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Invited Editorial

A Natural-Resource-Based View of the Firm: Fifteen Years After

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The authors revisit Hart's natural-resource-based view (NRBV) of the firm and summarize progress that has been made in testing elements of that theory and reevaluate the NRBV in light of a number of important developments that have emerged in recent years in both the resource-based view literature and in research on sustainable enterprise. First, the authors consider how the NRBV can both benefit from recent work in dynamic capabilities and can itself inform such work. Second, they review recent research in the areas of clean technology and business at the base of the pyramid and suggest how the NRBV can help inform research on the resources and capabilities needed to enter and succeed in these domains.

Keywords: *strategy; sustainability; clean technology; poverty; base of the pyramid*

In this article, we review the natural-resource-based view (NRBV) of the firm, as first developed by Hart (1995), and assess the work that has since built upon it. In the 15 years since the introduction of the NRBV, empirical research has tested a number of Hart's propositions. We demonstrate, however, that this work has focused primarily on uncovering the links between pollution prevention and firm profitability, while the other areas of Hart's theoretical development have been explored to a much less thorough degree.

We also describe developments both in the NRBV and in resource-based theory (RBT) in the time since the NRBV was introduced. A significant theoretical literature has emerged that expands upon Hart's (1995) description of sustainable development, refining that construct

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into clean technology and base of the pyramid (BoP). Meanwhile, the dynamic capabilities perspective has emerged (Teece, Pisano, & Shuen, 1997) as a complement to RBT in order to explain how firms adjust capabilities in rapidly changing markets. We argue not only that the NRBV has benefited from the emergence of dynamic capabilities research (Aragon-Correa & Sharma, 2003) but that the NRBV can extend and enhance our understanding of how dynamic capabilities emerge in the first place.

Origins of the Natural-Resource-Based View of the Firm

Stemming from Penrose's (1959) discussion of the antecedents of firm growth, the RBT has become a central theoretical perspective in strategic management (see, e.g., Barney, 1991; Dierickx & Cool, 1989; Montgomery & Wernerfelt, 1988). The key element of RBT is its focus on factors internal to the firm that lead to sustained competitive advantage. Given this focus, it marked a distinct departure from analysis at the industry or strategic group level, which had dominated strategy research and teaching prior to the emergence of RBT (Barney, 1996). RBT, in fact, marked a return to the roots of strategic thinking by placing the emphasis back on the firm's own decisions and competencies rather than on its environment (Hoskisson, Hitt, Wan, & Yiu, 1999).

It is well beyond the scope of this article to provide a full review of the elements of RBT, and such reviews have already been undertaken elsewhere (e.g., Acedo, Barroso, & Galan, 2006; Barney, 2001; Conner, 1991; Hoskisson et al., 1999). It is, however, fitting to briefly discuss the elements that are important for understanding the NRBV. The RBT emphasizes the role of resources and capabilities in forming the basis of competitive advantage. Broadly stated, a *resource* is something that a firm possesses, which can include physical and financial assets as well as employees' skills and organizational (social) processes. A *capability*, in contrast, is something a firm is able to perform, which stems from resources and routines upon which the firm can draw (Karim & Mitchell, 2000; Winter, 2000).

The RBT emphasizes that in order to provide an opportunity for sustained competitive advantage, a resource must be valuable, rare, inimitable, and supported by tacit skills or socially complex organizational processes (Barney, 1991). Value is found if the resource increases customers' willingness to pay or lowers their cost. Rareness gives the firm the potential to command a premium and avoid a perfectly competitive market. Inimitability, which can arise, for example, from the social complexity of the resource, creates the potential for sustained advantage. Finally, resources and capabilities within an organization are embedded in the organization, and the degree to which they are able to add value may depend upon the presence of complementary assets and supporting routines (Christmann, 2000).

Hart (1995) proposed that the existing RBT had a serious omission. Namely, while it considered a variety of potential resources and had a logic that was compelling and more complete than prior attempts to explain competitive advantage, it ignored the interaction between an organization and its natural environment. While such an omission might have been understandable in the past, it was clear by 1995 (and is more so now) that the natural environment could create a serious constraint on firms' attempts to create sustainable advantage. Or, put in a more positive way, "it is likely that strategy and competitive advantage in the coming years

will be rooted in capabilities that facilitate environmentally sustainable economic activity—a natural-resource-based view of the firm (Hart, 1995: 991).

