© *Academy of Management Review*
1999, Vol. 24, No. 1, 132–142.

NOTE

A RESOURCE-BASED VIEW OF PRODUCT DEVELOPMENT

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The resource-based view of the firm contributes to the management of product development by highlighting how different functional and integrative capabilities affect process efficiency and product effectiveness. Here, I first review this evidence and then add it to past findings on this topic to form an agent-resource model, which provides a more analytical understanding of product development performance drivers. I also discuss the model in order to direct future research on such relevant issues as the creation, the utilization, and the capitalization of capabilities.

This research note represents an attempt to update the state of current literature on the management of product development and to trace fruitful paths for future research on this topic. Recently, scholars have gained new insights thanks to a growing body of empirical work that embraces the resource-based view of the firm (e.g., Henderson & Cockburn, 1994; Iansiti & Clark, 1994; Leonard-Barton, 1995). According to this influential perspective, the presence of different *organizational capabilities* positively affects the outcome of the product development process and, thus, can be used to extend the findings gained by past research streams on this subject.

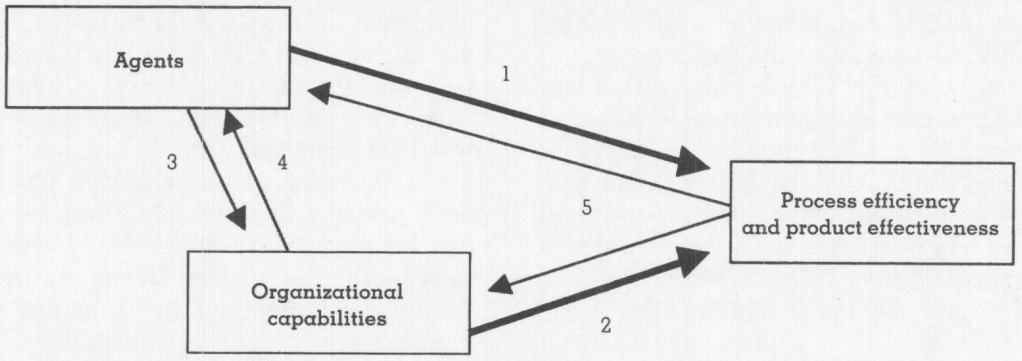
In an influential review, Brown and Eisenhardt (1995) thoroughly analyze most of these past findings related to atheoretical studies and empirical works from the theories of information processing, resource dependence, and problem solving. Their main claim is that process efficiency and product effectiveness are affected by the behavior of different *agents*, including team members, project leaders, senior managers, customers, and suppliers. Despite having included the capabilities partly identified by the above-mentioned streams, the two scholars consider agents primarily responsible for performance improvements. They ultimately argue that "there are multiple players whose actions influence product performance" (Brown & Eisenhardt, 1995; 366).

However, during product development, a firm's capacity for action resides in its capabilities (Iansiti & Clark, 1994). While acknowledging the direct contribution of players to product development performance, one must also observe that part of their actions focuses on leveraging organizational capabilities. The presence of a project leader with internal management skills can, for instance, by itself lead to an increase in product concept effectiveness, thanks to his or her ability to induce team members' creativity. Yet, the deployment of unique strategic visions is a valuable capability through which the leader can further improve the final outcome.

Likewise, gatekeepers in a project team can positively contribute to product development productivity by importing knowledge from outside. Yet, an incentive system that pushes them to participate in external discipline-specific networks of knowledge can further improve and increase the information absorption. In both examples it is clear that the final performance of product development can be driven by variables of a different nature; on the one hand, it can be associated with the presence of peculiar agents, and on the other, it can be due to the leveraging of organizational capabilities. Figure 1 portrays

Although I am solely responsible for the ideas contained in this research note, I could not have written it without the insightful comments of Rebecca Henderson, Salvio Vicari, and three anonymous *AMR* reviewers. Sandro Castaldo, Nader Sabbaghian, and Gabriele Troilo also gave critical suggestions and provided indispensable encouragement. Funding from the Area Marketing of SDA-Bocconi Graduate School of Mangement supported the writing of this article.

FIGURE 1
Relationship of Agents, Capabilities, and Performance During Product Development[a]



[a] Thick lines indicate the main scope of ongoing research, whereas thin lines indicate paths that could be undertaken in future studies to address new relevant issues.

this point by separating the contribution of agents and capabilities from the final outcome of the product development process.

By highlighting this distinction and by drawing from resource-based theory specifically focused on identifying capabilities affecting firm performance, one can offer a more analytical explanation of the product development drivers and extend previous findings that emphasize the role of agents. In addition, the different links among agents, capabilities, and performance enable one to identify several paths that can be pursued to improve our understanding of the management of product innovation.

To better illustrate these results, in the next section I deduce a resource-based model; I then use it to describe the capabilities already identified in the empirical literature on product development, as well as to present other useful resource-based variables not yet tested. In the subsequent section I add this resource-based view of product development to the studies emphasizing the role of agents involved in the process; in doing so, I discuss the agent-resource model in Figure 1 and present opportunities for future research.

