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Understanding dynamic capabilities: progress along a developmental path

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Introduction

The aim of dynamic capabilities research is ambitious: to understand how firms can sustain a competitive advantage by responding to and creating environmental change (Teece, 2007). As one of the most central and difficult questions within the strategy domain, this might well be characterized as the Holy Grail of strategic management. The topical domain of dynamic capabilities, in consequence, is as broad and as complex as any in the field. It spans the domains of strategy process and content, and involves multiple levels of analysis, from managerial decision-processes, to organizational routines, to competitive interactions and environmental change. The complexity of the topic is matched, fittingly, by the complexity of the theoretical underpinnings. Undoubtedly, this has generated some confusion. It is therefore not surprising that the critique of Arend and Bromiley (A&B) in the preceding essay reflects some of this confusion. Here, we address this by clarifying the dynamic capabilities concept, in relation to its development and the challenges faced.

We first survey the development path of dynamic capabilities research, and discuss the different theoretical bases of this emerging area of scholarship. Then we clarify issues regarding the definition of dynamic capabilities and discuss the link between dynamic capabilities and firm performance. As part of our analysis, we address the two main conclusions of A&B regarding dynamic capabilities research. The first is that we should abandon the dynamic capabilities approach if it does not 'quickly develop a theoretical foundation'. The second is that regardless of the pace of theory development, we should replace these efforts with 'work on strategic change tied to fuller theories of strategic organization'. In what follows, we explain why these conclusions are premature and unwarranted. We also address other issues raised by A&B, focusing on the main issues raised in the body of their commentary.[1]

Theory development in dynamic capabilities

Emerging and evolving theories develop slowly, over long periods of time. As Williamson (1999: 1094) observes, 'big ideas often take a long time to take on definition'. This was certainly the case for transaction cost economics, which, early on, was viewed as a tautological concept with no testable or practical implications; it took 35 years before scholars were able to operationalize this theory and begin testing it empirically (Williamson, 1993a). The process of developing evolutionary economics took place, likewise, over many years (Nelson and Winter, 1982). Even the comparatively simple concept of bounded rationality, which evolved out of Barnard's (1938) notion of 'intended rationality', took a long time to take shape and take hold (Williamson, 1993b).

Theory concerning dynamic capabilities has had little time to develop, in relative terms. As a field of inquiry, it is still in its infancy; the work remains mostly conceptual and focused on foundational level issues, including the definition of the term (see, for example, the bibliographic evidence provided by Di Stefano et al., 2009). As Kuhn (1970) notes, early versions of new theoretical ideas tend to be rough around the edges. Terms that are vague and elastic may offer the advantage of facilitating a more flexible development path (Winter, 1995).

A&B fault dynamic capabilities research for its lack of clarity, oversimplified dynamics, unresolved measurement issues and weak empirical support. What they fail to see is that these so-called 'deficiencies' are the tell-tale signs of early-stage development of an area of inquiry. They expect a good deal more of young, emerging fields than we think reasonable. This is evident from their assertion that theories 'need to start with something that looks like a theory or a model'. To us, this seems rather like Athena springing forth from Zeus's forehead fully armed. Their notion of how theories develop seems especially ill-suited to management research, which seeks to understand complex, real-world phenomena. Theories that make sense of complexity do not come neatly prepackaged, and often develop slowly.

Although dynamic capabilities began as an 'approach' to understanding strategic change (Teece et al., 1997), rather than as a 'theory', there are clearly identifiable theoretical foundations. Chief among these is evolutionary economics (Nelson and Winter, 1982) from which the attention to routines and path dependence derives. Evolutionary economics draws heavily on Simon (1947) and Cyert and March (1963), giving dynamic capabilities a direct behavioral birthright.[2] In contrast to the assertions of A&B, dynamic capabilities directly address concerns rooted in behavioral theory, including organizational growth, routines and processes, organizational learning and managerial decision-making (see, for example, Helfat et al., 2007; Teece, 2007; Zollo and Winter, 2002). Eisenhardt and Martin's (2000) influential treatment explicitly uses an organization theory (and thus behavioral) lens to analyze the processes that underpin dynamic capabilities.