The NRBV argues that there are three key strategic capabilities: *pollution prevention*, *product stewardship*, and *sustainable development*. Each of these has different environmental driving forces, builds upon different key resources, and has a different source of competitive advantage. Pollution prevention, which seeks to prevent waste and emissions rather than cleaning them up “at the end of the pipe,” is associated with lower costs. For example, removing pollutants from the production process can increase efficiency by (a) reducing the inputs required, (b) simplifying the process, and (c) reducing compliance and liability costs.

Product stewardship expands the scope of pollution prevention to include the entire value chain or “life cycle” of the firm’s product systems. Through stakeholder engagement, the “voice of the environment” can be effectively integrated into the product design and development process. Product stewardship creates the potential for competitive advantage through strategic preemption, for example by securing exclusive access to resources (e.g., green raw materials) or by establishing standards that are advantageous to the focal company.

Finally, a sustainable development strategy has two notable differences from pollution prevention or product stewardship strategies. First, a sustainable development strategy does not merely seek to do less environmental damage but, rather, to actually produce in a way that can be maintained indefinitely into the future. Second, sustainable development, by its very definition, is not restricted to environmental concerns but also involves focusing on economic and social concerns. Since economic activity in developed countries is intimately connected with issues of poverty and degradation in less-developed countries, a strategy that considers sustainable development must recognize this link and act to reduce the environmental burden and increase the economic benefits for the lesser developed markets affected by the firm’s activities.

The Impact of the NRBV

Hart (1995: 1008) argued that, as of the mid-1990s, “there were no examples, to my knowledge, of large manufacturing firms committed to a vision of sustainable development.” Research on sustainable development-based strategies, he suggested, must necessarily take a more qualitative, case-comparative approach. Product stewardship-based strategies were better developed in the mid-1990s, and he therefore suggested a somewhat more structured research strategy, with a focus on products and product development teams. He suggested, however, that hypothesis-testing work on pollution prevention-based strategies could start immediately, given the wide adoption of this strategy by existing firms.

It should come as little surprise, therefore, that over the past 15 years, most of the application of the NRBV has been focused on pollution prevention, with much less attention to empirical research on product stewardship or sustainable development strategies. Indeed, in the realm of research on organizations and the natural environment, one of the most commonly addressed issues is whether, and under what circumstances, it pays to be green (Berchicci & King, 2007; Hart & Ahuja, 1996). The essence of this research question is whether improving environmental performance is beneficial or detrimental to short-term financial performance. The

NRBV aids this research by providing a theoretical mechanism through which the link between environmental actions and profit can be established. As described in the prior section, the NRBV posits that the link between environmental strategy and competitive advantage depends on the form of environmental improvement being considered, as the mechanism is very different for pollution prevention than for product stewardship or sustainable development.

The question of whether or not it pays to be green was considered prior to the emergence of the NRBV, with most work focused on the relationship between profit and pollution control or the stock market reaction to disclosure of environmental liabilities (Berchicci & King, 2007). In accounting research, for example, a number of studies address the degree to which a firm's voluntary disclosure of environmental practices affected its market valuation. Disclosure of pollution control efforts have been found to affect investors' assessments of a firm's risk profile, as greater disclosure reduces the perceived risk of future remediation requirements (Belkaoui, 1974). For example, chemical firms that had previously released more extensive environmental disclosures experienced a less negative market reaction from the Union Carbide Bhopal disaster than firms with less extensive disclosures (Blacconiere & Patten, 1994).

The NRBV perspective allowed for a more systematic examination of the relationship between environmental and financial performance by specifying the link between resources and capabilities and strategic outcomes. In particular, the NRBV's emphasis on the contingent nature of resources and capabilities has aided researchers in making specific links between environmental and financial performance. In the 15 years since the NRBV was first outlined, research has identified a number of resources and capabilities that help firms profit from pollution prevention; indeed, researchers are now attempting to identify categories of capabilities that affect firms' abilities to profit from pollution prevention efforts.