A RESOURCE-BASED MODEL

Starting with the path-breaking article by Wernerfelt (1984), the resource-based view of the firm has evolved from the effort of several scholars. The core claim of those with this perspective is that a firm's *resource endowment* can be a source of rent generation if it is characterized by the properties of heterogeneous distribution among firms in the industry, imperfect mobility, and protection from competition both before and after rent achievement (e.g., Barney, 1991; Dierickx & Cool, 1989; Lippman & Rumelt, 1982; Peteraf, 1993).

These properties have helped clarify that the most critical ingredients of the resource endowment are not the tangible, such as physical and financial assets, and intangible, such as human capital and reputation, resource categories already identified in the traditional literature on strategic management (Amit & Schoemaker, 1993; Grant, 1991). Resources, in fact, tend to be tradable in markets (Barney, 1986a), and few of them can be productive on their own (Grant, 1991). Instead, rent comes primarily from *capabilities*, which, because they accumulate over time, are strictly idiosyncratic (Dierickx & Cool, 1989).

Capabilities aim at deploying and coordinating different resources (e.g., Amit & Schoemaker, 1993; Grant, 1996; Prahalad & Hamel, 1990; Teece, Pisano, & Shuen, 1997), and they reside in routines that are intrinsically intangible (e.g., Conner & Prahalad, 1996; Itami & Rohel, 1987; Kogut & Zander, 1992; Leonard-Barton, 1992; Winter, 1987). Since capabilities are composed of knowledge, their "wellspring" is learning that takes place within the organization (Iansiti & Clark, 1994; Leonard-Barton, 1995; Teece et al., 1997; Ulrich & Lake, 1990). Specifically, learning is triggered by problem-solving strategies stimulated by gaps between potential and effective performance (e.g., Dosi & Marengo, 1993; von

Hippel & Tyre, 1994). It originates from the activities undertaken by people (Leonard-Barton, 1995) in conditions of uncertainty, complexity, and conflict (Amit & Schoemaker, 1993) and requires social interaction for the continuous conversion of tacit and explicit knowledge (Nonaka, 1994). Learning makes capabilities consistent with the properties of rent generation, since its evolutionary nature results both from the history of the firm—that is, path dependence—and from the location where it physically takes place—that is, firm specificity (Dosi & Malerba, 1996; Montgomery, 1996; Nelson & Winter, 1982; Teece et al., 1997).

According to the knowledge they contain, these rent-generating routines can be classified as either *functional* or *integrative capabilities*. The former allows a firm to deepen its technical knowledge (e.g., Amit & Schoemaker, 1993; Grant, 1991; Henderson & Cockburn, 1994; Pisano, 1996; Prahalad & Hamel, 1990; Snow & Hrebiniak, 1980). The latter acts as an adhesive by absorbing critical knowledge from external sources and by blending the different technical competencies developed in various company departments (e.g., Cohen & Levinthal, 1990; Grant, 1996; Henderson & Clark, 1990; Iansiti & Clark, 1994; Kogut & Zander, 1992; Pisano, 1996; Teece et al., 1997).

The model in Figure 2 attempts to apply these theoretical concepts to the practice of product development. It shows that the presence of functional and integrative capabilities originating from agents' activities is positively correlated with *process efficiency*—measured in terms of lead time and productivity—and *product effectiveness*—related to the fit with market needs and product quality. Since they are strictly linked to the concept of rent, efficiency and effectiveness are appropriate dependent variables with which to study the impact of organizational capabilities on product development performance (McGrath, Tsai, Venkataraman, & MacMillan, 1996). Sustained above-normal returns can, in fact, come both from a process that is faster and more productive than competitors' and from a new product that creates customer value through its overall quality and its ability to fit with market needs.[1]

In this model *technological capabilities* are a first important driver of product development outcome. In fact, the presence of R&D and manufacturing routines can positively affect rent generation (Camuffo & Volpato, 1996; Hayes, Pisano, & Upton, 1996; Hayes, Wheelwright, & Clark, 1988; Helfat, 1994; Henderson, 1993). In their 1994 article on the pharmaceutical industry, for instance, Henderson and Cockburn report a positive link between the productivity of drug development and R&D capabilities regarding scientific expertise. The study of pharmaceutical and biotechnology firms also has led to the discovery of a positive relationship between the lead time of new molecular development projects and the manufacturing capability of process innovation (Pisano, 1996).[2]

