

**RESPONDING TO THE CHALLENGE OF TRUE UNCERTAINTY:
STAKEHOLDER SENSING AND PREDICTIONS OF EMERGENT STRATEGIC ISSUES**

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Abstract

We construe a conceptual framework for responding effectively to true uncertainty in the business environment. We drill down to the essential micro-foundational capabilities - sensing and seizing of dynamic capabilities - and link them to classical strategic issue management theory with suggestions on how to operationalize these essential capabilities. By definition true uncertainty represents environmental conditions that are hard to foresee, which can catch the unprepared by surprise while presenting opportunities to the conscious organization. We demonstrate that organizations relying on aggregation of stakeholder sensing and predictions of emergent strategic issues can positively influence the two capabilities and help the firm adapt in the face of uncertainty and unpredictability. Robust measures predicating performance based on information from key stakeholders involved in the firm's core operations provide faster, more accurate, and updated insights about environmental developments identifying important strategic issues and solutions to them. This provides corporate decision-makers with a proactive tool in the quest for timely and effective strategic responses.

Keywords: Dynamic capabilities, Environmental sensing, Organizational adaptation, Stakeholders, Strategic issues, Uncertainty

Introduction

How often have we not heard about environmental changes that took everybody by surprise and made it virtually impossible to take corrective actions in time that could have deflected the negative impacts on firm performance? Watkins and Bazerman (2003) refer to “predictable surprises” submitting to the fact that we, as human beings, often prefer not to see what is going on while sticking to convenient beliefs about our surroundings where higher awareness about environmental changes might help us see the ‘unpredictable’. The recent financial crisis illustrates the point as only a minority of alert market players shouted any warnings. We typically conceive of such crises and events as something negative even though the ability to foresee them just a little before everybody else, and acting on it, seems to present even larger differentiating opportunities.

The concepts of risk and uncertainty have been defined by Knight (1921) where risk relates to situations where the probability distributions of outcomes are known whereas in the case of uncertainty, probabilities and effects are unknown. However, as argued by Bettis (1982): “Almost all authors after noting this distinction ignore it and use risk and uncertainty interchangeably”. As a consequence, uncertainty is also referred to as ‘true uncertainty’ to remind us that we are in fact talking about uncertainty. In the following we will use the expressions interchangeably. Risk practitioners refer to ‘emergent risks’ by which they mean risks “that have not yet occurred but are at an early stage of becoming known and/or coming into being and expected to grow greatly in significance” (Richardson and Gerzon, IRM). So, risk professionals try to pay attention to the changing business conditions by gauging into the future. Many scholars have described this as, e.g., continuous rule changes from ongoing innovation under ‘hypercompetition’ (D’Aveni, 1994) or unpredictable shifts in technology and industry

paradigms (Bettis and Hitt, 1995). This has urged preparedness for the unexpected (Weick and Sutcliffe, 2007) and dealing with ‘unknowability’ (Andersen and Schröder, 2010) in the face of temporary (D’Aveni, Dagnino and Smith, 2010) or transient advantages (McGrath, 2013).

The concept of dynamic capabilities has been advanced as a promising framework to deal with environmental uncertainty and change (Teece, Pisano and Shuen 1997; Teece, 2007) but developing concrete operationalizations of dynamic capabilities has been more than challenging (e.g., Galunic and Eisenhardt, 2001; Arend and Bromiley, 2009). In short, there is a call for new practical approaches that can help organizations deal effectively with the challenges of uncertain and unpredictable business conditions that have been so eloquently described in the literature over the past decades. Hence, this paper introduces an approach to operationalize the micro-foundations of dynamic capabilities, *sensing and seizing*, by linking them to strategic issue management (Ansoff, 1980) in a way that can help strategic decision-makers exploit advance environmental insights about the firm’s own performance as the means to deflect emergent risks and exploit evolving opportunities.

In the following we first outline a theoretical rationale for dealing with (true) uncertainty and link it to prevailing thinking in the strategic management field. Then we review the literature on firm responsiveness to environmental uncertainty outlining the micro-foundations of dynamic capabilities and discuss how this conceptual framework can deal with environmental uncertainty by concrete operationalizations of the sensing and seizing capabilities (Teece, 2007). We develop propositions on how stakeholders can provide ‘weak signals’ about emergent developments relying on sensing and predictions for strategic issues identification that decision-makers can use to seize fast responses. We discuss how decision-makers can gather and integrate this updated information in ongoing decision processes to prepare for uncertainty and generate effective

strategic actions. The implications for strategic management are considered with suggestions for future research.