Significant progress has been made in identifying the broad capabilities and resources that affect a firm's ability to simultaneously pursue financial and environmental success (Berchicci & King, 2007; Etzion, 2007). A review of the "pays to be green" literature concludes that the greatest potential for future research in this area lies in continuing to identify the contingencies that affect the environmental–financial performance relationship (Berchicci & King, 2007: 1525). We concur that while there has been significant research investigating how pollution prevention can lead to positive financial outcomes, there is still work to be done in terms of identifying both the genesis of key resources and the link between resources and capabilities, and environmental–financial performance links. From our perspective, research thus far has identified two types of factors that affect the firm's ability to gain financial benefits from a pollution prevention strategy: organizational capabilities and managerial cognition or framing. We review these two factors below.

Organizational Capabilities and Pollution Prevention

Several studies have identified organizational capabilities that appear to affect the degree to which firms profit through pollution prevention strategies. Empirical studies of the environmental–financial performance link have found that profiting from pollution prevention

is more likely if the firm possesses strong innovation capabilities, particularly those related to continuous improvement (King & Lenox, 2002). Pollution prevention strategies also require companies to develop new competencies, as Russo and Fouts (1997) demonstrate in a cross-industry analysis of the environmental and financial performance of 243 American firms. They find that investment in environmental capabilities is especially beneficial during periods of industry growth, presumably because growth helps to ameliorate the risk that accompanies such investment.

The RBT recognizes that resources may not create rents in isolation; rather, bundles of resources may together create a configuration that conveys competitive advantage (Grant, 1996; Hoskisson et al., 1999). Moreover, bundled resources create complexity, which increases the importance of proper organizational configuration and impedes duplication (Rivkin, 2000). These features appear to also be found in firms' attempts to derive profit from pollution prevention. Having a commitment to pollution prevention is unlikely to create profit by itself, but in combination with the more general innovative capabilities noted above, along with skills in the implementation of new projects, profit may be derived (Christmann, 2000). In this sense, innovative capabilities and commitment to pollution prevention are complementary assets (Teece, 1986).

In recent years, an increase in data availability has enabled researchers to perform more extensive analysis of the link between pollution prevention capabilities, environmental performance, and financial performance. Data both from government sources such as the U.S. Environmental Protection Agency's Toxic Release Inventory and from ratings agencies such as KLD have enabled longitudinal studies of environmental performance, allowing for researchers to test for causality in the environmental–financial performance relationship in a manner that was not possible in earlier studies. This research has begun to uncover evidence regarding the antecedents of environmental capabilities, for example, by demonstrating that firms develop capabilities in response to stakeholder pressures, which are perceived differently by firms at different levels of eco-efficiency (Chatterji & Toffel, 2010; Delmas & Toffel, 2004; Walls, Phan, & Berrone, in press). Understanding these antecedents remains an important area for inquiry, as such research begins to answer the question of why some firms take more proactive environmental stances than others.

Cognition and Framing

Managerial attention and the framing of environmental issues have also been identified as affecting firms' abilities to profitably enact environmentally proactive strategies. The NRBV suggests that these factors are vital in developing a sustainable development strategy, but evidence from recent studies suggests that they are an important component of pollution prevention as well. Essentially, managers do not find profitable opportunities where they do not look for them, and thus the ability to profit from pollution prevention depends critically on managers' expectations that such opportunities exist (King & Lenox, 2002). In the oil and gas industry, for example, Sharma and Vredenburg (1998) find that those companies that perceive environmental responsiveness as fundamental to increasing shareholder value take proactive environmental stances, while those that see these as separate or even opposing goals are

more reactionary. Indeed, the proactive companies see the management of their interactions with the natural environment as requiring organizational capabilities that include stakeholder integration, higher order learning, and continuous innovation. Interestingly, Sharma and Vredenburg find that effective stakeholder integration enabled the firms to better manage their waste reduction and energy conservation programs. This implies that considering diverse stakeholder views is valuable not only for product stewardship (as we discuss below) but for pollution prevention efforts as well, which goes beyond the original NRBV model.

