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Investigating firm's customer agility and firm performance: The importance of aligning sense and respond capabilities

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ABSTRACT

In today's hypercompetitive environment, firms that are agile tend to be more successful. However, despite the widely accepted importance of agility, there is limited research on this construct. In this study we aim to conceptually define and operationalize firm's customer agility. We propose that agility comprises two distinct capabilities, sensing and responding, and we address the issue of alignment between these capabilities and its impact on performance. Using a dynamic capabilities framework, we formulate both matching and mediating perspectives on customer agility. Based on data collected from marketing managers, we tested hypotheses pertaining to the two methods of alignment. The results indicate significant support for the role of both forms of alignment on performance. Implications for research and practice are discussed.

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1. Introduction

Agility is emerging as an important dynamic capability in contemporary business environments. Many industries once considered to be relatively stable have evolved into fiercely aggressive environments in which long-established industry giants are being threatened by nimble start-up firms scattered across the globe (D'Aveni et al., 2010). One reason for this is that customer needs continuously shift in such hypercompetitive environments (D'Aveni, 1994; Jarratt and Fayed, 2001; Nath and Newell, 1998). In order to create competitive advantage, organizations must sense and respond quickly to changes in customer preferences (Day, 1994; Jayachandran et al., 2004). In other words, a firm's customer agility, its ability to sense and respond quickly to customer-based opportunities for innovation and competitive action, is critical for survival and success.

Although a firm's customer agility consists of two distinct yet complementary dimensions – customer sensing capability and customer responding capability (Zaheer and Zaheer, 1997) – simply possessing and leveraging these two capabilities may not be sufficient to achieve competitive advantage. Evidence from practice highlights the importance of aligning a firm's sensing and responding capabilities. For example, the apparel chain “The Buckle” uses Internet-generated buzz to constantly sense what its youth-oriented customers think is popular and trendy in the fashion world. In turn, The Buckle's “shallow and wide” inventory strategy – combined with a free alteration policy –

allows it to quickly respond to shifting customer preferences. Yet misalignment can bring about severe consequences. For example, Woolworth's initially failed to sense how the growth of suburbs in the U.S. would cause its target customer base to shift their shopping activities away from the urban centers where most of its stores were located. In turn, Woolworth's had a mismatch between its merchandise and the needs of the customers who continued to shop ‘downtown’. Woolworth's attempt to rebrand itself was too late and ineffective, ultimately leading to the closure of all its U.S. stores by 1997.

It is useful to note that alignment itself can be represented in different ways. For instance, the matching perspective holds that alignment is a theoretically defined match between two related variables (Venkatraman, 1989). Hence, the stronger the “match” (i.e., both variables are “high”) between customer sensing capability and customer responding capability, the greater the effect of customer agility on an appropriate criterion variable. Alternatively, the mediation perspective specifies the existence of a significant intervening mechanism between an antecedent variable and the dependent variable (Venkatraman, 1989). In doing so, the mediation perspective gives researchers insight into the sense–response–performance process. These alternative perspectives of alignment may provide deeper insight into the relationship between firm's customer agility and firm performance.

We aim to achieve two objectives in this study. First, we address the broad conceptual question, *what is firm's customer agility?* Despite the importance of customer agility to firms competing in dynamic, consumer-oriented markets, we know little regarding the conceptual domain of firm's customer agility. Second, while prior research shows that sensing and responding to customers is critical to firm performance (Hult et al., 2005; Jayachandran et al., 2004), we do not know the extent

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to which alignment between sensing and responding capabilities affects performance. Furthermore, there may be nuanced ways in which alignment impacts performance. Thus, our second research question is, *how does firm's customer agility impact firm performance; specifically, how does the alignment between a firm's sensing and responding capabilities impact its performance?*

We first describe the characteristics of firm's customer agility. We then leverage a dynamic capabilities framework to form the theoretical foundations of our research model. Building on these foundations, we present and formulate our research hypotheses, followed by a description of an empirical study designed to test our research model. We discuss our findings and limitations, implications for research and practice, and potential avenues for future research.