The dynamic capabilities concept is also rooted in the resource-based view (RBV), with its foundation in Ricardian economics (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984). This is a logical consequence of the mutual concern with firm capabilities that have the potential to confer competitive advantage. As Helfat et al. (2007) make clear, the question of whether a specific dynamic capability can confer a competitive advantage can be addressed with the same tests used for any resource-based advantage. Contrary to A&B's claim, this is not inconsistent with the behavioral and evolutionary foundations of dynamic capabilities and involves no illogical mixing of assumptions. A&B misunderstand two fundamental aspects of how resource-based tests relate to dynamic capabilities and their evolutionary underpinnings. First, the logic of the resource-based tests, while equilibrium-based, requires neither full economic rationality nor efficient markets, as A&B mistakenly assert. In fact, some of the resource tests are testing for *lack* of market efficiency. Immobile assets, for example, are difficult (and sometimes impossible) to trade in markets (Barney, 1991; Dierickx and Cool, 1989; Peteraf, 1993). Second, even in evolutionary economics, which assumes satisficing rather than optimizing behavior, markets tend to move in the direction of equilibrium, even if they never actually get there. Actors still respond to economic signals. As in mainstream economic models, price competition tends to drive prices in a downward direction. The resource tests rely on a logic no more efficiency-based or hyperrational than that.[3]

While A&B complain of 'varying theoretical foundations' of dynamic capabilities, an inclusive base reflects the breadth and complexity of the issues under consideration. Moreover, it offers hope for the type of 'integrated scholarship' that A&B advocate. They also favor more reliance on organizational theory, with which we agree. What A&B fail to appreciate is that dynamic capabilities research already draws significantly from the behavioral approach that A&B favor (e.g. Bromiley, 2004). There is no 'isolation' of dynamic capabilities 'from related organizational theory', as A&B charge. Rather, the broad and integrative foundation of dynamic capabilities provides a ready platform for further theoretical development from a variety of perspectives. Teece's (2007) recent effort to expand the micro-foundations of dynamic capabilities is one indicator of this.

Admittedly, this broad base increases the challenge of creating a coherent theory, since along with its potential for complementarities (e.g. Peteraf, 2005), a varied theoretical foundation brings a heightened risk for confusion and logical inconsistency. For this reason, along with other scholars of dynamic capabilities, we have been at the forefront of efforts to resolve conceptual issues regarding dynamic capabilities and to explore empirical evidence consistent with the concept (Helfat et al., 2007). Given the complexity of the topic, this effort is difficult and will take time. In what follows, we discuss progress to date in three areas on which A&B focus: the definition of dynamic capabilities, the

relationship to firm performance and competitive advantage, and empirical evidence.

The concept of dynamic capabilities

As research on dynamic capabilities has evolved, so too has the definition of dynamic capabilities. While building on earlier definitions, later definitions have sought to make incremental improvements. A&B focus their critique on the recent Helfat et al. (2007) definition in particular.

Helfat et al. (2007: 4) define a dynamic capability as 'the capacity of an organization to purposefully create, extend, and modify its resource base'. The 'resource base' includes the 'tangible, intangible, and human assets (or resources) as well as capabilities which the organization owns, controls, or has access to on a preferential basis' (Helfat et al., 2007: 4). This application of dynamic capabilities to a firm's resource base is entirely consistent with prior definitions – not a radical departure from previous work, as A&B assert. Teece et al. (1997: 515) state that dynamic capabilities operate on 'organizational skills, resources, and functional competences'. Eisenhardt and Martin (2000) state that dynamic capabilities alter a firm's resource base, which includes its physical, human and organizational assets. For Zollo and Winter (2002), dynamic capabilities act on ordinary (meaning operational) capabilities. These three definitions have been the most influential (Di Stefano et al., 2009); our new definition is a synthesis of these evolving but highly related views.

Since there are many different types of dynamic capabilities, the definition has always been intentionally general in form. Because different types perform different tasks, ranging from new product development to post-acquisition integration, Helfat et al. (2007) recommend that researchers be specific in characterizing the particular dynamic capabilities that they are investigating. This is simply good research procedure, something that A&B find problematic for unspecified reasons.

The word 'capacity' in our definition derives from Teece et al. (1997). It indicates only some minimal ability to perform a task, regardless of whether it is done well or poorly (Helfat et al., 2007). A&B argue that this somehow implies that lack of observed change demonstrates a lack of dynamic capabilities. This is incorrect: the word 'capacity' in our definition does not imply use. It is true, however, that capabilities (including dynamic ones) embody past learning and therefore may depreciate if unused for long periods of time (Helfat et al., 2007; Nelson and Winter, 1982). Thus, the statement of A&B that 'the ability to change successfully differs from the frequency with which the firm chooses to change' ignores what we know from the study of organizational learning – if you don't use it, you may lose it. Empirical research on alliances, for example, suggests that firms with greater prior experience in undertaking alliances have

better outcomes (see, for example, Helfat et al., 2007; Kale et al., 2002; Zollo et al., 2002).

