

STRATEGIC ENTREPRENEURSHIP, COLLABORATIVE INNOVATION, AND WEALTH CREATION

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Strategic entrepreneurship refers to firms' pursuit of superior performance via simultaneous opportunity-seeking and advantage-seeking activities. Both small and large firms face impediments while pursuing strategic entrepreneurship. While small firms' opportunity-seeking skills may be strong, their limited knowledge stocks and lack of market power inhibit their ability to enact the competitive advantages necessary to appropriate value from opportunities the firms choose to pursue. In contrast, large firms are skilled at establishing competitive advantages, but their heavy emphasis on the efficiency of their existing businesses often undermines their ability to continuously explore for additional opportunities. Building on a variety of theories, including network, learning, resource-based, and real options, we suggest that collaborative innovation can enable both types of firms to overcome their respective challenges. Collaborative innovation is the pursuit of innovations across firm boundaries through the sharing of ideas, knowledge, expertise, and opportunities. For small firms, we contend that pursuing entrepreneurship collaboratively allows them to preserve their creativity and flexibility while mitigating the inherent liabilities of smallness. We argue that collaborative innovation permits large firms to exploit their advantage-creating skills while concurrently exploring for opportunities outside their current domain. Thus, small and large firms that learn how to integrate strategic entrepreneurship and collaborative innovation are well positioned to create wealth. Copyright © 2008 Strategic Management Society.

INTRODUCTION

Understanding the process of wealth creation is a key goal underlying research throughout the organizational sciences (Hitt *et al.*, 2001). Each research area takes its own approach to this goal. Strategic management, for example, focuses on how competitive positioning can create advantages for firms

that, in turn, produce improvements in performance (Porter, 1980, 1996). Entrepreneurship's attention to wealth creation centers on identifying new and emerging opportunities in the marketplace (Shane and Venkataraman, 2000).

The focus of each of these areas suggests the existence of a clear demarcation between strategic management on the one hand and entrepreneurship on the other. The reality of organizational behavior is far more complex and interesting, however, in that executives attempting to lead their organizations in ways that create wealth must grapple with the challenges presented by both strategy and entrepreneurship. Therefore, focusing scholarly efforts on either

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strategy or entrepreneurship produces an incomplete portrait of the modern firm. In this context, it could be that concentrating on either strategy or entrepreneurship to the exclusion of the other enhances the probability of firm ineffectiveness or even failure.

Some scholars have long recognized that firms need to be concerned about both strategy and entrepreneurship (e.g., Burgelman, 1983, 2002). Recently, the formal concept of strategic entrepreneurship has been introduced in recognition of the dual, interwoven challenges that executives face. *Strategic entrepreneurship* refers to firms' pursuit of superior performance via simultaneous opportunity-seeking and advantage-seeking activities (Ireland, Hitt, and Sirmon, 2003). By working along both of these dimensions, firms attempt to create wealth by exploiting current competitive advantages and by setting the stage for future performance through identifying ideas that will create subsequent advantages (Ireland and Webb, 2007). Excelling along both dimensions is difficult because each requires very different organizational capabilities. However, simultaneously pursuing both advantages and opportunities may be necessary for survival in today's global economic arena (Hitt *et al.*, 2001; Ireland and Hitt, 1999).

Much remains unknown about why some firms can successfully pursue strategic entrepreneurship while others struggle. Large and small firms alike are susceptible to liabilities of size and age with respect to strategic entrepreneurship, but for different reasons (Aldrich and Auster, 1986; Ireland *et al.*, 2003). Large firms tend to be skilled at establishing competitive advantages, but their emphasis on operational effectiveness often undermines their ability to continuously explore additional opportunities. Small firms' opportunity-seeking skills may be strong, but their limited knowledge stocks and lack of market power inhibit their ability to enact the competitive advantages necessary to appropriate value from opportunities. As a consequence, smaller firms may wish to form some type of collaborative relationship with one or more larger firms in order to gain access to their partner's capabilities and resources as a way of exploiting an innovation it developed. Alternatively, large firms may wish to organize communities that include small firms so that cross-market product and service applications can be more easily identified and developed.

Drawing on relevant theoretical perspectives—network theory, learning theory, the resource-based view, and real options theory—we suggest that

collaborative innovation can enable both small and large firms to overcome their respective challenges related to successfully engaging in strategic entrepreneurship. *Collaborative innovation* is the creation of innovations across firm (and perhaps industry) boundaries through the sharing of ideas, knowledge, expertise, and opportunities (Miles, Miles, and Snow, 2005). For small firms, pursuing innovation collaboratively allows them to preserve their creativity and flexibility while mitigating the inherent liabilities of smallness. Typically, a small firm that devises a valuable innovation runs the risk that larger firms will imitate the innovation and gain significant market share before the small firm can fully develop its idea and appropriate value by successfully taking that idea to the market. Through collaborative innovation, a small firm's innovations can be implemented on a scale that permits market entry to be as fast and effective as that of large firms.