Uncertainty and dynamic response capabilities

In the strategic management literature the ability to manage environmental uncertainty is considered essential for firm survival (Schendel and Hofer, 1979; Ansoff, 1980; Porter 1980; Bettis and Hitt, 1995). While pending crisis may signal a potential for substantial harm to an organization, an alternative way of looking at it is that emerging challenges have been the key driver of human ingenuity and economic development over time where environmental threats were the very source of opportunities for societal advancement (Bernstein, 1996). Frank Knight (1921) famously conceived of risk as events where economic outcomes can be assessed on the basis of known probability distributions whereas uncertainty relates to events where the outcomes are hard to quantify and maybe even to foresee. Whereas this may be caused by the uniqueness of one-time environmental incidents, the inability to quantify potential outcomes can also arise from ignorance. That is, if decision makers fail to stay alert, and openly discuss and search for possible occurrences in advance, there is a higher likelihood that they will be taken by surprise when the unforeseeable happens. The challenge then becomes how decision-makers can best gather updated information that can be used to prepare for the unexpected.

An organization with high awareness about future crises and consciousness towards possible events and scenarios, and that continuously tries to gather relevant environmental information, will be less prone to surprise, and consequently will be dealing with risk as opposed to uncertainty compared to peers in the same industry (Weick, 1988). In fact, Knight (1921) argued that the ability to deal effectively with uncertainty is the very basis for generating excess

economic returns, so accepting the challenge of uncertainty and trying to understand its dynamic for strategic exploitation can be an essential source of competitive advantage. In line with this thinking, Ansoff (1980) argued for the need of strategic issue management (SIM) systems that continuously scan for uncertainties and unexpected developments in the environment and devise responses to them in a timely manner. Here a strategic issue can be seen as an impending uncertainty development that may arise, whether inside or outside of the organization, and that can affect the ability of the enterprise to meet its goals.

Contemporary strategic thinking considers dynamic capabilities to be the essential micro-foundations for managing environmental uncertainty and change processes (Teece, Pisano and Shuen 1997; Teece, 2007). Specifically, the dynamic capabilities enable organizations to create, deploy, and protect their intangible assets that support superior long-run business performance. The micro-foundations of dynamic capabilities are comprised by the distinct skills, processes, procedures, organizational structures, decision rules, and disciplines embedded in three core capabilities: (1) Sensing environmental changes to identify threats and opportunities, (2) seizing resources into viable business opportunities, and (3) reconfiguring the organization by recombining resources in structures that can exploit the opportunities under the new market and technological conditions (Teece, 2007). Hence, sensing is the ability to obtain early signals about things to happen and seizing is the ability to mentally grasp these signals and use them to capture new opportunities for fast advantage. Thus it is argued that organizations with strong dynamic capabilities are highly entrepreneurial because they are adept to the surrounding business ecosystem and can respond to it through new innovations (Teece, 2007). Organizational reconfiguration deals with the ability to adjust and implement the responses, which reflects a different aspect of organizational adaptability. In this paper, we focus more squarely on the

organization's environmental awareness in processing early signals and its preparedness capacity in devising innovative responses as the necessary prerequisite for adaptive moves.

The firm's primary stakeholders are important micro-foundational agents for the sensing and seizing capabilities because they gain intimate first-hand insights about the firm through ongoing business interactions (Bosse, Phillips and Harrison, 2009; Harrison et al., 2010; Bridoux and Stoelhorst, 2014). Hence, many scholars incorporate a stakeholder perspective as an essential element of their strategic management theories (i.e., Dill, 1975; Mitroff and Emshoff, 1979; Newman, 1979; Taylor and Sparkes, 1977; Wommack, 1979; Ackermann and Eden, 2011). It is commonly agreed that considering the essential needs and demands of the primary stakeholder groups is paramount for achieving high performance and hence these constituents possess important current knowledge about the firm's ability to accomplish that (Harrison et al., 2010; Ackermann and Eden, 2011). What is interesting in our context is that a number of new techniques have emerged in recent years that make it possible to systematically collect stakeholder insights that also may predict how the firm is expected to perform. These techniques seek to aggregate what is sometimes called the wisdom of the crowd (e.g., Surowiecki, 2004; Sage, 2007) where information from a broader set of constituents is gathered and used to gain more precise reconnaissance. The adoption of such information aggregation markets within organizations has fostered new market-hierarchy hybrids with a variety of emerging practices and organizational forms (Felin and Zenger, 2011). The most predominant organizational information aggregation approach is the use of prediction markets (for a description see Wolfers and Zitzewitz, 2004). A few empirical studies have also explored a new continuous information aggregation technique and found that sensing data collected from frontline employees about

changes in operating conditions have significant predictive power (Hallin, Tveterås, Andersen, 2012; Hallin, Andersen and Tveterås, 2013).