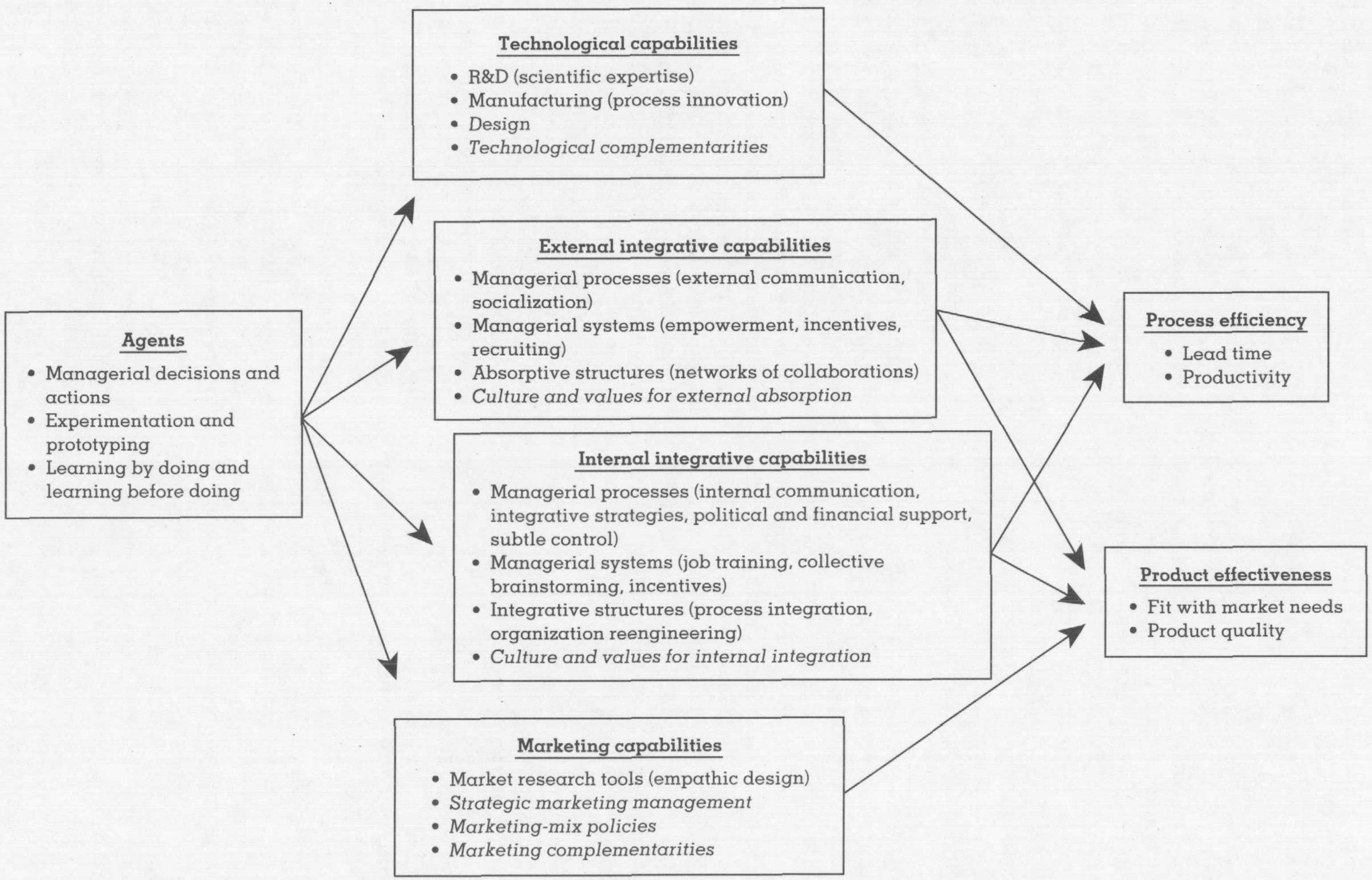
Besides R&D and manufacturing, technological complementarities are another dimension of functional capabilities related to technology. Previously accumulated technological knowledge is, for instance, an important driver of organizational rent (Helfat, 1997; Tripsas, 1997), even if specific capabilities deploying this knowledge still have to be linked to the efficiency of the innovation process. Likewise, knowledge of product architecture, aesthetics, and ergonomics is considered a source of competitiveness during product development (Ulrich & Eppinger, 1995), despite the fact that specific sets of design capabilities leading to a high degree of speed and productivity still have to be identified.

Also, *marketing capabilities* concerning the screening, use, and dissemination of market information can represent another valuable func-

[1] In addition, the evidence provided by past literature on product development focuses on process efficiency and product effectiveness (Brown & Eisenhardt, 1995). For this reason, the use of these two measures allows the merging of the resource-based findings with past ones in the agent-resource model represented in Figure 1.

[2] The work by Pisano (1994, 1996) on the pharmaceutical and biotechnology industries actually focuses on process innovation. I include his work here because of the close link between the development of a new drug and the innovation process underlying it. A new drug is, in fact, based on the development of new molecules. Such molecules usually are the result of highly specific synthetic processes, calling for the creation of an ad hoc process each time they are generated. For this reason, in the earlier stages of development, product innovation also requires process innovation (Pisano, 1994). In this article, I therefore assume that a gain in speed and productivity in process innovation will, other things being equal, positively impact the process performance of drug development.

FIGURE 2
A Resource-Based Model of Product Development[a]



[a] Words in italic indicate dimensions of capabilities not yet explored in empirical studies. Words in parentheses indicate how specific capability dimensions have been measured.

tional source of knowledge (Day, 1994; Hunt & Morgan, 1995). In this regard, research techniques employed to capture customer needs, wants, and preferences are a first dimension of marketing capabilities used in product development. Leonard-Barton (1995) provides detailed examples of consumer goods firms that increase the fit with market needs and improve overall product quality through the use of "empathic design" based on anthropological systems of documentation. This technique requires the development of a deep marketing expertise and a broad knowledge of a firm's capabilities, and it allows the discovery of latent or unperceived needs through the exploration of customer behavior.