2. Theoretical framework

2.1. What is a firm's customer agility?

The problem of how organizations can successfully deal with dynamic, unpredictable environments has been a topic of substantial interest both in practice and academe for several decades. Two perspectives have emerged within this broad stream of research. The *static* perspective investigates how an organization's structure and flexibility influences its ability to adapt to its environment (Burns and Stalker, 1961). In contrast, the *dynamic* perspective attempts to explain how firms build, leverage and reconfigure capabilities that allow them to adapt to environmental change (Eisenhardt and Martin, 2000; Teece et al., 1997). While the static perspective views organizations as *reacting* to environmental change, the dynamic perspective considers organizations as both *reacting to and proactively influencing* the competitive environment (Sanchez, 2004). Agility has emerged as an important determinant of firm success in hypercompetitive environments (Haeckel, 1999; Zaheer and Zaheer, 1997). Thus, we adopt a dynamic perspective to describe agility and its role in contemporary business environments. Table 1 describes key definitions of agility.

Despite the ambiguity reflected in the range of definitions, a number of characteristics emerge from the literature. First, agility is best viewed as an organizational *capability*, a set of organizational routines and processes that produces a particular output (Dove, 2001). This implies that a firm may be less or more agile than its competitors. Second, agility implies *sense and response*. Prior research suggests that strong sensing capabilities and responding capabilities are critical to firm success in turbulent environments (Haeckel, 1999; Zaheer and Zaheer, 1997). Thus, organizational agility consists of two complementary dimensions: sensing capability and responding capability.

Third, agility is especially important in dynamic, fast-paced environments (Zaheer and Zaheer, 1997). Hence, the ability to sense and respond *quickly* constitutes an important element of agility. Finally, a firm may be agile in one or more domains, such as customer-based processes, supply chain activities, or systems development (Sambamurthy et al., 2003). Thus, agility can be *domain-specific*. Taking these factors into account, we define firm's customer agility as *the degree to which a firm is able to sense and respond quickly to customer-based opportunities for innovation and competitive action*.

2.2. Customer agility as dynamic capability

Taking into account the importance of customer agility in dynamic environments, we turn to research on dynamic capabilities to further understand the nature and importance of firm's customer agility. The dynamic capabilities literature is grounded in the evolutionary theory of the firm (Nelson and Winter, 1982). Since managers make decisions under uncertainty and are boundedly rational, they 'satisfice' rather than optimize in searching for and selecting solutions to problems (March and Simon, 1958). The implication is that firms should continually reconfigure their existing capabilities, and they do so in three

Table 1
Key definitions of organizational agility.

Source	Definition	
Goldman et al. (1995)	Comprehensive response to the business challenges of profiting from rapidly changing, continually fragmenting, global markets for high-quality, customer-configured goods and services	t1.4
Bititci et al. (1999)	The business' ability to quickly adapt and change in response to rapidly changing environmental conditions	t1.5
Sharifi and Zhang (1999)	Ability to cope with unexpected changes, to survive unprecedented threats of business environment, and to take advantage of changes as opportunities	t1.6
Yusuf et al. (1999)	The ability of a business to grow in a competitive market of continuous and unanticipated change, to respond quickly to rapidly changing markets driven by customer-based valuing of products and services	t1.7
Day (2000)	The ability of an organization to thrive in a constantly changing, unpredictable environment	t1.8
Bessant et al. (2001)	The ability of a firm to respond quickly and flexibly to its environment and to meet the emerging challenges with innovative responses	t1.9
Dove (2001)	The ability to manage and apply knowledge effectively, so that an organization has the potential to thrive in a continuously changing and unpredictable business environment	t1.10
Sambamurthy et al. (2003)	The ability to detect opportunities for innovation and seize those competitive market opportunities by assembling requisite assets, knowledge, and relationships with speed and surprise	t1.11
Overby et al. (2006)	The ability of firms to sense environmental change and respond readily	t1.12
Setia et al. (2008)	An organization's ability to: (1) discover new opportunities for competitive advantage; (2) harness the existing knowledge, assets, and relationships to seize these opportunities; and (3) adapt to sudden changes in business conditions	t1.13

ways: (1) they sense and shape opportunities and threats; (2) they seize market opportunities; and (3) they maintain competitiveness through enhancing, combining and reconfiguring the firm's intangible and tangible assets (Teece, 2007). Agility captures the sensing and seizing (responding) components of dynamic capabilities. Hence, dynamic capability is an appropriate way to frame firm's customer agility.