While the dynamic capabilities concepts has received much attention, the mechanisms of the sensing and seizing capabilities that are so essential for the firm's ability to respond to uncertainty have largely been treated at a conceptual theoretical level. To give the dynamic capabilities managerial relevance they must be turned into concrete operational approaches, which is difficult because they constitute multifaceted constructs. Capability measures in empirical studies use a variety of more or less credible proxies, and approaches that operationalize dynamic capabilities remain scarce (Henderson and Cockburn, 1994; Williamson, 1999; Galunic and Eisenhardt, 2001; Arend and Bromiley, 2009). Hence, we suggest a practical approach to operationalize the sensing and seizing capabilities of the micro-foundations framework (Teece, 2007). This work draws on the strategic issue management (SIM) system proposed by Ansoff (1980), primary stakeholders as essential sensors for uncertainty identification and predictors of emergent strategic issues, multilevel methodologies to source stakeholder sensing and predictions about emergent strategic issues derived from both internal and external stakeholders, and adoption of new information aggregation techniques (Wolfers and Zitzewitz, 2004; Hallin, Tveterås and Andersen, 2012; Hallin, Andersen and Tveterås, 2013). We frame the ongoing performance prediction and strategic issue identification processes on environmental sensing collected and aggregated from multiple individuals among the firm's primary stakeholders.

Responding to environmental uncertainty

Ansoff (1980: 133) pointed to the identification of strategic issues related both to the firm's internal and external environments. He defined a strategic issue as an impending uncertainty development that either can happen inside or outside of the organization, and that will have an effect on the firm's ability to meet its strategic objectives. A strategic issue may be a positive uncertainty, which is an opportunity to be grabbed in the environment, or it may constitute an internal strength, which can be exploited for firm advantage. Yet, it may also be an unwelcome external threat, or an internal weakness, that can put the firm at risk for continuing survival. Frequently, external threats (uncertainties) can signal significant changes to come in the environment, and can possibly be converted into new opportunities through entrepreneurial management. Ansoff (1980) suggested the need for a new type of strategic issue management (SIM) system in the field of strategy due to a growing appearance of rapid uncertainties deriving from unexpected sources and that subsequently quickly can exert a significant impact on the enterprise. Specifically, the combination of speed and novelty of strategic issues make them too fast to permit timely perception and response within the conventional annual planning and budgeting systems. Some, and possibly some of the most important, of these issues may occur between the periodic planning cycles with impacts materializing so fast that intervention cannot be delayed to the next planning cycle. However, other strategic issues may concur with the planning cycle and become part of the considerations made for forthcoming planning period.

Although strategic issue management was suggested in the early development of the strategic management field (Ansoff, 1980) there is still a void in the theoretical and empirical foundations of these early warning systems and effective integration of emergent issues into the strategic management process. Nonetheless, the importance of uncertainty management systems has been noted and recognized by several strategy scholars in discussing the contemporary

challenges in strategic management related to the increasing turbulence in the business environment. This has identified a need for strategic response capabilities (Bettis and Hitt, 1995), dynamic capabilities (Teece, Pisano and Shuen, 1997; Teece, 2007) and dynamic managerial capabilities (Adner and Helfat, 2003) to reconfigure organizational resources as environmental conditions change.

The notion of dynamic capabilities as the ultimate source of competitive advantage in dealing with environmental change and uncertainty has brought the concept to the forefront of strategic management research (Teece, Pisano and Shuen 1997; Helfat et al. 2007; Teece, 2007). Dynamic capabilities are defined as the firm's ability "to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece, Pisano and Shuen, 1997: 516) and "purposefully create, extend, or modify" the resource base (Helfat et al., 2007: 4). The dynamic capabilities approach is said to comprise the ability to sense changes and identify threats and opportunities, to seize available resources around viable business opportunities, and reconfigure the organization by recombining available resources to exploit the opportunities under the new environmental conditions (Teece, 2007).

The dynamic capabilities arguably consist of a collection of different routines (Winter, 2003; Foss et al., 2011) and serve to change the products, the operating processes, the production scale, the market segments and customers served by the firm (Winter, 2003). That is, dynamic capabilities can help the organization reconfigure its resources into new valuable configurations of operational capabilities (Eisenhardt and Martin, 2000). They have also been conceived as strategic renewal where both incremental and discontinuous transformations can contribute to organizational changes (Agerwal and Helfat, 2009). As such, they comprise an ability to create and select new products, services and processes that can adapt the organization to environmental

changes and constitute (some of) the means to accomplish this on an ongoing basis. Empirical studies suggest that dynamic capabilities are associated with high product and service quality and fast cycle time (Henderson and Clark, 1990; Lansiti and Clark, 1994). That is, dynamic capabilities are described as timely innovations where internal and external competences are coordinated and redeployed in response to changes in the business environment (Teece, Pisano and Shuen, 1997; Helfat et al., 2007).