Market-related capabilities regarding sales, distribution, and services provide another set of rent-generating routines (Montgomery & Hariharan, 1991; Stalk, Evans, & Shulman, 1992). In the case of innovation, the study of these capabilities, so far, has been confined primarily to rent appropriability (Mitchell, 1992; Teece, 1987; Tripsas, 1997). However, it would be useful to analyze how the services delivered by market-related routines increase overall product quality and, therefore, ultimately contribute to rent creation as well.

Other relevant capabilities affecting the launch of new products into the market include strategic marketing management and marketing-mix policies. On the one hand, the ability to creatively and imaginatively make strategic decisions regarding such issues as market segmentation and product differentiation can positively affect the way customers perceive a new product's ability to fit with their market needs (Hamel & Prahalad, 1991; Vicari & Troilo, 1998). On the other hand, several decisions about the new product, such as its pricing, its distribution, and its advertising, can lead to an improvement of the product's overall quality (Urban & Hauser, 1993). Despite the importance of these marketing policies, empirical efforts must still validate which specific routines related to them can positively affect product effectiveness.

Besides directly developing the capabilities mentioned above, firms also can absorb functional knowledge through the use of *external integrative capabilities*. These have been associated with the dimensions of managerial processes (Cohen & Levinthal, 1990; Teece et al., 1997), structures, information and managerial systems (Henderson & Clark, 1990; Lado & Wilson, 1994; Leonard-Barton, 1992; Ulrich & Lake, 1990), networks (Eisenhardt & Bird Schoonoven, 1996; Grant, 1996), and culture (Barney, 1986b; Kogut & Zander, 1996; Leonard-Barton, 1992). In the case of product development, managerial processes based on frequent, political, and task-oriented communication have, for instance, been positively related to final performance (Brown & Eisenhardt, 1995: 368).

Since only explicit knowledge can be communicated, it is critical for firms to adopt as well processes of integration accessing the more valuable tacit knowledge (Grant, 1996). Nonaka (1991) shows that observation and emulation, called "socialization," of external technical experts are key steps for gaining such knowledge and, therefore, improving the new product concept at Matsushita. Similarly, Iansiti and Clark (1994) argue that external communication can only partly handle the performance outcomes of product development, pointing out that product quality, lead time, and productivity are preeminently linked to the ability of merging new knowledge with accumulated one. Their study of the automotive and computer industries shows that such managerial systems as the empowerment of engineers and product managers, who are characterized by a deep understanding of firm products and capabilities, can better achieve this goal.

In addition to processes, Henderson and Cockburn (1994) have unraveled the dimension of managerial systems in the form of incentives and rewards. They claim that pharmaceutical firms that have promoted researchers according to their stand in the scientific community have enjoyed a higher level of productivity. By doing research, writing papers, and attending conferences, these researchers maintain an extensive flow of valuable knowledge across organizational boundaries. In this vein, recruiting systems that have hired people at the cutting edge of their scientific and engineering disciplines are another important absorptive capacity that has contributed to the terrific increase in speed and productivity among U.S. computer firms (Iansiti & West, 1997).

External knowledge also can be imported through integrative structures and culture. The creation of an R&D network based on strong formal ties to suppliers, for instance, has been considered an important driver of product effec-

tiveness among Japanese firms during the 1980s (Nonaka, 1990). More recently, Iansiti and West (1997) have noted that process efficiency gained in the 1990s by U.S. computer firms is due also to the absorption of technological knowledge from collaborations with different institutions. Likewise, a discipline-dominant culture (such as a marketing or engineering culture) can impact the final outcome of the process by attracting, motivating, and holding talented people from specific disciplinary fields (Leonard-Barton, 1992).

Once the required technological and marketing knowledge has been both produced and absorbed, *internal integrative capabilities* organize its use. Such capabilities are strictly linked to the dimensions of processes, systems, and structures. In the case of processes, scholars have studied them in the form of communication among project team members and have positively related them to speed and productivity of the development process (Brown & Eisenhardt, 1995: 368). As in the case of external absorption, however, internal integration requires capturing tacit knowledge and needs to go beyond the more straightforward communication of explicit knowledge. In this case, Nonaka (1991) discovered that visions based on metaphors, analogies, and models can integrate different perspectives and different functional skills and, thus, improve the product concept effectiveness in Japanese firms. In a similar direction, contingent strategies based either on extensive planning and overlapping problem solving or experiential tactics have been positively related to outcome improvements (Brown & Eisenhardt, 1995: 369). Although their impact shows dissimilarities in industries characterized by different dynamics, these strategies can be used to provide internal integration and increase both product effectiveness and process efficiency. In this regard, political and financial support and subtle control are other processes that drive product development efficiency (Brown & Eisenhardt, 1995: 371). By acting as glue, they can both attract influential members and blend them together in the same team, thus affecting the final innovation outcome.