Similarly, collaborative innovation facilitates large firms' efforts to exploit their advantage-creating skills while concurrently exploring innovation-related opportunities outside their current domain. Large firms already have the resources and market power that small firms need to protect their innovations from rivals. Large firms also operate on a scale that allows them to be efficient in their operations. Large firms can learn how to 'think small' through their interactions with small firms. This does not imply having small ambitions; it suggests the value of approaching opportunity seeking with the open-minded optimism traditionally possessed by start-ups and young ventures. Such a mindset is difficult to maintain over time, because growth is commonly accompanied by the emergence of bureaucratic procedures, complex structures, and rigid cultures. This suggests that collaborative innovation can fuel the strategic renewal that large firms often find elusive (Floyd and Lane, 2000).

Overall, our belief is that large and small firms that effectively integrate strategic entrepreneurship and collaborative innovation are well positioned to continuously create wealth. On different dimensions, both large and small firms are disadvantaged to fully engage in strategic entrepreneurship. We argue that these disadvantages motivate large and small firms to join forces in order to share knowledge and develop a total strategic entrepreneurship 'package'—opportunity-seeking *and* advantage-seeking capabilities—that can foster a pattern of successful and continuous innovation. We are not suggesting that collaborative innovation has greater

wealth creation potential than innovative activity at the firm level. Instead, we contend that collaborative innovation can supplement firm-level activity in order to close the gap between the level of innovation a firm is capable of creating and the level of innovation a firm needs in order to pursue strategic entrepreneurship.

In this article, we first review the literature on strategic entrepreneurship and collaborative innovation, and we describe how the integration of these concepts benefits firms. Indeed, it takes a mix of innovative firms and established large enterprises to make a successful economy (Baumol, Litan, and Schramm, 2007). We then discuss four theoretical perspectives that inform the interplay between strategic entrepreneurship and the process of multi-firm collaborative innovation. We draw on these perspectives to develop ideas about how wealth creation can be enhanced through the confluence of strategic entrepreneurship and collaborative innovation. In the final section, we discuss the implications of our theorizing for issues of importance to three groups interested in wealth creation: scholars, managers, and investors.

THE CONCEPTS OF STRATEGIC ENTREPRENEURSHIP AND COLLABORATIVE INNOVATION

Strategic entrepreneurship

Our arguments involving strategic entrepreneurship build on four main assertions about the nature of strategic entrepreneurship. First, as its name suggests, strategic entrepreneurship is the melding of the strategy and entrepreneurship domains. Firms pursuing strategic entrepreneurship engage in both the opportunity-seeking activities required by entrepreneurship and the advantage-seeking activities required by strategy (Ireland *et al.*, 2003). Our contention is that firms desiring to create wealth on a continual basis cannot rely exclusively on the activities associated with either entrepreneurship or strategy. The reason for this is that actions taken to implement a chosen strategy enable a firm to extract value from existing domains. As such, these actions foster wealth creation in the short run.

However, profitable niches evolve, shift, and disappear rapidly in today's economy (Ireland and Hitt, 1999). Thus, a firm focused solely on taking actions to implement a selected strategy might become the most effective producer within a declining market

space. Activities associated with entrepreneurship, on the other hand, identify new niches and ways to serve them. Without being able to successfully use a chosen strategy—one that creates a competitive advantage—a firm will soon face copycat competitors whose offerings will erode its profits. Thus, the actions associated with strategy and with entrepreneurship are each necessary, but not individually sufficient, to promote sustained wealth creation. Moreover, these two elements must work in concert with each other. The union of strategy and entrepreneurship is one of the foundational notions of strategic entrepreneurship.

Strategic entrepreneurship also involves finding a balance between opportunity-seeking and advantage-seeking activities (Ireland *et al.*, 2003). Opportunity seeking involves sorting through potential opportunities to identify areas of future activity for the firm. The overall success of opportunity-seeking efforts depends on how the firm absorbs and integrates new and existing knowledge. More specifically, opportunity seeking is inherently a learning process, wherein a firm gathers knowledge from outside its borders to supplement its own knowledge stocks (Chesbrough, 2003; March, 1991). Outside sources include other firms that are acquired, alliance partners, and promising start-ups that the firm supports through corporate venture funds (Ireland and Webb, 2007). Building a diverse knowledge base enables a firm to expand its competitive repertoire. An expanded repertoire is vital for success during periods of upheaval and unpredictability, because executives cannot know in advance the responses their firms will need to enact.