However, the dynamic capabilities framework has been criticized for lack of precise definition, empirical grounding, and measurement (Williamson, 1999) where capability measures use a variety of proxies (Henderson and Cockburn, 1994). Galunic and Eisenhardt (2001) argue that the existence of dynamic capabilities often is assumed without specifying their exact components based on studies conducted at single organizational levels. Arend and Bromiley (2009) contend that the “plethora” of proxies provide unusual, imprecise, and even contradictory measures of dynamic capabilities. Winter (2003) further argues that dynamic capabilities are “born, not made” and he questions whether they even exist in practice. And, even if dynamic capabilities do exist, they are not useful for managerial action, if managers cannot recognize them in practice (Grant, 1996).

It is the sheer theoretical diversity of the dynamic capabilities concept that makes it impractical as a concrete methodological approach to deal with a rapidly changing environment. Yet, we observe a strong conceptual understanding of a new competitive environment that requires special capabilities to be handled effectively for ongoing and persistent value creation. To drill down to the very essential mechanisms of dynamic capabilities for how to adapt to uncertainties we summarize the prior theoretical review of uncertainty responses and dynamic capabilities in a theoretical framework.

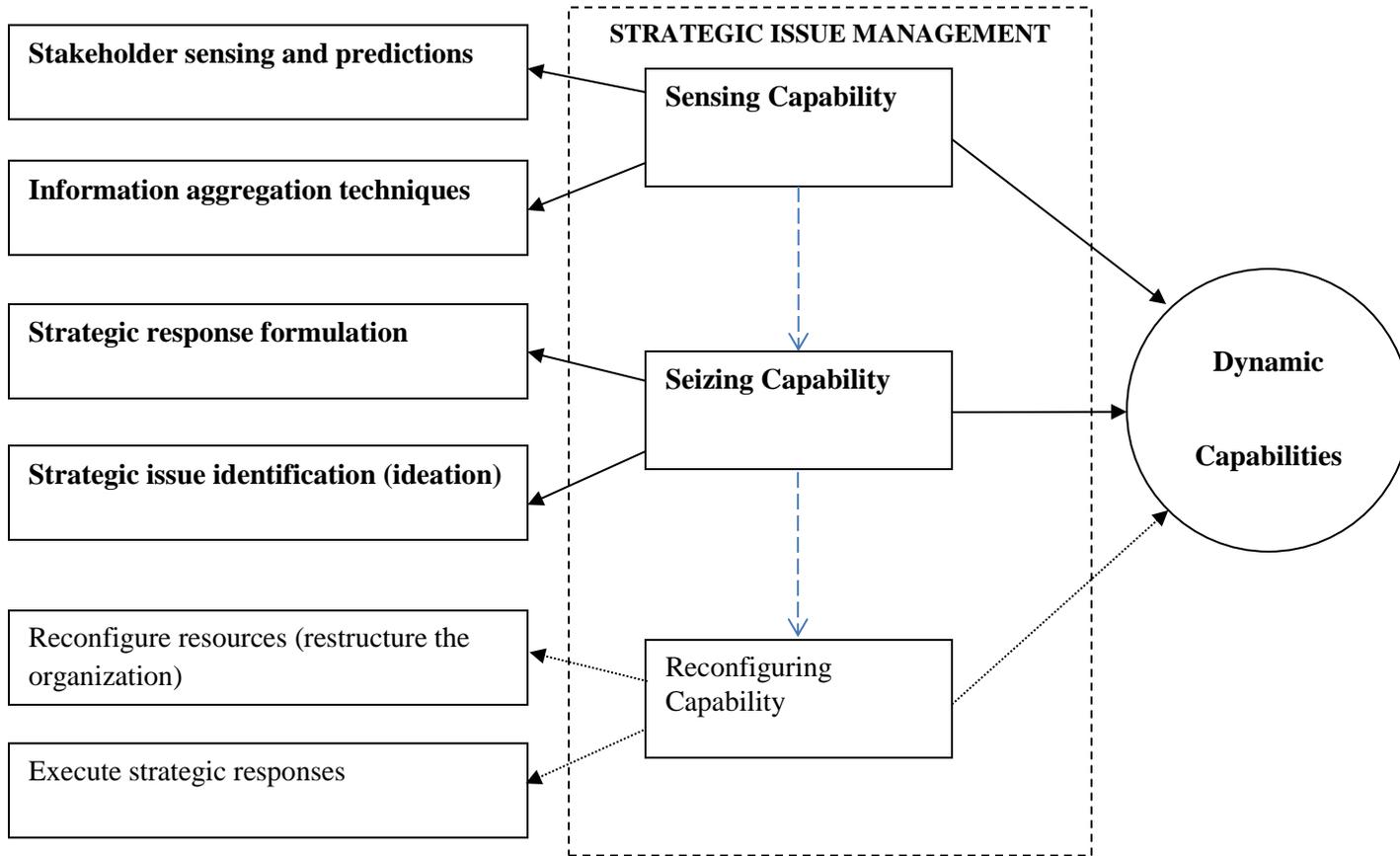


Figure 1. A Model of Strategic Issue management

Figure 1 presents how the three different micro-foundations capabilities can be effectively operationalized using stakeholder sensing and predictions of strategic issues. The framework consists of three primary dynamic capability constructs: *Sensing*, *seizing* and *reconfiguring* (Teece, 2007). In this conceptual paper, we frame the ideas of continuous sensing and prediction aggregation for strategic issues identification and incorporate the dynamic capability framework into an overall strategic management system (Ansoff, 1980). That is, we conceive the purpose of dynamic capabilities as strategic renewal through the aggregation of emergent strategic issues, as derived from pending uncertainties, that can contribute to organizational changes (Agerwal and Helfat, 2009). In view of this, we suggest that stakeholder

sensing of environmental change and opportunities is an essential starting point to operationalize dynamic capabilities and deal more effectively with uncertainty.

The sensing capability is related to stakeholder sensing and predictions of emergent strategic issues and the use of information aggregation techniques to extract that. *The seizing capability* is comprised by stakeholder issue identification where the aggregated sensing data identifies threats and opportunities in the current state of firm operations and a sensing function that can generate alternative solutions for the identified strategic issues and foster responsive innovations (ideation). Hence, the sensing-prediction information generated by primary stakeholders can provide a wide range of suggestions and ideas about how to respond to the impending environmental changes. That is, the process identifies potential problems and opportunities and provides possible solutions dealing with the identified issues that can be considered. This helps decision makers perform problem sensing, or