Despite the clearly important role of processes, in recent studies researchers mainly have focused their efforts on discovering the impact of integrative structures and managerial systems. On the topic of structure, Iansiti (1997) and Pisano (1994) highlight the integration of different internal sources of technological knowledge (i.e., R&D, design, engineering, and manufacturing) as a primary driver of lead time and productivity. More broadly, Leonard-Barton's longitudinal analysis of Chaparral Steel shows that a firm can improve the product development outcome by widening the internal integration from the project team to the entire organization through the minimization of vertical and horizontal boundaries (Leonard-Barton, 1995). On the topic of systems, Nonaka (1991) identifies, in strategic rotation, transversal carrier paths and collective brainstorming, important drivers of new product effectiveness in Japanese firms. Further, researchable hypotheses related to the positive impact of internal integration include both incentives and rewards systems, as well as informal social values promoting internal integration (Griffin & Hauser, 1996).

Finally, the resource-based theory underscores that capabilities originate from the activities undertaken by people within firms (e.g., Amit & Schoemaker, 1993; Iansiti & Clark, 1994; Leonard-Barton, 1995; Nonaka, 1994). In the specific case of product development, Henderson (1994) found that, during the development of new drugs, internal and external integrative capabilities were generated by a complex process composed of the accumulation of small decisions and actions undertaken over many years in a situation of great uncertainty. Likewise, work by Pisano (1996) emphasizes the powerful role of senior managers in shaping technological capabilities through decisions and actions that take place during the development process. In a similar vein, resource-based scholars have found that these actions are mostly composed of continuous experimentation and prototyping (Leonard-Barton, 1995). They have also provided further evidence of the complexity that permeates capability generation by discovering that experimentation can differ in terms of the locus of learning—that is, it can originate either from conceptual or field experimentation—according to the level of the previously accumulated knowledge (Pisano, 1994).

In summary, the resource-based model views functional and integrative capabilities originating from agents' activities and presenting rent-generating properties as a primary driver of effective and efficient product development. In

doing so, the model widens the understanding of the management of product innovation by articulating a set of original key factors affecting process performance.

DISCUSSION AND DIRECTIONS FOR FUTURE RESEARCH

In this research note I have attempted to update the state of current literature on product development with evidence from the resource-based view of the firm. The agent-resource model of Figure 1 goes beyond this evidence by extending this contribution with findings from past studies emphasizing agents involved in the process. I now discuss this model in order to trace the different paths that future research might undertake to further widen our understanding of product innovation.

As Brown and Eisenhardt (1995) point out, the behavior of the different players taking part in the product development game is an important driver of the process performance (link 1 in Figure 1). The influence of a strong senior management, the power and the managerial skills of the project leader, the cross-functional nature of the project team and its moderate tenure, and the presence of gatekeepers and of lead users all can positively affect product development outcome. In addition, an investigation of other players might even better disclose the agents' influence over the innovation performance. For instance, the presence of a CEO with a deep understanding of technology and business has been considered an important driver of innovation at Microsoft (Cusumano & Selby, 1995). Recent research in the computer industry demonstrates how technical gurus—called "futurists"—also can positively affect a firm's ability to innovate continuously (Brown & Eisenhardt, 1997).

In the future researchers could provide a more detailed picture of both the players and those characteristics they possess that might be powerful drivers of product development outcome. Nonetheless, since several of the players' actions leverage organizational capabilities, it is also important to formally highlight the relationship between capabilities and performance in order to widen the spectrum of options available in developing new products (link 2 in Figure 1). Moreover, one has to consider that the potential imitability of several agents' characteristics reduces their strength in driving competitive advantage. As noted by Grant (1996), cross-functional teams are not so difficult to set up; the real challenge is for them to access the breadth and depth of knowledge pertinent to product development. Further, whereas actors are highly mobile and potentially able to command a wage that mirrors their value, capabilities are tied to the firm (Henderson & Cockburn, 1994; Peteraf, 1993), thus being a more valuable source of performance.

For all of these reasons, a resource-based view is extremely helpful. Indeed, this perspective shifts the focus of analysis from players to resources and highlights the role of several capabilities employed in the development process. Using the same metaphor, players are essential in playing a game because without players there is no game—that is, without people there is no knowledge and, therefore, there are no capabilities. But once you have players—that is, once you have a team and project leader ready to run the process, senior managers ready to coordinate it, and suppliers and customers ready to be involved—you also need to use the knowledge to play and win; in other words, you need to leverage processes, structures, and values to gain the rent. A resource-based view of product development identifies this knowledge in the different dimensions of functional and integrative capabilities and shows that it can work as another important driver of performance. However, in achieving this, resource-based studies present limitations that future research should address in order to increase our understanding of how capabilities affect the final outcome.

First, the resource-based model is not yet robust. Some of the variables still need to be tested, and there is sometimes a loose connection between some of the capabilities studied—for example, external integration regarding customer voice—and the proxies used to measure them—for example, empowerment of product managers. Robustness is also undermined by the fact that most of the studies come from industry-specific analysis and a sample of few qualitative cases.[3] In some respects this is not surprising, given the idiosyncratic nature of capabilities and the fact that they might not

[3] I acknowledge an *AMR* reviewer for suggesting this critique.

be duplicable, yet interindustrial and cross-sectional studies might help us to understand the actual range of applicability of this model to both firms and industries.

Second, the list of resource-based variables is not yet exhaustive. Capabilities are, in fact, deeply ingrained in specific businesses and industry activities (Pisano, 1996: 20), and, therefore, it is hard to provide a list of them all. While I have identified, in the model in Figure 2, the basic dimensions within the different marketing, technological, internal, and external integrative capabilities, future studies might elicit other detailed capabilities within these dimensions.