Innovations generated by exploratory efforts can be highly disruptive, especially to industry leaders (Christensen, 1997). Between periods of disruptive change, however, shifts tend to be incremental and gradual (Tushman and Romanelli, 1985). For example, digital music that is stored on hard drives was introduced a few years ago. This represented a radical departure from tangible recording formats, such as the vinyl album, eight-track tape, cassette tape, and compact disc, which had dominated music retailing throughout the 20th Century. Currently, digital music is the dominant format. The attention of music providers is now focused on advantage seeking—finding the best ways to profitably deliver digital music. Indeed, music retailers such as Apple, Wal-Mart, Amazon.com, and Best Buy continually tweak their technology, pricing structures, and product bundling in an effort to effectively and

efficiently meet demand. Consistent with the notion of strategic entrepreneurship, each firm also hopes to be the first to identify the next frontier in this ever-changing environment.

Thus, discovering gold is only half of a firm's challenge—the firm must also find an effective way to mine the gold. The most effective 'miners' are firms that offer high-quality products soon after radical change makes an opportunity clear, build market share, and create a competitive moat around their business (Ireland and Webb, 2007). In the digital music arena, Apple has played this role. Its early creation of the iTunes music Web site and the iPod music player enabled it to not only dominate the market, but to do so using a proprietary music format that makes replication by competitors very difficult. Apple's exploitation of the digital music business helped the firm create enormous wealth. A share of Apple stock that sold for approximately \$12 in early 2004 was worth over \$165 per share in the last quarter of 2007.

Being able to balance opportunity seeking and advantage seeking is necessary in today's economic environment. However, achieving this outcome challenges managers. The third pillar of strategic entrepreneurship is an appropriate managerial mindset within the firm (Ireland *et al.*, 2003). Typically, organizational identities are built around singular distinctions. For example, IBM built its identity around being a service organization, McDonald's has long emphasized consistency, Hermes designs and sells only high-end fashion items, and the focus of the Walt Disney Company has been squarely on entertainment and creativity. Today's executives are forced to find ways to embrace a broader set of capabilities as central to the organization's well being without allowing its identity to become diluted or schizophrenic. Executives must be able to simultaneously initiate and monitor activities that vary between creative opportunity seeking and precise advantage seeking. Evidence suggests that firms led by executives who are skilled at this task are better positioned to create wealth than those who are not (c.f. Brorstrom, 2002; Ireland *et al.*, 2003; Miles *et al.*, 2000; Tushman and O'Reilly, 1996).

Our final assertion is that strategic entrepreneurship requires a continuous flow of innovations (Ireland and Webb, 2007). Firms strive for a scenario wherein opportunity seeking and entrepreneurship provide a steady pipeline of new ideas whose value is then extracted via integration and advantage seeking. When the flow of innovations slows

or stops, the balance required to sustain strategic entrepreneurship is jeopardized. In turn, the firm may fall into an inertial pattern of simply relying on its existing routines and offerings (March, 1991). As existing niches shift and shrink, the firm is sure to suffer as its ability to create wealth is negatively affected.

Eastman Kodak is a good example of a firm that fell into this pattern. Although Kodak led the photography business since the industry's creation, it failed to maintain its position as a market leader. While firms such as Nikon and Olympus were aggressively pursuing innovations in digital photography in the 1990s, Kodak remained focused on film-based cameras. Today, digital cameras dominate photography, and the film side of the industry is occupied mainly by a small group of specialists. Kodak was forced to sell digital cameras at 'fire sale' prices in a desperate effort to regain lost market share. Despite Kodak's low prices and enhanced commitment to the technology, by 2006 it held only 10 percent of the digital camera market.

The wealth effects of Kodak's inability to maintain continuous innovation have been profound. In the predigital era, the firm's stock sold for over \$80 a share. By early 2007, Kodak stock traded at about \$25 a share. The effects on Kodak employees were even more brutal. A recent restructuring eliminated over 25,000 jobs. A more devastating example can be found in the case of Polaroid, a firm that never innovated beyond instant photography and fell into bankruptcy.

Collaborative innovation

Until the 1990s, both the academic and business literatures tended to portray innovation and entrepreneurship as driven by entities acting alone. New ideas and product innovations were thought to be the product of an individual entrepreneur, a small business, or a unit within a corporation. Today, however, the unprecedented level of complexity and change posed by the competitive environment makes a unitized approach to innovation increasingly difficult, and creates opportunities for new idea generation and knowledge sharing that span firms, industries, and countries (Ireland and Hitt, 1999). The concept of requisite variety seems to be as relevant to innovation as it is to social systems. Requisite variety means that an organization's design must match the complexity of its environment, and that its ability to adapt must keep pace with changes in

the environment (Ashby, 1956). Accelerating trends in globalization and information technology have helped create competitive arenas whose demands are growing quickly and unpredictably, and competition in such settings exceeds the ability to keep pace of even the most agile individuals, small businesses, and corporate research and development units (Friedman, 2005).