Sensing new opportunities is very much a scanning, learning, and interpretive activity (Rapp et al., 2009; Teece, 2007). Thus, sensing activities involve investing in research activities, probing customer needs, understanding latent demand, and assessing likely supplier and competitor responses (Teece et al., 1997). Once an opportunity for innovation or competitive action is sensed, it must be addressed by mobilizing the firm's existing processes or services (Jayachandran et al., 2004; Teece, 2007).

2.3. Distinguishing customer agility from market orientation

Finally, we distinguish firm's customer agility from market orientation, a well-established construct in both marketing and organizational research. Market orientation refers to the extent to which organizations generate, disseminate and respond to market intelligence pertaining to current and future customer needs (Kohli and Jaworski, 1990). Market intelligence includes information about customers, competitors and other factors such as technology and regulatory developments.

We note three distinctions between market orientation and customer agility. First, market orientation includes intelligence dissemination as one of its three dimensions (Kohli and Jaworski, 1990). While intelligence dissemination is critical to a firm's ability to sense and respond to market opportunities (Teece, 2007), it is not a core component of customer agility. Second, market orientation does not take into account the alignment among its dimensions; alignment

between a firm's sensing and responding capabilities is central to customer agility and – as we show later – firm performance.

Third, market orientation is often conceptualized as a substantive capability (Kirca et al., 2005), yet customer agility should be considered a dynamic capability. Dynamic capabilities are distinguished from substantive ('ordinary') organizational capabilities in that dynamic capabilities refer to the ability to change or reconfigure existing substantive capabilities. Market orientation captures a firm's ability to engage in certain behaviors (e.g., generate intelligence, respond to customer needs). Although a firm can be agile by building higher-order routines that allow changes to substantive capabilities (e.g., quickly modify its manufacturing capabilities to serve an emerging customer segment), it may or may not have a strong market orientation. Thus, customer agility emphasizes the dynamic nature of how organizations sense and respond to customer-based opportunities in turbulent environments.

3. Research model

We propose that firm's customer agility impacts firm performance; however, the full effect of customer agility on performance will take place when a firm's sensing and responding capabilities are aligned (Haeckel, 1999; Overby et al., 2006; Teece, 2007). Alignment refers to "the degree to which the needs, demands, goals, objectives, and/or structures of one component are consistent with the needs, demands, goals, objectives, and/or structures of another component" (Nadler and Tushman, 1983, p. 119). When applied to customer agility, the objectives and structure of a firm's customer sensing capability should be consistent with the objectives and structure of its customer responding capability. When considering the most appropriate perspective of alignment for a given research question, researchers recommend considering multiple specifications as competing theories or models (Venkatraman, 1989). Thus, we investigate the alignment between customer sensing capability and customer responding capability in terms of two perspectives: matching and mediation.

3.1. Alignment as matching

The *matching perspective* is used for concepts in which alignment is a theoretically defined match between two related variables. The basic premise is that the stronger the match between customer sensing capability and customer responding capability, the greater the effect of customer agility on an appropriate criterion variable (Overby et al., 2006). Thus, firms aligned in their sensing and responding activities are more likely to extract greater value from their customer agility capability. For example, BMW senses emerging customer needs by involving lead users in the generation of ideas toward its product innovation activities, and they also respond quickly by implementing valuable ideas in future products. On the other hand, Digital Equipment Corporation failed to sense and respond to emerging markets for personal computers in the 1980s, thereby leading to its ultimate demise.

Misalignment can also have negative consequences (Strandholm et al., 2004). Some firms are able to sense change relevant to their business activities (high sensing capability) but fail to respond to it in an agile manner (low responding capability). In the 1970s, Xerox sensed impending changes in the computing industry and developed multiple computing innovations; however, Xerox failed to bring these innovations to market. Although Xerox was able to sense shifts in customer demand, it was unable to quickly respond.