Third, capabilities have, so far, been linked to traditional measures of performance—that is, product effectiveness and process efficiency—whereas more recent measures employed in product innovation have not been considered. Multiple-product innovation, for example, is an outcome that recently has been related to the integrative capabilities of semi-structures, probes into the future, and transitional processes in the hypercompetitive computer industry (Brown & Eisenhardt, 1997). Likewise, really new products are increasingly expected to have a dramatic impact on a firm's profitability (Wind & Mahajan, 1997). In future studies, therefore, scholars should also try to explain whether outcomes such as multiple-product and radical innovations require different capabilities from those mentioned previously.

The distinction between agents and capabilities also serves to highlight the mutual dependencies between these two variables. In fact, agents create capabilities through the activities they are involved in (link 3 in Figure 1). As highlighted in the previous section, proponents of the resource-based view have just begun to explore some general processes on which the creation of capabilities is based (e.g., Henderson, 1994; Leonard-Barton, 1995; Pisano, 1994). Nevertheless, they do not delve into the specific activities that should be performed to gain them in order to offer a more detailed explanation of their origin. They also do not specify which actors are in charge of the creation of each capability. But without a clear understanding of the sources of capabilities, their relevance is strategically limited by the difficulties of their replication (Peteraf, 1993). In addition, it is not clear whether, once created, specific capabilities are, by themselves, a source of advantage or if they have to be leveraged by specific actors to gain the desired result. Resource-based scholars so far have pointed out how capabilities impact process performance, but they have not paid attention to how agents leverage them during product development. For this reason future research must also bridge this gap.

Further, capabilities originate from agents, while at the same time influencing their actions (link 4 in Figure 1). Capabilities contribute to structuring the attention of each agent shaping organizational behavior and, therefore, affect his or her performance over time (Ocasio, 1997). For example, senior managers could design and implement a planned and overlapping problem-solving strategy as the most efficient way to gain improvements in product development performance. Once built, this capability will, in turn, structure the attention of several actors involved in the product development process, some of which would be the team members. Problem-solving strategies, therefore, could force the project team to focus the actions of its members on both planning and parallel processing and not, for instance, on a strategy based on continuous experimentation. If this capability really proves to be efficient, it can nurture a positive cycle, unraveling more and more detailed activities through which it can be better pursued, thus spanning the overall efficiency of the process.

On the contrary, if the integrative strategy is less efficient, such as in the case of more turbulent environments (see, for example, Eisenhardt & Tabrizi, 1995), it will bind agents' actions and will progressively reduce the overall performance. In this sense the dependence of agents from capabilities can sometimes transform them into interpretative barriers (Dougherty, 1992) and core rigidities (Leonard-Barton, 1992). Christensen and Bower (1996), for instance, demonstrate how the integrative capability of resource allocation, which tends to satisfy the firm's leading clients, can lead to failure because of its inability to let managers capture emergent technologies.

For all of these reasons, in future research scholars should investigate more deeply how this self-reinforcing cycle takes place and, most of all, put effort into understanding in which circumstances its positive impact turns negative and prevents firms from generating perfor-

mance from their knowledge repositories. By identifying possible moderator variables affecting the management of knowledge, such as market and technological turbulence, Moorman and Miner's (1997) study on product development could be taken as a good starting point in this direction.

Finally, researchers might also try to identify what must be done to capture, store, and reuse the knowledge stemming from the feedback received during the product development process (link 5 in Figure 1). Although, in fact, several scholars have identified that this feedback both redirects the actors' attention and generates new capabilities (Iansiti & Clark, 1994; Leonard-Barton, 1995; Nonaka, 1994; Pisano, 1994), none of them explains how to capitalize on this valuable knowledge in future projects.

In summary, the agent-resource model extends the findings on the topic of product development with the insightful intuition of the resource-based view, and, in doing so, it unravels several paths for future research. By pursuing some of these paths, it will be possible to provide a more detailed and exhaustive picture of the performance drivers of product development: one that will prove to be useful both for practitioners and scholars. On the one hand, since the direction of people's attention is a key issue in the management of innovation (Van de Ven, 1986), such a picture will help managers better shape the context of product development by directing attention toward the critical variables. On the other, the deeper understanding of the relationships among actors, capabilities, and performance will improve the same theoretical framework of the resource-based view, the future development of which is strictly linked to the study of innovation (Rumelt, 1987).

REFERENCES

Amit, R., & Schoemaker, P. 1993. Strategic assets and organizational rent. ***Strategic Management Journal,*** 14: 33–46.

Barney, J. B. 1986a. Strategic factor markets: Expectations, luck, and business strategy. ***Management Science,*** 32: 1231–1241.

Barney, J. B. 1986b. Organizational culture: Can it be a source of competitive advantage? ***Academy of Management Review,*** 11: 656–665.

Barney, J. B. 1991. Firm resources and sustained competitive advantage. ***Journal of Management,*** 17: 99–120.

Brown, S. L., & Eisenhardt, K. M. 1995. Product development: Past research, present findings, and future directions. ***Academy of Management Review,*** 20: 343–378.

Brown, S. L., & Eisenhardt, K. M. 1997. The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. ***Administrative Science Quarterly,*** 42: 1–34.