Large-sample statistical studies and experimental research have also provided evidence that cognition and framing play key roles in the development of environmental capabilities. Studies using the Toxic Release Inventory suggest that managers tend to underinvest in pollution prevention (King & Lenox, 2002). In fact, increased pollution control is not associated with higher profit, but pollution prevention is, as predicted by the NRBV. Managers that search for opportunities to profit via pollution prevention have the potential to find such opportunities, but their prior expectations about whether such opportunities exist strongly affects their search. Similarly, experimental work suggests that managers' and employees' cognitive framing of environmental issues significantly effects whether the firm characterizes the interaction with the natural environment as a threat or an opportunity (Tenbrunsel, Wade-Benzoni, Messick, & Bazerman, 2000).

Product Stewardship

The pollution prevention domain is mature relative to the study of the factors that affect a firm's ability to develop competitive advantage from product stewardship or sustainable development. In one of the few articles that address the link between a product stewardship strategy and competitive advantage, Sharma and Vredenburg (1998) provide evidence in favor of Hart's (1995) propositions. Specifically, Hart suggests that "firms that adopt product stewardship strategies will evidence inclusion of external stakeholders in the product development and planning process" (Hart: 100, Proposition 2b). Sharma and Vredenburg find that the oil companies that had more proactive environmental strategies and incorporated elements of product stewardship did have greater stakeholder integration capabilities. Stakeholder involvement was also found to be a key ingredient in Patagonia's product stewardship efforts (Fowler & Hope, 2007).

Research on product stewardship is ongoing in operations management, marketing, and strategy, and although this is still a nascent area, a number of interesting findings have emerged. Most of the studies thus far have employed a case-based approach (Bakker, Fischer, & Brack, 2002; Fowler & Hope, 2007; Lave, Conway-Schempf, Harvey, Hart, Bee, & McCracken, 1998; Linton et al., 2007), although surveys have also been used (e.g., Pujari, Wright, & Peattie, 2003). The research suggests that product stewardship efforts require coordination across a number of domains. For example, a recent study found that cross-functional coordination and top management support were significant determinants of successful environmental new product development performance (Pujari et al., 2005). Using a grounded-theory-building approach, Matos and Hall (2007) examine product stewardship and approach life cycle analysis as an example of a rugged landscape in which interdependencies between

decisions create great uncertainty about how a seemingly simple change may affect performance. They suggest that developing product stewardship strategies requires understanding interdependencies, and firms that approach life cycle issues as specialized, disconnected aspects of the product are less likely to develop successful product stewardship strategies.

Sustainable Development

The academic literature on the link between sustainable development strategies and firm performance is virtually nonexistent. In part, this failure is due to the difficulty of defining sustainable development in a business context and the degree to which the concept has resulted in a proliferation of terminology (Hart & Milstein, 2003). This proliferation may make scholars wary of attempting to create constructs to test elements of firms' sustainable development strategies. The result, however, is that academic research is failing to inform management practice in this increasingly important arena.

The Evolution of the NRBV and RBT

In this section, we consider the evolution of the NRBV and RBT since Hart's article (1995). We pay particular attention to two developments. First, while Hart outlined pollution prevention, product stewardship, and sustainable development as the three stages of proactive environmental strategy, the area of corporate sustainable development strategy has since been separated into two distinct areas: clean technology and BoP (Hart, 1997, 2007; Prahalad & Hart, 2002). We discuss the NRBV's role in understanding how firms incorporate clean technology strategies in their quest for competitive advantage. We also note that there is a dearth of academic research on the ways in which corporations can meet the needs of the world's poor, which Hart (1995) suggested is an essential element of a sustainable development strategy. Second, the dynamic capabilities perspective has emerged to account for the lack of attention to how firms build new resources and capabilities, especially in fast-moving environments (Teece et al., 1997). We first discuss these developments separately and then outline how they combine to enhance our understanding of the role of environmental strategies and firm success (Aragon-Correa & Sharma, 2003).