Other firms may have a low sensing capability and a high responding capability. Although these firms are able to quickly respond to market opportunities, they usually fail to sense these opportunities or sense the wrong opportunities. Apple's introduction of the Newton, a personal digital assistant (PDA), provides a nice illustration of low sensing and high responding. Apple positioned the Newton as a mass-market product when, in fact, it was too early in its development for the Newton

to be made generally available. As a result, the Newton lost its audience and never again gained traction in the PDA market.

These examples illustrate the consequences of alignment and misalignment of sensing and responding capabilities. Conceptually, firms that score high on both sensing and responding capabilities are more likely to respond to the *right* customer-based market opportunities at the *right* time than their misaligned or non-agile competitors. As a result, these agile firms will enjoy greater performance benefits. Thus, we hypothesize:

H1. *Agility alignment is positively related to firm performance, such that firms with high (low) sensing capabilities and high (low) responding capabilities will have high (low) performance.*

3.2. Alignment as mediation

The *mediation perspective* specifies the existence of a significant intervening mechanism between an antecedent variable and the dependent variable. In contrast to the matching perspective, the mediation perspective on alignment is anchored with respect to a particular criterion variable (Venkatraman, 1989). Hence, in addition to the matching perspective's ability to provide insight regarding combinations of various levels of sense and respond capabilities, the mediation perspective provides insight concerning the sense–response–performance process.

Conceptually, the mediation perspective implies that we investigate how customer agility works from a process perspective. Building on the dynamic capability framework, Teece (2007) argues, "An enterprise's ability to manage competitor threats and to reconfigure itself is dependent on its investment activity, which is in turn dependent on its ability to sense an opportunity" (p. 1343). When applied to our study, a firm's performance is dependent on its ability to respond to market opportunities (Hult et al., 2005). In turn, a firm's ability to respond is inherently dependent on its ability to sense opportunities. Superior sensing capabilities cannot be effectively leveraged for value creation if a firm has weak responding capabilities. Likewise, a strong customer response capability cannot be effectively leveraged if the firm fails to sense customer-based market opportunities. Based on this reasoning, customer responding capability mediates the relationship between customer sensing capability and firm performance.

H2. *Customer responding capability mediates the impact of customer sensing capability on firm performance.*

4. Research method

4.1. Sampling frame and characteristics

We developed and administered two surveys to collect data from marketing managers to measure the constructs in the research model. Marketing managers are the most informed respondent with respect to how well their organization senses and responds to customers (Narver et al., 2004). We measured the customer agility and control variables at one point in time, and we measured performance at a second point in time. The second survey was completed by the same respondent four months after the first survey. We conducted our study in two high-tech industries – computer manufacturing and prepackaged software.

A professional marketing research firm administered our surveys. Survey invitations were sent to a random set of 1200 sales/marketing managers employed in U.S.-based high-tech firms, who were then invited to complete the online survey. Of these 1200, a total of 208 respondents accessed and completed the survey, for a response rate of 17%. Our screening for missing data left us with 188 usable responses. Of the 188 usable respondents from survey one, a total of 110 respondents sufficiently completed the second survey, for a response rate of 60%.

The demographics of our sample reveal that they were mostly middle-aged (mean = 44 years), well-educated (93% with at least some college experience), and almost split in gender (54% were female). Respondents' average organizational tenure was 10.8 years, with an average of 6.1 years in their current position. They were highly active in formulation of marketing/sales policies for their firms at the time of the study (mean = 4.48 on a 5-point scale, 5 representing "very active"). Thus, respondents were highly qualified to answer the questions.

We used wave analysis (Armstrong and Overton, 1977) to assess the impact of non-respondent bias. Responding firms were grouped into early and late respondents, and comparisons were made along firm size and firm age. Our analysis showed no significant differences between early respondents and late respondents. Responding and non-responding firms were also compared along firm size and firm age for the second survey. Again, there were no significant differences between responding and non-responding firms. Based on these findings, non-response bias does not appear to impact our study.