Camuffo, A., & Volpato, G. 1996. Dynamic capabilities and manufacturing automation: Organizational learning in the Italian manufacturing automobile industry. ***Industrial and Corporate Change,*** 5: 813–838.

Christensen, C. M., & Bower, J. L. 1996. Customer power, strategic investment, and the failure of leading firms. ***Strategic Management Journal,*** 17: 197–218.

Cohen, W. M., & Levinthal, D. A. 1990. Absorptive capacity: A new perspective on learning and innovation. ***Administrative Science Quarterly,*** 35: 128–152.

Conner, K. R., & Prahalad, C. K. 1996. A resource-based theory of the firm: Knowledge versus opportunism. ***Organization Science,*** 7: 478–496.

Cusumano, M., & Selby, T. 1995. ***Microsoft secrets: How the world's most powerful software company creates technology, shapes markets, and manages people.*** New York: Free Press.

Day, G. S. 1994. The capabilities of market-driven organization. ***Journal of Marketing,*** 58: 37–52.

Dierickx, I., & Cool, K. 1989. Asset stock accumulation and sustainability of competitive advantage. ***Management Science,*** 35: 1504–1511.

Dosi, G., & Malerba, F. 1996. Organizational learning and institutional embeddedness. An introduction to the diverse paths of modern corporations. In G. Dosi & F. Malerba (Eds.), ***Organizational learning and institutional embeddedness:*** 1–24. Sussex, England: Oxford University Press.

Dosi, G., & Marengo, L. 1993. Some elements of an evolutionary theory of organizational competencies. In R. W. England (Ed.), ***Evolutionary concepts in contemporary economics:*** 234–274. Ann Arbor: University of Michigan Press.

Dougherty, D. 1992. Interpretative barriers to successful product innovation in large firms. ***Organization Science,*** 3: 179–202.

Eisenhardt, K. M., & Bird Schoonoven, C. 1996. Resource-based view of strategic alliance formation: Strategic and social effects in entrepreneurial firms. ***Organization Science,*** 7: 136–150.

Eisenhardt, K. M., & Tabrizi, B. N. 1995. Accelerating adaptive processes: Product innovation in the global computer industry. ***Administrative Science Quarterly,*** 40: 84–110.

Grant, R. 1991. The resource-based theory of competitive advantage. ***California Management Review,*** 33(3): 114–134.

Grant, R. 1996. Prospering in dynamically-competitive environments: Organizational capability as knowledge creation. ***Organization Science,*** 7: 375–387.

Griffin, A., & Hauser, J. R. 1996. Integrating R&D and marketing: A review and analysis of the literature. ***Journal of Product Innovation Management,*** 13: 191–215.

Hamel, G., & Prahalad, C. K. 1991. Corporate imagination and expeditionary marketing. ***Harvard Business Review,*** 69(July–August): 81–92.

Hayes, R. H., Pisano, G., & Upton, D. M. 1996. ***Strategic operations: Competing through capabilities. Text and cases.*** Cambridge, MA: Harvard Business School.

Hayes, R. H., Wheelwright, S., & Clark, K. 1988. ***Dynamic manufacturing: Creating the learning organization.*** New York: Free Press.

Helfat, C. E. 1994. Firm-specificity in corporate applied R&D. ***Organization Science,*** 5: 173–184.

Helfat, C. E. 1997. Know-how, asset complementarity & dynamic capability accumulation: The case of R&D. ***Strategic Management Journal,*** 18: 339–360.

Henderson, R. 1993. Underinvestment and incompetence as responses to radical innovation: Evidence from the photolithographic alignment equipment industry. ***RAND Journal of Economics,*** 24: 248–268.

Henderson, R. 1994. The evolution of integrative capability: Innovation in cardiovascular drug discovery. ***Industrial and Corporate Change,*** 3: 607–630.

Henderson, R., & Clark, K. 1990. Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. ***Administrative Science Quarterly,*** 35: 9–30.

Henderson, R., & Cockburn, I. 1994. Measuring competence? Exploring firm effects in pharmaceutical research. ***Strategic Management Journal,*** 15: 63–84.

Hunt, S. D., & Morgan, R. M. 1995. The comparative advantage theory of competition. ***Journal of Marketing,*** 59: 1–15.

Iansiti, M. 1997. ***Technology integration: Making critical choices in a dynamic world.*** Boston: Harvard Business School Press.

Iansiti, M., & Clark, K. 1994. Integration and dynamic capability: Evidence from product development in automobiles and mainframe computers. ***Industrial and Corporate Change,*** 3: 557–605.

Iansiti, M., & West, J. 1997. Technology integration: Turning great research into great products. ***Harvard Business Review,*** 75(May–June): 69–79.

Itami, H., & Rohel, D. 1987. ***Mobilizing invisible assets.*** Cambridge, MA: Harvard University Press.

Kogut, B., & Zander, U. 1992. Knowledge of the firm, combinative capabilities, and the replication of technology. ***Organization Science,*** 3: 383–397.

Kogut, B., & Zander, U. 1996. What firms do? Coordination, identity, and learning. ***Organization Science,*** 7: 502–518.