The ability to innovate in the face of change and complexity has long been a characteristic of professional communities, occurring regularly among scientists, artists, scholars, doctors, engineers, and other professionals (John-Steiner, 1997, 2000; Lee and Cole, 2003; Miles *et al.*, 2005; Wenger, 2000). For example, scientific challenges are often explored by individual researchers and research teams who are part of international scientific networks. The scope and complexity of such challenges overwhelm the ability of isolated investigators to resolve them. The development of new therapeutic drugs based on the biosciences, for instance, involves thousands of scientists spread around the world who are affiliated with a variety of private, government, and university organizations (Audretsch and Feldman, 2003; Powell, Koput, and Smith-Doerr, 1996). For management scholars, the quest to understand how business strategies influence firm performance began in earnest following the publication of Chandler's (1962) seminal book, *Strategy and Structure*. Over the next 45 years, hundreds of strategic management researchers worldwide joined this quest using a variety of theories and methods. Neither of these research endeavors could be effectively pursued by individuals acting alone.

Researchers and others involved in knowledge production recognize the value of external networks in the innovation process (Brown and Duguid, 1991; Chesbrough, 2003; Powell, 1990; von Hippel, 1988). Interorganizational collaboration is a process whereby two or more parties work closely with each other to achieve mutually beneficial outcomes (Appley and Winder, 1977; Emery and Trist, 1965; Gray, 1989). Collaboration is a philosophically different (and, arguably, more demanding) process than cooperation, where desired outcomes are relatively clear, the distribution of future returns can be negotiated in advance, and the cooperating parties act essentially in their own self-interest (Miles *et al.*, 2005). Collaboration often involves unpredictable outcomes and relies heavily on trust and a joint commitment to values of honesty and equitable treatment. In contrast to cooperation, collaborating

parties take each other's interests into account as much as their own (von Krogh, 1998). Collaboration can be directed toward any mutually desired objective: identifying and then solving a problem, resolving a conflict, creating a new product or business, and so on. According to Link and Siegel (2007), interorganizational collaboration in the commercial arena has been growing steadily over the past two decades, fueled by institutional changes such as (1) investments in public-private partnerships including incubators, science parks, and small business programs; (2) relaxation of antitrust enforcement to promote collaborative research; and (3) enactment of legislation designed to promote more rapid technological diffusion from universities and federal laboratories to firms (Bayh-Dole Act and Stevenson-Wydler Act, both passed in 1980).

Firms that choose to pursue collaborative innovation as a strategy must be able to develop the capabilities, structures, and processes to support a collaborative approach. Nokia is one such firm. Nokia has a network of over 300 small high-tech firms. Nokia and its partners have developed ways of building 'fast trust' among interacting parties in order to facilitate rapid innovation (Blomqvist, 1998). Although Nokia's size relative to its partners provides it with the opportunity to exploit the partners, the firm seems to recognize that a collaborative approach is sometimes essential for the innovator and its partners to capture a significant share of the economic value associated with an innovation (c.f. Teece, 1986). Organizationally, Nokia can be viewed as a firm embedded in an ecosystem of flexible 'collaborative networks.' In such a rich ecosystem, a lead firm can participate in multiple networks, each of which has large entrepreneurial potential.

Raytheon Company provides a good example of how portions of an ecosystem can be quickly and effectively activated for purposes of innovation. A few years ago, the firm was involved in developing the U.S. Navy's next-generation aircraft carrier, the U.S.S. Gerald Ford. The goals for this vessel included increasing aircraft missions (sorties) by 20 percent, improving resistance to future military threats, reducing the number of personnel on board, and reducing maintenance time at port by up to 25 percent. Achieving these goals required all contractors involved in the ship's construction to extend their capabilities in new and sometimes uncertain directions.

Raytheon was tasked with providing the warfare and aviation support systems that would ensure that

the U.S.S. Gerald Ford excelled in terms of communications, combat, intelligence, surveillance, and reconnaissance. Raytheon executives quickly realized that their firm did not possess the skills to create all of the needed technologies and processes. The typical approach in the defense business is to simply subcontract such work, often to small firms with specialized expertise, and then integrate the results of individual subcontractors' output to create the final product. Given the complexity of the project, Raytheon de-emphasized formal contracting, opting in its place to build an entrepreneurial community it calls a 'small business federation.' The small business federation is a formal consortium composed of the small business partners allied with Raytheon on the contract.