4.2. Measures

We followed recommended guidelines for developing measures of our constructs (Churchill, 1979). For firm's customer agility, we first conducted a literature search to specify the domain of the construct (see Table 1). Following this, we generated sample items based on this literature review and validated measures of similar constructs (e.g.,

Jayachandran et al., 2004). We then conducted a pretest and pilot study to assess the reliability and validity of our measures (see the Appendix A). Our pilot analysis placed sufficient confidence in the scales to proceed with the full-scale survey administration of the target sample frame. Table 2 lists the measures and their sources. Firm age was measured as number of years since the firm was founded, and firm size was measured as number of employees.

We used confirmatory factor analysis techniques in EQS 6.1 to evaluate measurement properties of our customer sensing and customer responding constructs. The fit indices suggest that the data fits the model well ($\chi^2 = 57.21$, d.f. = 34; CFI = 0.96; RMSEA = 0.061). Standardized factor loadings of measurement items on their respective factors were all highly significant ($p < 0.01$), providing support for convergent validity. A chi-square difference test between sensing and responding capabilities is significant ($p < 0.01$), indicating support for discriminant validity. With respect to reliability, Cronbach's alphas for all reflective measures exceed the prescribed 0.70 threshold (Nunnally and Bernstein, 1994) (see Table 3).

We conducted a Harman one-factor test to determine the extent to which common method bias may be a problem. Our results extracted three factors with eigenvalues greater than 1.0; these accounted for approximately 68% of the total variance. No single factor accounted for a majority of the covariance. We also measured the independent variables and the dependent variable at two points in time, thus reducing the potential for common method bias to severely threaten the validity of our study.

5. Hypothesis testing

5.1. Agility alignment as matching

We used polynomial regression to test hypotheses involving agility alignment as matching. Polynomial regression equations allow a researcher to obtain direct tests of theoretical models relevant to the study of alignment (Edwards, 1994; Edwards and Parry, 1993). We used the following polynomial regression equation:

$$\text{Firm Performance} = \beta_0 + \beta_1\text{CS} + \beta_2\text{CR} + \beta_3\text{CS}^2 + \beta_4(\text{CS}*\text{CR}) + \beta_5\text{CR}^2 + \beta_6\text{FSize} + \beta_7\text{FAge} + e$$

where CS refers to customer sensing capability and CR refers to customer responding capability. Table 4 details our results.

Simply inspecting the signs and magnitudes of the coefficients in Table 4 reveals little as to the shape of the surface they represent.

Table 3 Inter-construct correlations, descriptive statistics and reliabilities.

Construct	Mean	S.D.	1	2	3	4	5
1. Customer sensing	5.49	1.09	0.87				
2. Customer responding	5.36	1.23	0.61**	0.92			
3. Firm performance	3.00	0.56	0.38**	0.33**	-		
4. Firm size	2.71	1.18	0.10	-0.14*	0.02	-	
5. Firm age	50.89	45.13	0.01	-0.22**	0.01	0.51**	-

n = 110. Cronbach's alphas are reported in the diagonals for reflective measures. To facilitate analysis, firm size was converted as the logarithm of number of employees. As part of our agreement with the market research firm, we were not provided the identities of our survey respondents or their employer. However, 25 of the 110 respondents in our sample did provide the name of their company. We collected ROI, ROA, and ROE measures from secondary sources (e.g., annual reports) for these 25 firms. These objective performance measures were taken 1 year after the survey. The correlations between each objective performance measure and our subjective performance measure ranged from 0.48 to 0.59 (all of which are significant at $p < 0.001$). Thus, while we could not collect objective performance data for our entire sample, we believe the results from this sub-sample place greater confidence in the validity of our subjective measures.

** $p < 0.01$. * $p < 0.05$.

Table 2 Construct measures.