Lado, A. A., & Wilson, M. C. 1994. Human resource systems and sustained competitive advantage: A competency-based perspective. ***Academy of Management Review,*** 19: 699–727.

Leonard-Barton, D. 1992. Core capabilities and core rigidities: A paradox in managing new product development. ***Strategic Management Journal,*** 13: 111–125.

Leonard-Barton, D. 1995. ***Wellsprings of knowledge: Building and sustaining the sources of innovation.*** Boston: Harvard Business School Press.

Lippman, S. A., & Rumelt, R. P. 1982. Uncertain imitability: An analysis of interfirm differences in efficiency under competition. ***Bell Journal of Economics,*** 13: 418–438.

McGrath, R. G., Tsai, M., Venkataraman, S., & MacMillan, I. C. 1996. Innovation, competitive advantage and rent: A model and test. ***Management Science,*** 42: 389–403.

Mitchell, W. 1992. Are more good things better, or will technical and market capabilities conflict when a firm expands? ***Industrial & Corporate Change,*** 1: 327–346.

Montgomery, C. A. (Ed.). 1996. ***Resource-based and evolutionary theories of the firm: Towards a synthesis.*** Norwell, MA: Kluver.

Montgomery, C. A., & Hariharan, S. 1991. Diversified expansion by large established firms. ***Journal of Economic Behavior and Organization,*** 15: 17–39.

Moorman, C., & Miner, A. S. 1997. The impact of organizational memory on new product performance and creativity. ***Journal of Marketing Research,*** 34: 91–106.

Nelson, R. R., & Winter, S. G. 1982. ***An evolutionary theory of economic change.*** Cambridge, MA: Harvard University Press.

Nonaka, I. 1990. Redundant and overlapping organization: A Japanese approach to managing the innovation process. ***California Management Review,*** 32(3): 27–37.

Nonaka, I. 1991. The knowledge-creating company. ***Harvard Business Review,*** 69(November–December): 96–104.

Nonaka, I. 1994. A dynamic theory of organizational knowledge creation. ***Organization Science,*** 5: 14–37.

Ocasio, W. 1997. Towards an attention-based view of the firm. ***Strategic Management Journal,*** 18(Summer Special Issue): 187–206.

Peteraf, M. A. 1993. The cornerstones of competitive advantage: A resource-based view. ***Strategic Management Journal,*** 14: 179–191.

Pisano, G. 1994. Knowledge, integration, and the locus of learning: An empirical analysis of process development. ***Strategic Management Journal,*** 15: 85–100.

Pisano, G. 1996. ***The development factory. Unlocking the potential of process innovation: Lessons from pharmaceuticals and biotechnology.*** Boston: Harvard Business School Press.

Prahalad, C. K., & Hamel, G. 1990. The core competence of the corporation. ***Harvard Business Review,*** 68(May–June): 79–91.

Rumelt, R. P. 1987. Theory, strategy, and entrepreneurship. In D. J. Teece (Ed.), ***The competitive challenge:*** 137–158. Cambridge, MA: Ballinger.

Snow, C. C., & Hrebiniak, L. G. 1980. Strategy, distinctive competence, and organizational performance. ***Administrative Science Quarterly,*** 25: 317–336.

Stalk, G., Evans, P., & Shulman, L. E. 1992. Competing on capabilities: The new rules of corporate strategy. ***Harvard Business Review,*** 70(March–April): 57–69.

Teece, D. J. 1987. Profiting from technological innovation: Implication for integration, collaboration, licensing and public policy. In D. J. Teece (Ed.), ***The competitive challenge:*** 185–219. Cambridge, MA: Ballinger.

Teece, D. J., Pisano, G., & Shuen, A. 1997. Dynamic capabilities and strategic management. ***Strategic Management Journal,*** 18: 509–533.

Tripsas, M. 1997. Unravelling the process of creative destruction: Complementary assets and incumbent survival in typesetter industry. ***Strategic Management Journal,*** 18(Summer Special Issue): 119–142.

Ulrich, D., & Lake, D. 1990. ***Organizational capability: Competing from the inside out.*** New York: Wiley.

Ulrich, K. T., & Eppinger, S. D. 1995. ***Product design and development.*** New York: McGraw-Hill.

Urban, G. L., & Hauser, J. R. 1993. ***Design and marketing of new products*** (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.

Van de Ven, A. H. 1986. Central problems in the management of innovation. ***Management Science,*** 32: 590–607.

Vicari, S., & Troilo, G. 1998. Errors and learning in organizations. In G. von Krogh, J. Roos, & D. Klein (Eds.), ***Knowing in the firm: Understanding, managing and measuring:*** 92–115. London: Sage.

von Hippel, E., & Tyre, M. J. 1994. How learning by doing is done: Problem identification in novel process equipment. ***Research Policy,*** 24: 1–12.

Wernerfelt, B. 1984. A resource-based view of the firm. ***Strategic Management Journal,*** 5: 171–180.

Wind, J., & Mahajan, V. 1997. Issues and opportunities in new product development. ***Journal of Marketing Research,*** 34: 1–12.

Winter, S. 1987. Knowledge and competence as strategic assets. In D. J. Teece (Ed.), ***The competitive challenge:*** 159–184. Cambridge, MA: Ballinger.

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