Clean Technology

The term *clean technology* has been in use for several decades, although it has been used to refer to a varied set of activities.¹ In the NRBV, the seeds of the separation of sustainable development into the elements of clean technology and BoP were planted in Hart's article (1995) and in other contemporaneous work (see, e.g., Goodland, 1995). Hart suggests that while pollution prevention and product stewardship allow for greater environmental efficiencies, meeting the challenge of global sustainability might require firms to actually reduce the material and energy consumption in developed markets while building markets in the developing countries. Clean technology strategies deal with the way that firms build new competencies and

position themselves for competitive advantage as their industries evolve. Reduced material and energy consumption occurs through the pursuit of clean technologies that provide for human needs without straining the planet's resources (see, e.g., Meurig Thomas & Raja, 2005, for a discussion of the science of green chemistry and clean energy production).

Hart (1997) made an explicit distinction between "greening" strategies (pollution prevention and product stewardship), which focus on incremental improvements to today's products and processes, and "beyond greening" strategies (clean technology and sustainable development), which focus on tomorrow's technologies and markets. In recent years, academic and practitioner interest in clean technology has increased along with entrepreneurial activity in renewable energy and other clean technology domains. Venture capital investment in clean technology firms, for example, was relatively low before increasing sharply in 2006 (Shachmurove & Shachmurove, 2009).

For the purposes of the NRBV, the key clean technology issue lies in understanding which firm resources and capabilities are likely to be associated with effective clean technology commercialization. We see at least two interesting paths for NRBV research to pursue in this regard. First, following from prior work (Hart 1995, 1997, 2007; Schmidheiny & Zorraquin, 1992), we suggest that the development of clean technology strategies requires a focus on innovation and future positioning as the metric for success. This implies, in turn, that we build a better understanding of factors that affect the likelihood that firms are willing to invest in innovation, including the degree to which investors affect managerial myopia (Bushee, 1998; Stein, 1989).

Second, as we outline below, the commercialization of clean technologies involves developing abilities to deal with areas of knowledge that are uncertain, constantly evolving, and dynamically complex (Aragon-Correa & Sharma, 2003; Hart & Sharma, 2004). For firms, this entails the organizational capacity to protect and nurture disruptive or leapfrog clean technologies, including those technologies that may eventually cannibalize parts of the existing core business. This, in turn, opens up a question of whether firms will be able to sustain competitive advantage through the development of clean technologies or whether this domain is characterized by too much uncertainty and discontinuous change for competitive advantage to be maintained (Fiol, 2001).

Base of the Pyramid

The second major direction in which the sustainable development element of the NRBV has evolved is the increased attention to the role of corporations in alleviating poverty for the poorest of the world's citizens. Hart (1995: 997) suggests that "a sustainable development strategy means that firms must build markets in the South while reducing the environmental burden created by this new economic activity." Subsequent work has expanded upon this idea, and a nascent literature has emerged around what has come to be known as the *base of the pyramid*, or BoP (Hart, 2005; Hart & Christensen, 2002; London & Hart, 2004; Prahalad, 2005; Prahalad & Hammond, 2002; Prahalad & Hart, 2002). BoP has also attracted growing attention from corporations (Immelt, Govindarajan, & Trimble, 2009).

Despite corporate interest and a growing practitioner-oriented literature, however, there is a dearth of scholarly research on BoP. Indeed, there is a real opportunity for scholars to address

Table 1
The Natural-Resource-Based View (NRBV): Fifteen Years After

Strategic Capability	Societal Driving Force	Key Resource	Competitive Advantage	State of Research Development
Pollution prevention	Minimize emissions, effluents, and waste	Continuous improvement	Lower costs	Strong empirical evidence in favor of NRBV
Product stewardship	Lower product life cycle cost	Stakeholder integration	Reputation/legitimacy	Growing area of research but much to be accomplished
Clean technology	Make quantum-leap improvement	Disruptive change	Future position	Little research to date
Base of the pyramid	Meet unmet needs of the poor	Embedded innovation	Long-term growth	Growing body of practitioner-oriented research, but academic attention needed

this issue in a rigorous way in order to assess the degree to which our current theories are sufficient in understanding the BoP phenomenon and to what degree this issue requires us to augment existing theories or even develop entirely new ones.