issue identification, while conceptualizing effective responses to anticipated environmental changes (Kiesler and Sproull, 1982; Eisenhardt, 1989; Heinrichs and Lim, 2008). It also incorporates the decision makers' mental models and strategic response patterns that must be balanced by an ability to formulate strategic responses for decision making. The discussion of viable responses must draw on the creation, retention, sharing, and transfer of insights and knowledge from the anticipatory processing of many and diverse stakeholders to challenge existing mental models. The organizational performance metrics adopted by the stakeholder informants are used to assess and evaluate the result of alternative strategic responses (Heinrichs and Lim, 2008). That is, the decision makers' formulation of strategic responses will draw on ideation information about strategic issues generated by the stakeholders.

The reconfiguring capability relates to the actual execution of the problem/opportunity solutions uncovered from stakeholder sensing and predictions and strategic issue identification and relies on the ability to implement the formulated strategic responses. This capability essentially depends on the flexibility and modularity of available resource and competencies as they are recombined into the new adaptive solutions. They also relate to the ability of corporate decision makers to communicate and motivate the organizational actions needed to execute the strategic responses and as such is more linked to the literatures on strategy implementation and strategic change processes.

Stakeholder sensing and predictions

A main purposes of strategic management expressed in the literature is to explain why some firms outperform others (Rumelt, Schendel, and Teece, 1994). The stakeholder concept has played an important role in this discussion during the early development of the strategic management field (Harrison et al., 2010). For instance, Taylor (1971), in his review of corporate strategy practices, assumed that stockholders would eventually take on a planning approach that incorporates a broader group of stakeholder interests. As the strategic management field evolved, many scholars have incorporated a stakeholder perspective into their strategic management theories (i.e., Dill, 1975; Taylor and Sparkes, 1977; Mitroff and Emshoff, 1979; Newman, 1979; Wommack, 1979; Ackermann and Eden 2011). The common argument is that firms must adopt a broad strategy-making perspective incorporating the needs and demands of all the primary stakeholder groups to ensure high performance outcomes (Harrison et al., 2010; Ackermann and Eden, 2011).

Stakeholders are seen as the varied nature of demands that are put on the organization. However, as Mitchell, Agle, and Wood (1997) point out, the broad concept of stakeholder management must be better clarified to serve the interests of the firm's legitimate stakeholders that are involved and have direct dependencies with the firm. So, proponents of stakeholder theory contribute to the micro-foundations of dynamic capabilities by suggesting that stakeholder effects derive from mechanisms at individual level. This applies to how stakeholder motivation (Bridoux and Stoelhorst, 2014), perceived fairness (Bosse, Phillips and Harrison, 2009), and sense of organizational justice and trust (Harrison et al. 2010) can affect competitiveness and firm performance.