Although many aspects of the federation remain a closely guarded proprietary secret, from the outside it is clear that Raytheon provides support to the federation in the form of mentoring, infrastructure, and training that would not be economically viable to offer to individual partner firms. Members also benefit from the federation because it provides a setting for them to exchange new ideas, combine skills, and work together collaboratively to solve problems. For example, when a particular issue or task arises, Raytheon charges a member of the federation to take the lead in addressing the matter. The lead firm then identifies which members of the federation are needed and assembles a project team. By empowering its small business partners, the value of the creative solutions that emerge from interactions within the federation far exceeds Raytheon's administrative costs. The end result has been a series of innovations that substantially improved the aircraft carrier's capabilities and performance.

Raytheon leveraged the knowledge it acquired about multi-firm collaboration through the U.S.S. Gerald Ford project when it recently led the creation of the Warrior Training Alliance. This alliance of 67 firms was assembled to provide support for the U.S. Army's training activities, including war games, electronic simulations, and classroom teaching. The contract runs for 10 years and is worth approximately \$11.2 billion. The collaborative network was created because senior Raytheon executives realized that their firm could not readily provide the vast array of sophisticated technologies and processes required by the Army. For example, Computer Science Corporation (another large firm) will take the lead in providing support for electronic simulations. For the small specialist firms, Raytheon once again helped these

partners create a formal consortium. This second small business federation consists of 43 small firms allied with Raytheon on the contract. The members of the federation are expected to work collaboratively to fulfill a variety of specialized tasks as their contribution to the Warrior Training Alliance, and they will receive collective mentoring and training from Raytheon. In both examples, collaborative innovation enabled a large firm (Raytheon) and a set of small firms (its small business partners) to overcome their own limits. It remains unknown at this early stage whether the enhancements provided by the two networks to Raytheon's ability to innovate will be additive or exponential.

Integration of strategic entrepreneurship and collaborative innovation

As discussed earlier, the effective practice of strategic entrepreneurship is rapidly becoming an organizational imperative for companies competing within the modern, innovation-driven global economy. For most firms, however, finding the proper balance between advantage-seeking and opportunity-seeking activities is extremely difficult. This jeopardizes firms' ability to create wealth, and it suggests the need to identify ways to close the gap between what firms can do on their own and what they need to do in order to pursue strategic entrepreneurship.

We believe collaborative innovation can serve as a tool to fill this gap, particularly with respect to the need for a stream of continuous innovations. As shown in Figure 1, the wealth creation process is unpredictable, resulting in an erratic pattern of innovations within the typical firm. If the overall innovation level is low at any given time, attempting to remedy the situation by exerting extraordinary effort is just as likely to produce frustration as it is to create new ideas. A scientist or engineer cannot simply vow, 'Today, I will be brilliant,' and concoct a new idea. Thus, to a large extent, patterns of innovation within a firm will always include elements of variability and even randomness.

We use the term 'innovation gap' in Figure 1 to refer to the distance between a firm's internal level of innovation and the continuous innovation required by strategic entrepreneurship. Collaborative innovation offers a means for bridging this gap. As shown in the vertically shaded area, a firm can extend its innovative reach both by accessing the creative ideas of allied organizations and by having its partners identify new market applications that the