One key area for BoP research that is related to the NRBV is what capabilities are needed to enable companies to identify, develop, and profit from opportunities at the BoP. To date, some qualitative and theoretical research has addressed these questions, but much more remains to be done (London & Hart, 2004, 2011). With regard to identification of BoP opportunities, Dowell, Hart, and Sharma (2010) suggest that organizations develop interest in the BoP as a result of competitive and institutional pressures and that prior development of a proactive environmental strategy amplifies the effect of these pressures. To date, the most in-depth treatment of the factors that affect firm success at the BoP is the emerging work on “embedded innovation” as exemplified by the BoP protocol (e.g., Simanis & Hart, 2008, 2009). This work emphasizes the need for companies to co-create businesses in conjunction with BoP communities rather than simply marketing low-cost products through extended distribution systems (London & Hart, 2011).

Table 1 presents a summary of the elements of the NRBV and our assessment of the state of academic research for each of these domains. As we have outlined in this section, research thus far has focused on the areas of pollution prevention and to a lesser extent product stewardship. There is a significant need for additional academic research on the role of the NRBV in clean technology and BoP.

As the NRBV has evolved to separate sustainable development into the areas of clean technology and BoP, RBT has evolved to incorporate dynamic capabilities. In their seminal article outlining dynamic capabilities, Teece et al. (1997) argue that RBT does not adequately address how firms can renew their sources of competitiveness, especially in rapidly changing environments. They emphasize the need for firms to “integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (p. 516). These high-velocity markets create unique challenges for firms because the resources and capabilities on which the firms have attempted to build competitive advantage have uncertain life spans

in such markets (Eisenhardt & Martin, 2000). Dynamic capabilities, therefore, are the capabilities that allow firms to reconfigure resources to gain advantages as markets shift in discontinuous ways.

The dynamic capability perspective has had a significant impact on strategic management research in general and in research regarding organizations and the natural environment in particular. It offers the potential to extend and supplement the NRBV to create a more thorough understanding of the process by which firms undertake sustainable development strategies. The dynamic capabilities perspective, with its emphasis on adaptation within ambiguous and dynamic markets, is particularly well suited to the study of clean technology and BoP strategies because the context in which firms develop capabilities to deal with these issues is highly complex and ambiguous (Aragon-Correa & Sharma, 2003). Hart (1995) suggests, for example, that constraints created by the natural environment, such as ecosystem degradation and resource depletion, create discontinuities that threaten firms' existing resources and capabilities.

The net benefit of a dynamic capability needs to be assessed in the context of the competitive environment in which the firm is embedded (Winter, 2003). For a firm in a relatively stable environment, the investment in the creation and maintenance of a capability to change is unlikely to be beneficial, as the cost of maintenance outweighs the benefit of change. However, in a rapidly shifting environment, when adapting capabilities is beneficial, the investment and upkeep of the dynamic capability may well be worthwhile. One implication of Winter's argument is that external forces affect firms' decisions to pursue dynamic capabilities. Firms that are in dynamic and complex environments are more likely to attempt to build dynamic capabilities. Since the capabilities themselves are dependent upon the firms' existing structures, strategies, and resources, two firms that are faced with similar external environments can develop similar, but not identical, capabilities (Aragon-Correa & Sharma, 2003; Eisenhardt & Martin, 2000).

Aragon-Correa and Sharma (2003) argue that a proactive environmental strategy meets the definition of a dynamic capability. They review Eisenhardt and Martin's (2000) definition of dynamic capabilities and demonstrate that proactive environmental strategies are dependent upon specific and identifiable processes, are socially complex and specific to organizations, require path-dependent and embedded capabilities, and are nonreplicable or inimitable. They derive propositions that suggest that dimensions of a firm's external environment, including state uncertainty, complexity, and munificence, affect the development of proactive environmental strategies and also the firm's ability to profit from such strategies.

We suggest that one fruitful extension of Aragon-Correa and Sharma's (2003) model would be to separate environmental strategies into the categories of pollution prevention, product stewardship, clean technology, and BoP strategies, as suggested by the NRBV. As we outline above, these strategies have different drivers of competitive advantage. Thus, for example, different elements of the firm's external environment are likely to be more important for firms' decisions to develop pollution prevention strategies than for their decisions to develop BoP strategies.

