement scale developed in this study can be used to test the relationship between entrepreneurship and strategic thinking proposed by Zahra and Nambisan (2012). Because of the multi-dimensional characterization of this measurement scale, it can also aid in providing a more nuanced understanding of the relationship between strategic thinking and creativity in organizations (e.g., Herrmann-Nehdi, 2017), and it can be employed to expand current views that have limited their focus to design thinking (e.g., Lee *et al*., 2019; Lloyd, 2013). Further, there is increasing scholarly interest in studying the innovation imperative of modern organizations. Strategic thinking has been

[1] See, for example, applications of this procedure by Holt *et al.* (2003), Shaffer *et al*. (2016), and Sieger *et al.* (2016).

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characterized as a determinant of organizational innovation (e.g., Chen *et al*., 2018; Bouhali *et al*., 2015; Dragoni *et al*., 2014), and this measurement instrument will help drive much needed empirical research to synthesize the multiple streams of scholarly thought that exist on organizational innovation.

Research on the relationship between strategic thinking and organizational change covers several decades and has grown active in recent years (e.g., Goldman *et al*., 2015; Switzer, 2008; Zeffane, 1996). Further, the measurement scale will aid in empirical research in two related areas of scholarly interest – corporate entrepreneurship and corporate survival. For example, the measurement instrument can be used in empirical studies to test the proposed framework for corporate entrepreneurship (Kuratko and Hoskinson, 2018), and corporate survival (Tregoe and Zimmerman, 1980). These are areas where the employment of a measurement scale will aid in providing empirical support and shed new light on the nature of the relationship between these two constructs.

The measurement scale developed in this study can be incorporated in research on phenomena associated with the upper echelons of the organization suggests that senior-level managers are primarily responsible for the selection and deployment of organization-specific resources and capabilities that result in organizational change (Hayden *et al*., 2017; Huber and Glick, 1995). Further, it can be used to support recent research on the relationship between leadership style and strategic thinking (Gross, 2016). Relevant and nuanced empirical investigations that extend the understanding of the relationship between leadership and strategic thinking will be easier to undertake because of the instrument developed herein.

At a more micro-level, the instrument can be used to provide empirical support for, and understanding of the influence of strategic thinking on an organizational phenomenon like opportunity recognition (Hanford, 1995), leadership development (Dragoni *et al*., 2014), team building, and team-based decision-making (Bates and Dillard Jr., 1993; Thomas and McDaniel Jr., 1990). Further, given the fine-grained operationalization of strategic thinking at the dimensional level, it will be interesting to see what happens when researchers empirically test the contributions of each of the dimensions of strategic thinking to strategy formulation and strategic action in entrepreneurial organizations (Baron, 2006).

Finally, the instrument can also be used in a number of behavioral research streams. For example, research on leadership and top management teams can be revisited to empirically test the significance of strategic thinking as an antecedent, a covariate, or an outcome, as hypothesized in prior research (e.g., Bass, 1969; Hambrick and Mason, 1984; Moon, 2013). In the area of HRM, the instrument enables empirical research on the role of work experience, work environment, and professional development on the strategic thinking abilities of managers (Goldman *et al*., 2015). Further, scholars can now empirically test the relationship between individual strategic thinking abilities (i.e., systems thinking, divergent thought processing, and reflection) and personnel workplace effectiveness as recommended by Pang and Pisapia (2012). Further, empirically investigating the relationship between strategic thinking and job-related capabilities of managers is now feasible (Simester, 2016), and researchers can include strategic thinking in empirical investigations on the relationship between capability-role alignment and job satisfaction (Caldwell and O'Reilly, 1990). Finally, the costs and benefits of building strategic thinking capabilities in the organization (Delaney and

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Huselid, 1996; Kim and Ployhart, 2014) can be explored fully now that a relevant measurement instrument is available.

LIMITATIONS

As with every research effort, this study has some limitations that readers should be aware of when making inferences based on the results of the study. First, the scale is developed using a capability perspective, and hence it may not be applicable in other contexts. Second, the scale does not include visionary thinking as an element of strategic thinking. Strategic scholars have noted that vision and strategy are distinctly different organizational constructs, and they are in general agreement that management's vision and the thought processes that shape it act as guard-rails to configure their strategic thinking abilities. Therefore, the authors posit that visionary thinking should be characterized as an antecedent of strategic thinking rather than an inherent dimension of the construct. Third, the reader should note that a key-informant approach was used to collect data from managers. Although statistical tests undertaken in the study suggest that the associated biases are not significant and that the results are relevant and robust, readers should consider the limitation and treat them accordingly.

CONCLUSION

Scholars agree that strategic thinking helps managers achieve desired organizational outcomes (Bonn, 2005; Casey and Goldman, 2010; Pang and Pisapia, 2012; Simester, 2016). In this study, a well-accepted methodology is used to develop a valid and reliable instrument to measure strategic thinking in an organizational context. The resulting instrument was tested for nomological validity against another construct, absorptive capacity. The availability of a valid and reliable instrument to measure strategic thinking in an organizational context will open many new research opportunities for scholars in the field of management.

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