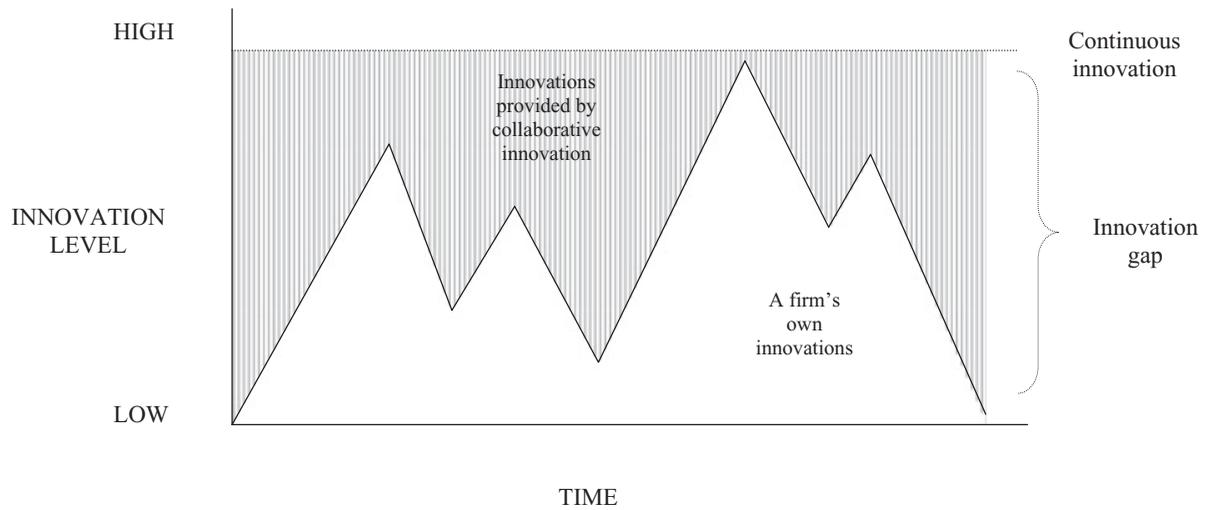


Figure 1. Closing the innovation gap

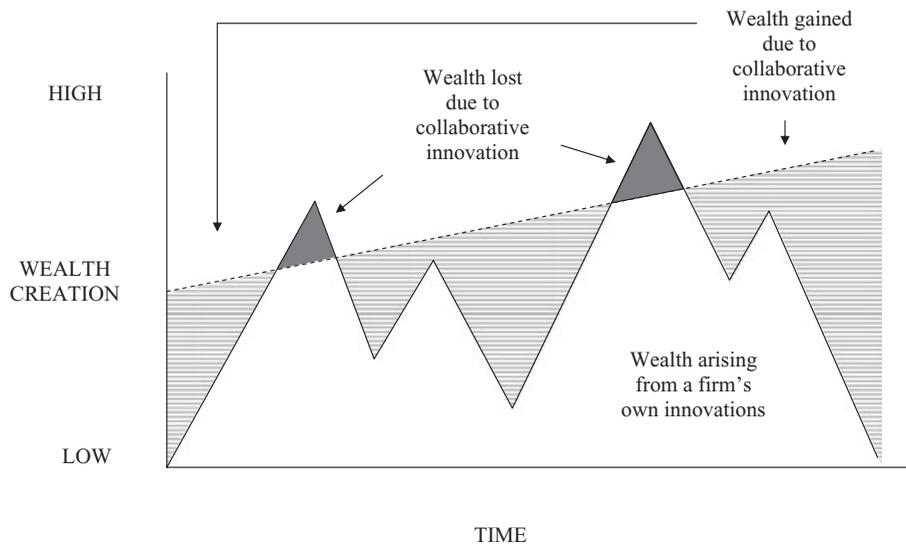


Figure 2. Wealth creation over time

firm could not locate on its own. While it is true the focal firm does not ‘own’ these ideas, the nature of collaborative innovation is such that the originating firms do not own them either. Within a collaborative network, ideas are open-source opportunities—each member can use the ideas to devise projects within the network (Lee and Cole, 2003). By importing ideas from its collaborative network, a firm can not only fill the innovation gap, but also preserve the balance between advantage-seeking and opportunity-seeking activities and maintain the dual mindset needed for strategic entrepreneurship.

Figure 2 displays the implications for wealth creation of integrating strategic entrepreneurship and collaborative innovation. The slightly positive slope of the dashed line reflects our argument that a firm that integrates the two strategic approaches can become more skilled at creating wealth over time (c.f. Ireland and Webb, 2007; Miles *et al.*, 2005). The large white area denotes the wealth creation arising from a firm’s own innovations. The uneven performance shown reflects the uneven nature of innovation within most firms. A good example of a firm following this pattern is Apple, which has

created enormous wealth during periods of strong innovation (e.g., 1986–1991 and 2004–2007) but has struggled at other times (e.g., 1993–1999).

The shaded areas of Figure 2 merit special attention. The horizontally shaded areas show the wealth gained due to using collaborative innovation to fill the innovation gap and achieving the stream of continuous innovation required by strategic entrepreneurship. These areas represent occasions where a firm's collaborative allies have enabled it to maintain its 'innovation treadmill' and thereby avoid falling into the trap of emphasizing advantage-seeking over opportunity-seeking activities (c.f. March, 1991). For example, prior to the formation of the Warrior Training Alliance, Raytheon led a smaller collaborative network focused on supporting the U.S. Army's live training activities. One of Raytheon's assignments from the Army was to help train soldiers to avoid Improvised Explosive Devices (IEDs) that adapt cell phones and other electronic products as detonators for concealed explosives. IEDs are a central element of insurgents' tactics in Iraq. Rather than attempting to exploit its existing but ill-suited training technology to prepare soldiers for this threat, Raytheon sought to draw on its collaborative network partners to devise innovative, customized solutions.