We define stakeholders as those that are most closely associated with the firm's operations comprising those who have accumulated sufficient knowledge about operational processes or external factors that influence the organization to form credible sensing and anticipations about a future state of the firm. In line with Harrison et al. (2010), we consider these groups to be the primary organizational stakeholders, such as, employees and managers, customers, suppliers, and the firm's owners (i.e., shareholders, partners and/or members). Due to the close operational ties, the sensing and predictions of primary stakeholders have strong predictive power and thereby can contribute significantly to the micro-foundations of the firm's sensing capabilities.

Environmental sensing is categorized as a capability that is difficult to replicate by other firms as it serves as a basis for competitive heterogeneity and firm-specific uniqueness (Teece, 2007). The sensing capability depends in part on individual cognitive capabilities and the learning capacity of the organization where the individuals belong (Burrell and Morgan, 1979; Daft and Weick, 1984). It is argued that companies are vulnerable and exposed to too much

uncertainty, if the sensing and learning functions are left only to few decision-makers (Teece, 2007). In other words, using sensing information from many primary stakeholders to identify strategic issues and seize new opportunities can provide more accurate and current information that helps the firm adapt its strategic direction.

Hodgkinson and Healey (2011) organize and outline fundamental sensing capabilities based on Teece's (2007) micro-foundations framework. They argue that "opportunity discovery and creation originate from the cognitive and creative ('right brain') capacities of individuals, requiring access to information and the ability to recognize, sense, and shape developments and groups to blend effortful forms of analysis with the skilled utilization of less deliberative, intuitive processes" (Hodgkinson and Healey, 2011: 1502). They call for more emphasis on the psychological foundations of sensing, asserting that sensing embeds both reflexive (e.g., intuition, implicit associations) and reflective (e.g., explicit reasoning, cognitive and emotional capabilities). Hence, sensing generates prediction processing, which refers to any type of processing that incorporates or generates, not just information about the past or the present, but also future states of the surrounding environment (Bubic, Cramon, Schubotz, 2010). A particular advantage of reflexive processes is the ability to see through plenty of information about trends in the business environment to reach general judgments on threats and opportunities (Hodgkinson and Healey, 2011). Llinas (2002) for instance finds that prediction processing saves resources and makes it possible for the receiver to prepare an appropriate reaction. As such, predictions can lead to faster recognition and interpretation of events encountered in the environment (Bar, 2007) thus limiting the repertoire of potential responses applied to such events.

Interpretations and intuitive processes derive from social actions where shared meaning is formed through everyday interactions among people (Daft and Weick, 1984; Walsh and Ungson, 1991). Hence, we focus on the importance of ongoing sensing and predictions of emergent strategic issues among networks of stakeholders for strategic adaptation purposes (Ansoff, 1980). Until now only few empirical studies have looked into the micro-level empirical foundations of stakeholder sensing and predictions to understand their implications for firm performance (Hallin, Tveterås, Andersen, 2013; Hallin, Andersen and Tveterås, 2013). Yet, it is argued that organizations that incorporate intuition (predictions) into their repertoire of sensing capabilities will identify and respond to threats and opportunities more effectively than organizations that rely solely on analytic approaches (Hodgkinson and Healey, 2011). These arguments lead to the following proposition:

Proposition 1: Data collected from the environmental sensing of the firm's primary stakeholders can effectively identify emergent strategic issues as input to a strategic issue management system.

To illustrate the practical implications of this proposition, consider the role of central management. They are typically removed from the daily operational activities, due to limited time and many pressing executive duties, where they otherwise could sense the efficacy of operational capabilities and environmental changes. Their primary responsibility is to lay out strategic plans and ensure the firm will reach the long-term goals. When executives engage in social interactions it is primarily with other leaders from relevant industry networks and with management teams in the organization. Hence, frontline employees, daily customers and essential suppliers that are involved in frequent operational transactions have a more precise and

accurate sense of the qualitative state of firm's operational performance that can point to emergent strategic issues. As frontline employees, customers and suppliers engage in business execution and interact with peers from competing businesses and within the industry, they gain detailed insights about changing conditions and other stakeholder sentiments about the quality of internal firm competencies in dealing with changes. These insights provide an intuitive understanding of internal strengths and weaknesses and the ability to deal with emerging needs and opportunities that cannot be accessed elsewhere in the organization. For example, the idea behind customer-driven strategies is to satisfy the needs of the customers at all times although it is hard to know precisely what they are. Collecting the sensing impressions from many individuals in the customer stakeholder network on a continuous basis can provide updated information of this nature that also provides information to reveal emerging environmental changes.