Construct	Measures	Measure source ^a
Customer sensing capability ^b	1. We continuously try to discover additional needs of our customers of which they are unaware.	(Narver et al., 2004; Slater and Narver, 2000)
	2. We extrapolate key trends to gain insight into what users in a current market will need in the future.	
	3. We continuously try to anticipate our customers' needs even before they are aware of them.	
	4. We attempt to develop new ways of looking at customers and their needs.	
	5. We sense our customers' needs even before they are aware of them.	
Customer responding capability ^b	1. We respond rapidly if something important happens with regard to our customers.	(Jayachandran et al., 2004; Kohli et al., 1993)
	2. We quickly implement our planned activities with regard to customers.	
	3. We quickly react to fundamental changes with regard to our customers.	
	4. When we identify a new customer need, we are quick to respond to it.	
	5. We are fast to respond to changes in our customers' product or service needs.	
Firm performance ^c	1. Marketing	Delaney and Huselid (1996)
	2. Growth in sales	
	3. Profitability	
	4. Market share	

^a Although we draw our survey items from the well-established measurement of marketing constructs, we only adapt items that correspond to the conceptual definitions of our constructs.

^b 1 = Strongly disagree, 7 = Strongly agree. ^c 1 = Much worse, 2 = Worse, 3 = Better, 4 = Much better.

t4.1 **Table 4**
Results of polynomial regression analysis.

t4.2		Beta coefficient ^a
t4.3		
t4.4	Intercept	2.97
t4.5	Customer sensing capability (CS)	0.19*
t4.6	Customer responding capability (CR)	0.05
t4.7	CS ²	0.04
t4.8	CS*CR	0.05
t4.9	CR ²	−0.03
t4.10	Firm size	−0.02
t4.11	Firm age	0.01
t4.12	R ²	0.23
t4.13	^a Unstandardized regression coefficients.	
t4.14	* p<0.05.	

361 Response surface methodology (Khuri and Cornell, 1987) provides the
362 basis necessary for describing and testing the required features of
363 surfaces corresponding to quadratic regression equations. Fig. 1 depicts
364 a surface for agility alignment (sense and response) as it relates to firm
365 performance.

366 Fig. 1 depicts four basic effects. First, firm performance is higher
367 when customer sensing capability and customer responding capability
368 are aligned than when they are misaligned. Also, firm performance is
369 higher when sensing and responding values are both high than when
370 they are both low (point A). Third, the response curve is slightly
371 concave, which tells us that firm performance is greatest when customer
372 responding capability is at a medium level (i.e., firm performance tapers
373 off for both low response and high response firms, see point B). Finally,
Q2 374 the sense curve shows us that high sensors score higher on firm
375 performance than low and medium sensors (point C).

376 5.2. Agility alignment as mediation

377 Agility alignment as mediation implies that the effect of customer
378 sensing capability on firm performance is mediated by customer
379 responding capability. Baron and Kenny (1986) developed a set of
380 mediation tests in which several regression analyses are conducted and
381 significance of the coefficients is examined at each step. Although many
382 researchers use this approach, one limitation is that it never really tests
383 the significance of the indirect pathway. To overcome this limitation,
384 we performed mediation analysis using the Sobel (1982) product of
385 coefficients approach. The Sobel test builds on Baron and Kenny's

(1986) approach by calculating the indirect effect and testing for its
significance. The regression coefficient for the indirect effect represents
the change in the outcome variable (performance) for every unit change
in the independent variable (sensing) that is mediated by the
intervening variable (responding). Our results show that customer
responding capability mediates the relationship between customer
sensing capability and firm performance (H2; $\beta = 0.05$; $p < 0.05$).

6. Discussion

We conceptualized and empirically tested a research model that
relates firm's customer agility to firm performance. Broadly speaking,
our analysis finds that customer agility is significantly related to firm
performance. Specifically, the alignment between customer sensing
capability and customer responding capability impacts performance,
albeit in unique ways.

When conceptualized as matching, agility alignment is significantly
related to firm performance. Specifically, firm performance is
higher when customer sensing capability and customer responding
capability are aligned than when they are misaligned. Also, firm
performance is higher when sensing and responding values are both
high than when they are both low. In terms of independent effects,
firm performance is greatest when 1) customer responding capability
is at a medium level and 2) customer sensing capability is at a high
level. This implies that high customer sensing capability and "middle"
customer responding capability could be the "next best" option, in
terms of firm performance, after high sensing/high responding. This
indicates that marginal return for firms on investments in sensing
capabilities might be higher than corresponding returns on invest-
ments in responding capabilities.