While it is beyond the scope of this article to derive specific propositions regarding which dimensions of the external environment are most likely to drive development of which proactive environmental strategy, we can outline a general framework that we believe can fuel

further inquiry. In general, we expect that particular dimensions of the external environment will drive firm performance for the different strategies so that institutional uncertainty will be more likely to affect a firm's strategies in pollution prevention (Delmas & Toffel, 2004), while uncertainty in the technological environment is likely to have a much more significant effect on its development of clean technology capabilities.

We expect, moreover, that a firm's specific capability investments will be dependent upon both the external environment it faces and its existing stock of resources. So, a firm with strong R&D capabilities is more likely to respond to technological uncertainty with a proactive clean technology strategy than one that lacks such capabilities. However, the challenges associated with the BoP—lack of formal institutions, poor infrastructure, low literacy levels—appear to force companies to develop entirely new capabilities if they are to successfully develop business models to serve the poor (Hart, 2007).

Thus, while it is clear that the NRBV benefits from the emergence of the dynamic capabilities perspective, we argue that the reverse is also true and that the NRBV can in fact inform and extend the dynamic capabilities literature by helping to understand the genesis of new capabilities themselves. Winter (2003) suggests that firms invest in the creation of dynamic capabilities in order to solve some problem with which they are faced. Thus, the capabilities themselves arise out of a perceived need and a deliberate investment. Developing leapfrog or disruptive clean technologies and the unique challenges associated with the BoP clearly present such needs. The capabilities themselves, therefore, become akin to the second-order learning described by Argyris (1976).

Indeed, within the NRBV perspective, we see two areas that are fruitful directions for research into the origins of dynamic capabilities. First, the NRBV can help to explain why some firms are more likely than others to develop the capabilities to adopt proactive environmental strategies, especially with regard to clean technology and the BoP. One process by which this occurs is through the firm engaging with new "fringe" stakeholders and through this process becoming aware of new problems and potential solutions (Aragon-Corea & Sharma, 2003; Hart, 1995; Hart & Sharma, 2004). Thus, two firms may face the same problems but have differing awareness of them and of potential solutions due to differences in their engagement of stakeholders. The more open of the firms is the one that is more likely to explore, create, and invest in the dynamic capabilities.

Second, while market expansion in general does not require dynamic capabilities (Winter, 2003), expansion to novel markets, or the creation of entirely new ones, is a different matter. In particular, firms must invest in dynamic capabilities as they move to markets in which the dominant logic that they are accustomed to using is no longer valid (Prahalad & Bettis, 1986). Firms that attempt to enter the BoP face such a circumstance, as their standard heuristics and routines are of little use, and they need to "learn to learn" in these unfamiliar institutional and competitive environments, which may render existing competencies of little use in generating advantage (Peng, 2001).

The NRBV, then, can improve our understanding of how the physical and social environments affect the development of dynamic capabilities. Hart (1995: 991) suggests that "strategists and organizational theorists must begin to grasp how environmentally oriented resources and capabilities can yield sustainable sources of competitive advantage." With respect to dynamic capabilities, then, the particular dynamic capabilities that a firm invests in will depend

not only on the institutional and demand environment but also on the specific challenges that the physical environment places on the firm's operations. For example, those firms that face greatest risk from the consequences of climate change have strong incentives to develop strategies to deal with those consequences (Hoffman, 2005).

While the emphasis of much of the existing work on the NRBV has been focused on the link between the firm and the physical environment, both the original description of the theory by Hart (1995) and subsequent work (Hart, 2007; Hart & Sharma, 2004; Prahalad & Hart, 2002) consider the firm's relationship with external stakeholders and the socioeconomic drivers of poverty and inequity. In the future, we expect that this will be a significant area of inquiry within the NRBV, for two reasons. First, these questions relate directly to an important and expanding body of literature that applies social movement theory to understanding how changes occur across an institutional field and within organizations themselves (Dowell, Swaminathan, & Wade, 2002; Weber, Rao, & Thomas, 2009). The NRBV links directly to this literature not only through its emphasis on engaging traditional, powerful stakeholders but also through the potential benefits of engaging with fringe stakeholders that can spur competitive imagination and enhance legitimacy (Hart & Sharma, 2004).