One goal was to create a new device that simulates an IED. Raytheon did not possess the needed skills; instead the firm worked closely with Pacific Coast Systems. Pacific Coast Systems is a three-person company with unique design and manufacturing capabilities, but it lacked the infrastructure to fully develop the devices. As a result, Raytheon and Pacific Coast Systems jointly developed the patented technology embedded in the devices. Collaboration within the network then allowed the quick production of the devices and deployment to training sites around the world to occur. In the end, multi-firm collaboration enabled Raytheon and its allies to provide an innovation that filled a pronounced market need.

Integrating strategic entrepreneurship and collaborative innovation is not without costs, however. The dark-shaded areas of Figure 2 show the wealth lost due to using collaborative innovation. Some innovations that a firm would have been able to completely develop itself will be surrendered to the network through collaboration with other firms. For example, a firm might generate a patent that other network members figure out how to bring to market. The firm accrues wealth in this scenario, but not as much as if it had acted alone. Because collaboration

produces ideas synergistically, however, most firms should realize more wealth than they lose over time (Miles *et al.*, 2005). This is denoted in Figure 2 by the horizontal shading capturing more space (i.e., wealth) than the dark shading.

THEORETICAL PERSPECTIVES ON INTEGRATING THE CONCEPTS

To this point, we have argued that collaborative innovation may help a firm pursue strategic entrepreneurship by enhancing the firm's ability to be continuously innovative. At least four theoretical perspectives inform the integration of these two broad concepts in more specific ways: network theory, learning theory, resource-based theory, and real options theory. Each perspective is briefly described below in order to delineate possible linkages among strategic entrepreneurship, collaborative innovation, and wealth creation.

Network theory

Network theory focuses on the relationships a firm has with other firms, and on how those relationships influence a firm's behavior and outcomes (Dyer, 2000). Network theory is useful to our consideration of strategic entrepreneurship, collaborative innovation, and wealth creation in at least two ways. First, network theory takes a relational perspective (Dyer and Singh, 1998). In such a perspective, the capabilities of entrepreneurs and firms are clearly important. However, the nature and quality of the relationships among various individuals, groups, and firms are equally important to innovation success. This is consistent with our suggestion that a firm's own efforts at continuous innovation may fall short, and that collaborative innovation can fill the resulting innovation gap.

Second, network-based studies indicate the types of collaborative innovation approaches that are likely to lead to successful outcomes (e.g., Hansen, 1999; Tsai and Ghoshal, 1998). Networks composed of tightly coupled firms that possess similar experiences and cultures are expected to produce relatively low levels of creativity and innovation. The main reason is that similar mindsets and similar approaches to problems tend to be developed in these networks. More creative ideas are likely to arise when networks are characterized by loose ties (Granovetter, 1973)—where resources and assets are complementary,

organizational processes are open, and so on. This allows diversity of thought and experience to be brought to bear on problems and opportunities.

Within the context of a multi-firm collaborative network, we expect the looseness of ties among the member firms to shape the network's effectiveness at devising the innovations that help allied firms achieve strategic entrepreneurship on an ongoing basis. As Figure 2 suggests, to the extent that this challenge is met, wealth will be created. It would, therefore, be interesting to examine in future research how the relative looseness of ties within a collaborative network is related to the quantity of innovations that the network produces. Our suspicion is that the relationship is likely to be positive. In terms of wealth creation, we suspect that to the extent that collaborative innovation is pursued largely via loose ties, wealth creation will be increased.

Learning theory

Learning theory focuses on how a firm builds its knowledge base over time and deploys its stock of knowledge to achieve success, including creating wealth. This general scholarly thrust has been pursued under a variety of labels, including organizational learning, the knowledge-based view, and knowledge management. One summary of the organizational learning literature concluded that there are four key concepts associated with a process view of learning: knowledge acquisition, information distribution, information interpretation, and organizational memory (Huber, 1991). Each stage in the organizational learning process must be well managed in order for innovation to be continuous and effective.

Large and small firms possess different strengths and weaknesses relative to these four learning dimensions. Most large firms have the infrastructure to acquire and distribute information on a massive scale. Large firms generally have the competitive intelligence systems needed to interpret information as it is gathered. They also have large stocks of memory (often in the form of routines) to draw upon as new situations are encountered. All of these features facilitate the advantage seeking that is central to strategic entrepreneurship (Ireland and Webb, 2007). In terms of limitations, large firms may lack the precise focus needed to sense trends as they emerge. Large firms can also fall into the trap of distributing too much information, slowing down the process of opportunity seeking that is

equally vital to strategic entrepreneurship (Ireland and Webb, 2007). Lastly, large firms can become too dependent on existing interpretive frames and knowledge stocks. As the environment changes, this dependency can undermine the firm's effectiveness at information processing and learning.