We also found that customer responding capability mediates the
influence of customer sensing capability on firm performance. This
result corroborates prior research on the sense–response–performance
system of relationships (Hult et al., 2005). Although a firm may sense
customer-based opportunities for innovation and competitive action,
the firm cannot reap the benefits of those opportunities if it cannot
respond to them quickly and effectively. In other words, a minimal
customer responding capability is still key to firm performance, even
when customer sensing capability is also strong.

6.1. Limitations

Our study has several limitations which should be noted. One
limitation is the use of the same respondent for both our independent
and dependent variables. Statistically, common method bias does not
appear to threaten the validity of our results. Furthermore, our two-
stage survey design should have reduced the potential for bias.
However, we note that using the same respondent might have upwardly
biased our results. Another limitation is the use of a single respondent
for organizational-level data. Although our respondents appeared to
possess sufficient knowledge of their organization's ability to sense and
respond to customers, as well as their performance relative to major
competitors, a multiple-respondent survey design would have strength-
ened the validity of our results.

6.2. Implications for research

Our study has a number of implications for research. First, we
synthesized various streams of literature and identified several key
characteristics which define firm's customer agility: 1) customer
agility is a capability which must be developed and nurtured by the
firm; 2) customer agility includes the ability to sense and respond to
market opportunities; and 3) customer agility implies an element of
quickness, or speed. This implies that future research should take into
account these three factors when conceptualizing and measuring
firm's customer agility. Our conceptualization of firm's customer

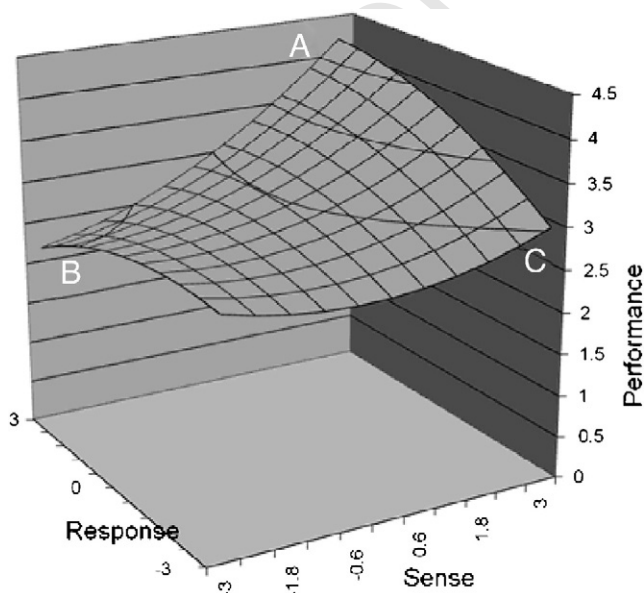


Fig. 1. Agility alignment as it relates to firm performance.

agility also introduces a dynamic, capability-driven approach to how firms sense and respond to shifting customer needs and preferences.

Our literature review and resulting definition allowed us to conceptualize different ways in which the sensing and responding components relate to each other. Sensing and responding capabilities need to be simultaneously developed and applied in order for firms to reap the benefits of agility (Haeckel, 1999; Overby et al., 2006). However, no work has conducted a comprehensive investigation of the ways in which sensing and responding can or should be aligned. We took into account two types of agility alignment: matching and mediation. The matching perspective implies that firm's customer agility is a "higher order capability" that requires matching between two lower order capabilities. This view is consistent with that of a hierarchy of capabilities (Winter, 2003). Organizations that invest in higher-order dynamic capabilities may be more capable of responding to "competence destroying" change than those who simply invest in routinizing the response to familiar types of change (lower-order capabilities). Thus, organizations that develop alignment between strong sensing capabilities and strong responding capabilities will be in a greater position to respond to customer-based market opportunities than organizations that simply develop either sensing or responding capabilities.