Information aggregation

The idea of imposing decision structures and processes that can use aggregated locally held knowledge to cope with environmental uncertainties has long been discussed in economics and social science (e.g., Hayek, 1995). To deal with strategic issues, firms can establish a strategic issue management (SIM) system as a systematic procedure for early identification and fast response to important changes both inside and outside the firm (Ansoff, 1980). In that way early identification can be assured that otherwise would be missed in the long-cycled strategic planning process. SIM operates within the annual planning period as a real time system that continuously updates strategic issues during the year, which in practice may mean monthly reviews and updates of key strategic issues. This requires continuous surveillance, both inside

and outside the organization for fast issues arising between annual reviews issuing warning signals when issues are identified to alert management of the need for action.

To extract dispersed knowledge about important environmental uncertainties a number of new techniques have emerged in recent years. The techniques seek to aggregate what is referred to as the wisdom of the crowd (Surowiecki, 2004; Sage, 2007) where information from a broader set of constituents is gathered and used to gain more precise information. Collective wisdom is the ability of a population or group of individuals to make an accurate forecast of a future outcome or an accurate characterization of a current outcome (Sage, 2007).

Few studies have demonstrated the importance of frontline employees' to sense and form accurate predictions about changes in the firm's operational capabilities (Hallin et al., 2013). However, by comparing sensing and predictions from several groups of individuals over time, it is possible to look closer on the conditions for a crowd to be more successful in its predictions. Studies have already looked at the conditions that should be met in order to make strong predictions (Page et al., 2004). They conclude that for "wisdom" to emerge, the group must be sophisticated and sufficiently diverse in order to be "smart", i.e., able to make good predictions (Page et al., 2004). This has been embraced by several scholars that advocate more research that will look at constituents at multiple levels of the organization to gain a more holistic understanding of organizational phenomena (Gupta, Tesluk, and Taylor, 2007; Klein and Kozlowski, 1999; Hitt et al., 2007).

A multilevel information sampling assumes that organizations are made of interacting "layers". A layer can be firms, divisions, departments, groups, teams and individuals. Several authors agree that organizations must be understood as multilevel systems, which means that adopting a multilevel perspective is fundamental to understand real-world emerging phenomena

(Rousseau, 1985; Kozlowski and Klein, 2000). Surowiecki (2004: xx) finds it mystifying how little interest corporations have shown in these approaches. Where corporate strategy is about collecting information from many diverse sources and evaluate the likelihood of different outcomes to make better decisions in an uncertain world, the prediction markets seem tailor-made for that task. However, companies have for the most part remained reluctant to use this source of potentially excellent strategic information, and have been surprising unwilling to improve their decision-making by tapping into the collective wisdom of their primary stakeholders. These arguments lead to the following proposition.

Proposition 2: Collecting environmental sensing data from stakeholders at multiple levels in the organization can gain more accurate information about the firm's emergent strategic issues.

A few practical examples can illustrate the implications of the proposed relationships. The Iowa Electronic Markets, The Policy Analysis Market, The Hollywood Stock Exchange as well as many academic studies have shown that a diverse crowd of stakeholders, consisting of involved but independently thinking people, is better at sensing and predicting the future than the brightest experts among them on their own (Coles, Lakhani, McAfee, 2007). So, it is important to examine how sensing and prediction by different groups can affect predictions.

Seizing predictions

There are different perspectives on what constitutes the most effective techniques for strategic response formulation. One perspective emphasizes the idea that too much richness of information will slow the strategic decision-making process. In this view, decision-makers must obtain input from few sources to achieve quick decisions (e.g., Mintzberg, 1973; Nutt, 1976).

Another view advocates autocratic decision-making when speed is essential (Vroom and Yetton, 1973) because the involvement of many decision-makers will lengthens the decision process (March and Olsen, 1976), which is consistent with proponents of power centralization as a natural response to high uncertainty situations (Staw, Sandelands and Dutton, 1981). It is also argued that political conflicts (Mintzberg, Raisinghani and Theoret, 1976) and powerful factions (Hickson et al, 1986) can trigger interruptions in the decision-process and slow the speed of decisions. Conversely, organization theory suggests the structural solution to deal with the increased information processing demands imposed by higher uncertainty is to move decision power down the organization closer to the relevant local knowledge (Daft and Lewin, 1993; Child and McGrath, 2001). That is, decentralization is advocated under pervasive uncertainty (e.g., Child, 1997; Bigley and Roberts, 2001). All the while it is recognized that for dispersed decision-making to be effective, there is a need for integrative organizational processes (Hill, Martin and Harris, 2000) within more rigid organizational structures.