The Helfat et al. (2007) definition also adds the word 'purposeful' to prior definitions, in order to make explicit what previously was implicit. The word purposeful indicates a minimal degree of intentionality, in order to distinguish a capability (dynamic or otherwise) from pure luck (Helfat et al., 2007). This minimal standard does not require, as A&B claim, that observed changes must precisely match managerial intention. Consider the example of an Italian candy company that decided to develop a new chocolate for a perceived untapped market segment, without knowing what attributes the new candy might have or whether the effort would succeed. Nevertheless, this product development effort was 'purposeful'; it involved intent to develop a new candy for a particular purpose (to meet a perceived market opportunity). A&B misunderstand that intentions for change are often much more diffuse and broadly specified than any subsequent observed changes.

The word purposeful also distinguishes a capability such as product development from routines that are utilized in a somewhat automatic fashion (Helfat et al., 2007). As the comments of A&B indicate, scholars differ somewhat in how they conceptualize routines. Our definition relies on the evolutionary economics definition of routines as consisting of patterned and predictable behavior (Nelson and Winter, 1982). Regardless of how one defines routines, it is hard to claim, as do A&B, that new product development capability consists entirely of routines. As our candy example indicates, product development entails intent. More generally, although dynamic capabilities utilize routines and other organizational processes, they also have an element of intent (Eisenhardt and Martin, 2000).

Dynamic capabilities such as new product development have utility in both moderately dynamic and more fast-paced environments (Eisenhardt and Martin, 2000; Helfat, 1997). Thus, in contrast to the assertion of A&B, frequent use of dynamic capabilities is often justified even in moderately dynamic environments. A&B also question the relevance of dynamic capabilities in fast-paced environments, noting that repeated, frequent strategic reorientations may be so disruptive that firms cannot function effectively. Major strategic reorientations, however, do not occur overnight. Often what looks like a large strategic shift ex post consists of a series of incremental and less disruptive changes.

Additionally, not all fast-paced environments are marked by regular disruptive change; some are better characterized in terms of continual incremental change. For coping with environments such as these, dynamic capabilities may be critically important. Moreover, dynamic capabilities hold the potential to promote ongoing adaptation so that disruptive change becomes less necessary (O'Reilly and Tushman, 2007).

Dynamic capabilities and competitive advantage

The Helfat et al. (2007) definition of dynamic capabilities purposefully does not include a reference to firm performance or competitive advantage (a comparative construct). Understanding the link between dynamic capabilities, firm performance and competitive advantage requires a more general understanding of the distinction between firm performance and competitive advantage (see Peteraf and Barney [2003] for an explanation).

The critique of A&B suffers from a number of misconceptions in this regard. These misunderstandings include Figure 1 in A&B regarding the relationship between dynamic capabilities and firm performance in Teece et al. (1997), Eisenhardt and Martin (2000) and Teece (2007). In a new Figure 1, we

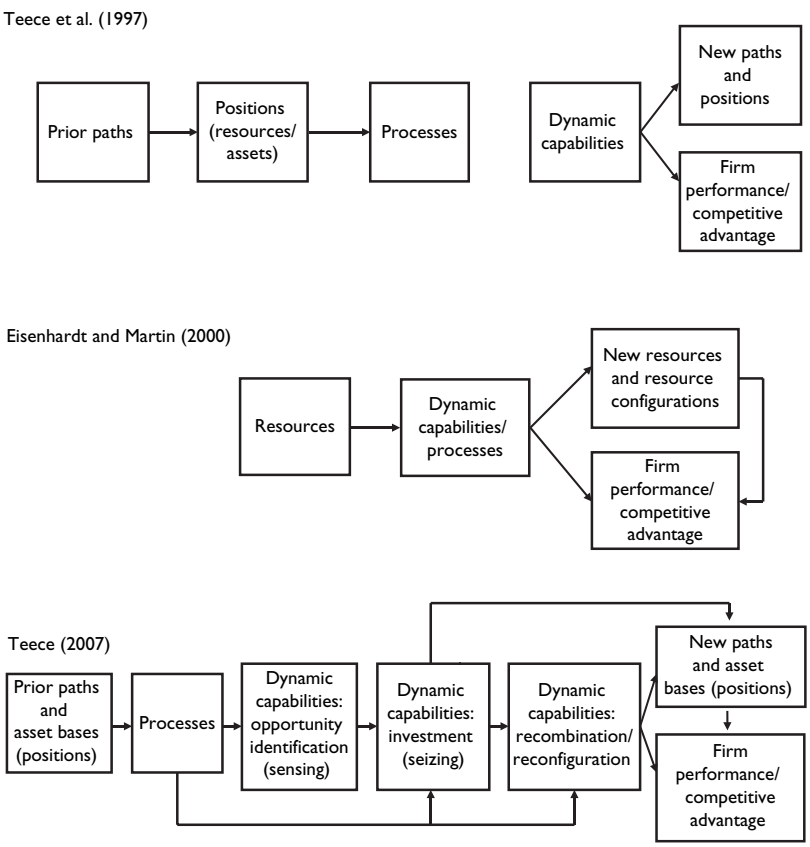

Figure 1 Basic chain of logic in core dynamic capabilities articles

provide a more accurate representation of the basic chain of logic involving dynamic capabilities and firm performance in each article.[4]