Second, as both academic research and corporate experience in the BoP expand, we see a need to understand how legitimacy is conferred on firms that operate in such complex and dynamic environments. Traditionally, legitimacy depends upon a stable set of institutional actors that are capable of determining what is and what is not a legitimate action for a given field. The very act of undertaking a BoP initiative, however, might be seen as illegitimate in some settings (e.g., Karnani, 2007). For firms that are operating in the BoP, however, it is unclear how legitimacy is gained and maintained and what linkages to other actors might be needed. Understanding this dynamic better will help to illuminate the processes by which firms gain a "license to operate" within the BoP and maintain the legitimacy required to profit from those ventures.

In reviewing the literature that has emerged in the 15 years since the NRBV was published, we have identified a number of important areas for further inquiry. We present several of these questions in Table 2. The questions fall into two categories. First, we see a need for research that continues to evaluate and extend the propositions offered by Hart (1995), such as understanding the capabilities and resources needed for effective product stewardship. Second, we suggest that future NRBV research could consider the degree to which clean technology and BoP strategies can draw on and augment existing theories and the degree to which entirely new theories might be needed to understand these domains.

Conclusion

In formulating the original NRBV, Hart (1995: 990) outlined the environmental problems stemming from population growth combined with an exponential expansion of industrial activity and resource use in the years following World War II. In the 15 years since the publication of the NRBV, the environmental, economic, and social challenges he outlined have only multiplied. Climate change, for example, was known to be a significant issue in 1995 (International Panel on Climate Change, 1995), but the full implications of climate

Table 2
Key Areas for Further Research in the Natural-Resource-Based View

Strategic Capability	Key Areas for Inquiry
Pollution prevention	How do resources combine to affect environmental performance? What is the genesis of key resources that drive the link between environmental and financial performance?
Product stewardship	How do firms develop resources and capabilities in stakeholder integration that allow for improved product stewardship? What factors enable and constrain product stewardship strategies in complex global supply chains?
Clean technology	Which firms are best positioned to develop the dynamic capabilities needed to bring clean technologies to market? What firm resources and capabilities are likely to be associated with clean technology commercialization? Can clean technology capabilities lead to sustained competitive advantage?
Base of the pyramid (BoP)	What are the capabilities needed to enable firms to succeed with BoP strategies? How is legitimacy gained and maintained among firms in the BoP? Do our existing theories adequately address how firms can succeed in the BoP, or do we need to augment or even replace these theories?

change and the degree to which it is considered an issue for top management to consider is only now being understood (McKinsey, 2009).

And as business leaders attempt to come to grips with the challenges of climate change, resource depletion, and global poverty, the reputation of businesses and their leaders is at historic lows (Harris Interactive, 2008). Increasingly, people around the world are asking the question, Must capitalism's thirst for growth and profits serve only to exacerbate inequity and environmental deterioration? One of the major challenges (and opportunities) of our time is thus to create a form of commerce that uplifts the entire human community in a way that respects both natural systems and cultural diversity. Thus, 15 years after the publication of "A Natural-Resource-Based View of the Firm" (Hart, 1995), the argument contained in that original piece has only become stronger and more relevant.

Yet while these challenges call for bold innovation, most firms continue to focus on incremental strategies such as eco-efficiency, pollution prevention, product stewardship, and corporate social responsibility. As important as these corporate initiatives have been, it is now clear that such incremental sustainability strategies will simply not be sufficient. Companies and management scholars are being challenged increasingly to develop breakthrough strategies that actually resolve social and environmental problems, rather than simply reducing the negative impacts associated with their current operations.

As clean technology and BoP strategies continue to gather momentum in the world, the opportunities to advance management theory have never been greater. Each provides important pieces to the sustainable development puzzle: the promise of "next generation" technologies with dramatically lower environmental impacts, and innovative new ways to reach and include all of humanity in the capitalist dream. Our hope is that in another 15 years, these elements will be fully integrated into the NRBV and that the NRBV will be fully integrated into strategic management theory and practice.

Note

1. In the scientific literature, the earliest reference to this term we uncovered was by Atwater (1970), who used it to refer to nuclear power and other technologies that produce no aerosol or climate-changing emissions.

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