Decision making research acknowledges that prior research has not eliminated the main barriers for effective strategy formulation, namely that decision-makers find it difficult to make decisions under conditions of (true) uncertainty (George, 1980). Bourgois and Eisenhardt (1988) find that fast strategic responses are associated with high firm performance and Eisenhardt and Bourgeois (1988) confirm that politics can slow the decisions. In a study by Eisenhardt (1989) performed in eight microcomputer computer companies, she finds that fast decision-makers collect more information and develop more alternatives than do the slow decision-makers. She further finds that the involvement of multiple knowledgeable informants coupled with instant access to updated on-line data sources provide the best decisions information (Eisenhardt, 1989). However, to remain effective any outstanding discrepancies must eventually be reconciled by a

central decisions-maker or power broker. So, centralized decision-making does not constitute a fast process, but rather a process of layered advice from experienced counselors in formulation strategic alternatives while integrating current information from various updated sources will speed up decisions in high-velocity environments and reach better outcomes. These findings indicate that information aggregation of diverse knowledge from multiple sources can help decision-makers in the response formulation process. The review of responsive decision processes suggests the following proposition.

Proposition 3: Firms that collect environmental sensing data from stakeholders at multiple levels in the organization to inform the response formulation process reach faster and better decisions.

So which information system facilitates effective information collection from different crowds of stakeholders? Ansoff (1980:134) suggested that fast response to strategic issues can be maintained in the following complementary ways: (1) The responsibility for managing the system is maintained by senior management with the resources and authority to initiate prompt action without unnecessary delays. If necessary, maintenance of a strategic issue management system may cut across normal hierarchical organizational lines (e.g., senior management, middle level managers, operational employees and customers). (2) Management assigns responsibility for individual issues directly to the units that are best equipped to deal with a response, even if this means reaching across several hierarchical levels. (3) The allocated responsibilities are not to plan a response but to resolve the issue. Thus SIM is a *management action* (and not only a planning) system. With several planned strategic projects under way and continuous updating and revision of the strategic issue list, the usual separation between planning implementation periods is not visible in SIM.

But how do decision makers collect the proper information to effectively identify strategic issues for decision making within a strategic issue management system? We argue that stakeholder sensing and seizing information can contain valuable insights for uncertainty predictions, e.g., about development in sales, markets, team performance, managerial performance, innovativeness, competitiveness, etc. (Hallin, Tveterås, Andersen, 2013). Stakeholders can also provide explanations for *why* they expect the environmental uncertainty as they do and thereby point to possible counteractive resolutions of those developments. As stakeholders engage directly in the firm's business execution, they gain detailed insights about changing conditions and the quality of internal competencies in dealing with such changes. This provides an intuitive understanding of *why* certain developments happen and become strategic issues. Consequently, this information will provide indications to the management team about what the underlying problems are related to the identified strategic issues thereby effectively locating the causes of emergent strategic issues. By observing how the daily operational transactions are performed, frontline employees will sense emerging operational problems that over time can mount to major problems and potential threats for firm survival. The aggregated sensing and prediction information from frontline employees on *operational problem identification* can provide management with knowledge about different areas of organizational operational the strategic issues derive from (Hallin et al. 2013). This leads to the following proposition.

Proposition 4: Firm's that collect explanations (ideation) from stakeholders about their sensing and predictions about emergent environmental strategic issues will have better response formulations and more effective responsive decisions.

Discussion and conclusions

The perceptions of dynamic capabilities as a hidden and intangible asset have caused mystery and confusion (Winter, 2003). This confusion has made it difficult for managers to understand, measure, and act upon concrete operationalizations of the dynamic capabilities. Dynamic capabilities have furthermore been criticized for a lack of empirical grounding and measurement (Williamson, 1999), and “weak attempts” to measure them using distant proxies (Henderson and Cockburn, 1994; Arend and Bromiley, 2009). In this article, we have developed a conceptual model proposing concrete mechanisms, measures, techniques, and approaches to make the sensing and seizing capabilities operational constructs. The implication of this is the development of a forward-looking prediction methodology that can identify emergent strategic issues that can be utilized for dynamics strategy-making processes. This offers a new dynamic way of managing strategic uncertainty by way of predicting performance for strategic issue identification and identifying solutions for the response formulation process. Applying this conceptual method in conjunction with fast strategic issue management (SIM) systems can feed strategic decision-makers with continuous and up-dated information from the organizational grapevines about environmental developments that reveal emergent threats and opportunities that can help management deal more effectively with turbulent environmental conditions.

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