As depicted in Figure 1, Teece et al. (1997) have prior paths (firm history, previous investments) leading to current firm positions (tangible and intangible assets), consistent with evolutionary economics. Dynamic capabilities rest on firm processes that can alter current positions, leading to an effect on firm performance and competitive advantage, as well as to new positions and paths. Teece (2007) focuses on particular types of dynamic capabilities, using a chain of logic that expands upon that in Teece et al. (1997). In the later article, dynamic capabilities of opportunity identification ('sensing') and investment in these opportunities ('seizing') lead to new positions and paths, which then affects firm performance in terms of growth, profits and competitive advantage. Subsequent to investment, dynamic capabilities for recombination and reconfiguration can alter the accumulated asset base of the organization further, leading to an additional effect on firm performance and competitive advantage, and to new positions and paths.

Eisenhardt and Martin (2000) describe dynamic capabilities as processes that firms can use to obtain, integrate, reconfigure and release resources, leading to new resources and resource configurations (or new positions, in Teece's terms). Dynamic capabilities have a direct effect on firm performance and competitive advantage, as well as an indirect effect through resource reconfiguration. Although Eisenhardt and Martin (2000) view competitive advantage as more difficult to achieve through dynamic capabilities than does Teece, their basic chain of logic is very similar to that of Teece and of Helfat et al. (2007). In all of these treatments, organizational processes play a central role. It is therefore inaccurate for A&B to suggest that dynamic capabilities 'jumps directly to', modeling the change–performance relationship' without considering underlying organizational factors.

These exemplars of dynamic capabilities research indicate that, in contrast to the statement of A&B, researchers do in fact 'roughly agree on the place of dynamic capabilities in their models'. Where there is perhaps less agreement in prior work is on the question of the extent to which dynamic capabilities necessarily confer competitive advantage. Here we agree with A&B that researchers should not define dynamic capabilities by their outcomes. In Helfat et al. (2007), we address this issue at some length.

Helfat et al. (2007) propose two conceptual measures of performance for dynamic capabilities. The first, technical fitness, denotes 'how effectively a capability performs its intended function when normalized (divided) by its cost' (Helfat et al., 2007: 7). This metric has several advantages. First, it provides a sliding scale of measurement; the dynamic capabilities of some firms may be less technically fit than others. Thus, it is misleading for A&B to say that 'dynamic capabilities are features that firms either have or do not have'. Second, technical fitness takes into account the cost of the capability, which A&B note is important. Third, technical fitness enables us to separate the performance of a task

from firm performance. In order to measure firm performance, we introduce a second metric, evolutionary fitness, which refers to 'how well a dynamic cap ability enables an organization to make a living by creating, extending, or modifying its resource base' (Helfat et al., 2007: 7).

These two measures remove any possibility of a tautological link between possession of a dynamic capability and firm performance or competitive advantage. A firm might not use a dynamic capability that it possesses, the dynamic capability may have poor technical fitness, and even with high technical fitness, a dynamic capability still may not lead to high firm performance in terms of evolutionary fitness. At this early stage, we are agnostic regarding empirical metrics that researchers might use to implement these performance yardsticks. We note, however, that researchers have already starting using these yardsticks in empirical work (e.g. Hess and Rothaermel, 2008), a subject to which we turn next.

Empirical evidence

Early empirical analysis of a phenomenon has much to gain from broad, unconstrained investigation. In contrast, A&B view only a narrow range of topics, settings and methodologies as useful in empirical work on dynamic capabilities. For example, A&B criticize empirical work on dynamic capabilities for analyzing the oil industry (Adner and Helfat, 2003; Helfat, 1997), which they characterize as 'stable'. This is an odd characterization of an industry that has endured large price swings and several rounds of consolidation since the mid-1970s. Given that most industries today are at least moderately dynamic (Eisenhardt and Martin, 2000), dynamic capabilities have relevance in a broad range of settings.