The mediation perspective suggests that agility is idiosyncratic to the nature of the stimulus. Firms sense opportunities and then respond accordingly based on a process. This process is socially constructed and unique to the firm (Day, 1994). Thus, the sense–response–performance process complements prior empirical research (Hult et al., 2005). In sum, agility has a general aspect as a higher order capability, but it also has an idiosyncratic aspect. Our study implies that researchers should take into account multiple perspectives of agility alignment when investigating agility-related phenomena.

6.3. Implications for practice

Our results suggest that managers should align their firm's sensing and responding capabilities. However, given the significant results for both the matching and mediation perspectives, we suggest that firms should invest in not only building alignment capabilities, but also the conversion processes that facilitate the true dynamic capability reflected in agility. Firms that have high sensing and responding capabilities can not only acquire and process information on product–market gaps, but also leverage this arbitrage by organizing themselves and configuring the resources to capitalize on it. Yet, to do this effectively, there needs to be an organizing process in place that can assimilate sensing information and structure the response. This could be in the form of ad-hoc committees, or ambidextrous structures that have the ability to do regular work, but also have the ability and slack to engage in higher order agility activities. The results of this study alert managers to the need for *both* matching (building both sense and respond capabilities) as well as mediation (developing process structures).

7. Future research and conclusion

We hope that this study adds more granularity to the agility construct. It reflects a capability that is increasingly important in today's hypercompetitive environments. However, in order to build on this work, far more research is needed on the nomological network around agility. This could include specific antecedents to sensing capabilities like social networks, their absorptive capacity, and the important role of information infrastructure and software to tap into important repositories. Additionally, the role of environmental scanning, its incidence, people and structures can shed light on the gatekeeping aspects of sensing capability. For responding, flexibility and speed in configuring people, technology, structure, strategy, and processes, would be key aspects to building capabilities. Slack resources should also facilitate a firm's ability to respond to environmental change.

Another stream of research can focus on the alternative outcomes of agile capabilities. How does it manifest itself into agile behaviors or actions? Characterizing these actions as innovative or ones that create competitive advantage, could be fruitful in backward chaining through the capability antecedents to determine successful causal sequences. Ultimately, the goal is to better understand how firms can develop and leverage agility. Related to this is the intriguing possibility to tradeoffs between investment alternatives in capability building. Our results suggest that firms might get a greater return on their marginal investments in sensing over responding capabilities. Theoretically, sensing capabilities need to be in place, while possibly firms can engage in "learning by doing" with respect to responding activities. Qualitative research might provide deep and unique insight into these areas. We hope that our study stimulates future research into how firms can effectively sense and respond to market opportunities to gain competitive advantage in dynamic environments.

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Appendix A

Since all of our measures were adapted from the literature to the current study, we gave careful consideration to the content validity of the measures. Three faculty members and seven doctoral students carefully assessed the wording of the items in the questionnaire. Based on their feedback, minor changes were made to the wording and design of the questionnaire. Next, phone interviews were conducted with three marketing professionals. The questionnaire was sent to these individuals a few days prior to the interview. The feedback gained from these interviews was incorporated into the questionnaire.

For our pilot test, we downloaded a mailing list of 1080 respondents from the Million Dollar Database, a directory of U.S. companies from all industries with sales of one million dollars or more, or 20+ employees, or branches with 50+ employees. These respondents held job titles consistent with our established criteria, such as "Marketing Manager", "VP Marketing", and "VP Sales & Marketing". Consistent with our target sample frame, we restricted our search to U.S.-based firms operating in high-tech industries.

Surveys were mailed to 400 individuals randomly selected from the initial set of 1080. Within four weeks, 18 completed surveys were returned (an effective 4.6% response rate). All 18 respondents fully completed their surveys. Respondents had an average of 18 years of marketing work experience, and an average of 10 years employment with their current organization. An exploratory factor analysis was conducted for each set of items. The results suggested that some items did not load well with others for the customer sensing capability and customer responding capability constructs. As a result, changes were made to the wording of some items.

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