A&B also suggest that some topics of prior research on dynamic capabilities are irrelevant. For example, they view downsizing as outside the purview of dynamic capabilities. Downsizing, however, is one way to adapt to environmental change. A&B also denigrate case study research, despite the fact that cases can be especially useful in early stages of research in an area. Their criticism of case research, which is generally behavioral in nature, also seems to conflict with their call for a more behavioral approach.

Empirical work relevant to dynamic capabilities is far broader than that described by A&B. As Helfat et al. (2007) note, topics such as technological innovation, mergers and acquisitions, strategic alliances, top management decision-making, firm survival and growth, and more relate to dynamic capabilities. Rather than criticize a small set of studies, a more promising approach would be to survey empirical work that is relevant to dynamic capabilities, perhaps by topic (e.g. innovation), in order to learn what it may tell us about dynamic

capabilities and enhance the foundation for future empirical research. Helfat et al. (2007), for example, take this approach in a chapter that relates findings from research on alliances to dynamic capabilities.

This suggests that the empirical support for dynamic capabilities may be more extensive than A&B recognize. An equally important point, however, is that A&B's expectations for empirical work in this area are unrealistic, given the early stage of this field of inquiry and the complexity of the phenomena involved. Their readiness to redirect research efforts elsewhere on this basis seems premature.

Conclusion

A&B's recommendation to abandon dynamic capabilities research also derives from their assessment that it does not meet the criteria against which the objectives of scientific theories are commonly evaluated. We see several problems with this rush to judgment and willingness to abandon a research area that many in the field deem promising. One problem is that they propose judging research on dynamic capabilities by the standards applied to scientific theories (e.g. Laudan's [1977] criteria). Dynamic capabilities are not yet a theory. Criteria, such as Laudan's (1977), provide useful guidelines for developing theory in a robust manner. We agree that standards such as these should guide the progress of research on dynamic capabilities. We disagree with the use of these criteria to assess the value of the dynamic capabilities approach at this point in its development. To judge dynamic capabilities by the standards expected of a fully developed theory seems counterproductive.

As an alternative to dynamic capabilities, A&B suggest that we turn to change management. As diverse an area as change management seems unlikely to meet Laudan's (1977) standards for a theory. But more importantly, dynamic capabilities are concerned with strategic issues related to firm performance, which is largely missing from research on change management. We need strategic approaches to understanding strategic change, of which dynamic capabilities are one.

As we have acknowledged before in our work on the 'dynamic resource-based view' (Helfat and Peteraf, 2003), dynamic capabilities are not required for cap ability building and strategic change. There are many other mechanisms that firms can use to drive strategic change, including simple ad hoc problem solving (Winter, 2003a). What is unique about the dynamic capabilities concept is that it also addresses that Holy Grail of strategic questions: how to sustain a capabilities-based advantage in the context of environmental change. Given the importance of this question for practice, as A&B admit, and strong signals in terms of scholarly interest regarding dynamic capabilities potential, why not give it a chance?

Notes

1 Tables 1–4 in their essay consist of abbreviated notes with little explanation in the body of their commentary.

2 Nelson and Winter (1982) explicitly acknowledge their great debt to Simon in their preface. Chapters 2 and 3 of Nelson and Winter's (1982) book contain many references to the work of Cyert and March (1963), including their term 'satisficing', which Nelson and Winter (1982) adopt as a central concept in evolutionary economics. Di Stefano et al.'s (2009) investigation of the theoretical roots of dynamic capabilities provides additional evidence of the connection between the behavioral view and dynamic capabilities.

3 While we do not have space in this essay to more fully debate A&B regarding the usefulness of economic rationality and equilibrium as analytical tools, consider the following as evidence suggesting that the blanket proscriptions of A&B against using these tools merit reconsideration: (1) Gul and Pesendorfer (2008: 34), quote from Kahneman (1994), noting that his 'observations make it clear that rationality is not an assumption in economics but a methodological stance'. (2) Camerer and Fehr (2006: 47) report experimental evidence indicating that outcomes can match 'the predictions of a model that assumes that everyone is rational' even when these assumptions are violated'. (3) Experimental evidence suggests that despite the lack of descriptive accuracy, equilibrium is 'always reached eventually', in games that allow people to gain experience (Camerer, 1997: 186). (4) In the often quoted words of G. E. P. Box (known for his work on model-building), 'All models are wrong, but some are useful' (Box, 1979: 202). Even an evolutionary scholar such as Winter (2003b) has made use of these tools in a long-run asymmetric Cournot equilibrium model of imperfect imitation of capabilities by rivals.

4 We contacted Eisenhardt and Teece to insure that our Figure 1 is a reasonable interpretation of the logic in their respective articles. We are grateful to them for suggestions regarding the figure. The usual caveat applies.

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