Given their need to specialize, small firms are well positioned to acquire and distribute 'mission critical' information and knowledge. This enhances small firms' ability to explore opportunities (Ireland and Webb, 2007). In today's competitive arenas, however, determining what is and is not crucial information is very difficult (Ireland and Hitt, 1999). Small firms' relatively limited interpretive and memory systems allow them to make unfettered examinations of trends and events, but these limitations also inhibit the ability to devise effective approaches to creating competitive advantages.

Within the context of a collaborative network, large and small firms can develop significant synergies along the four learning dimensions. Large firms can provide economies of scale in information processing, while small firms can provide the specialized knowledge needed to identify trends early. Large firms can draw on the recipes that are codified in their memories for time-tested solutions, while small firms' relative lack of memory and recipes helps the network approach situations with a fresh perspective. Our expectation is that to the extent that large and small firms integrate their different learning capabilities, both should improve the quality of their opportunity-seeking and advantage-seeking activities, ultimately resulting in greater economic wealth.

Resource-based view

The resource-based view is perhaps the dominant theoretical perspective within strategic management (Barney and Mackey, 2005), and it is a major perspective in the entrepreneurship field as well (Alvarez and Busenitz, 2001). Resource-based theory contends that certain assets and capabilities provide the foundation for a competitive advantage, and thereby set the stage for substantial wealth creation (Wernerfelt, 1984). To provide a competitive advantage, resources must be valuable, rare, inimitable, and difficult to replace via substitution (Barney, 1991). Chi (1994) refers to resources that meet these standards as 'strategic' resources. Examples of strategic resources found in the literature include patents, brand name reputations (Combs and

Ketchen, 1999), and unique organizational cultures (Barney, 1986).

For a firm with strategic resources, the prospect of using collaborative innovation to ensure that it achieves the requirements of strategic entrepreneurship presents a dilemma. On one hand, engaging in any kind of interorganizational relationship may be risky because a firm's partner can learn the firm's secrets and then try to replicate those value-creating secrets within its own operations. For example, in the 1980s, Toyota and General Motors created a joint venture in California called *New United Motor Manufacturing Incorporated* (NUMMI), where Toyota and GM cars were produced side by side under Toyota's management system and using GM workers. GM learned a great deal about the system through this relationship and copied the system with considerable success in its Saturn business unit. From the perspective of resource-based theory, Toyota may have made a mistake by revealing too much about a key strategic resource to a partner with whom it competes in multiple arenas. Fortunately for Toyota, its large array of strategic resources and other strengths has allowed it to flourish. Indeed, the firm is the biggest auto manufacturer in the world today.

On the other hand, collaborative innovation may create new strategic resources with a high level of inimitability. Strategic resources are not limited to the firm itself (Barney and Mackey, 2005); they can develop among the members of a network as well (Hult, Ketchen, and Nichols, 2002; Ketchen and Hult, 2007). The causal processes underlying the emergence of such resources are unusually difficult to dissect because they span multiple firms with varied leadership, strategies, cultures, and structures. This causal ambiguity makes it very unlikely that a competing network could replicate the resources (Reed and DeFillippi, 1990). The result may be an impossible to bridge competitive moat and substantial wealth creation.

This dilemma has different implications for large and small firms. Large firms are likely to possess a variety of strategic resources. Some will be deployed in the network, while others will not. Small firms, in contrast, are likely to have a limited array of resources, all of which may need to be committed to the network. In the example of Raytheon and Pacific Coast Systems discussed earlier, there is an imbalance in strategic resources. Raytheon has an established brand name, enormous knowledge stocks about the defense business, many technical capabilities, and

established relationships with the military planners that award defense contracts. It is unlikely that any activity by Pacific Coast Systems can erode the value of Raytheon's strategic resources. In contrast, Pacific Coast Systems' strategic resources are limited to its technical knowledge about specific training devices. Raytheon could acquire this knowledge in a number of ways, including by simply hiring away key Pacific Coast Systems personnel.

From a resource-based perspective, the downside risk of collaborative innovation is far greater for small firms than it is for large firms. Thus, we would expect small firms to seek to protect their unique features from partners more than large firms do. When this protection occurs, however, the flow of continuous innovation needed for strategic entrepreneurship will be reduced, causing wealth creation across the network to suffer (Ireland and Webb, 2007). Collaborative innovation depends on the free flow of ideas and knowledge. Restricting this flow will hold back the network's opportunity to build wealth.

Real options theory

Real options theory is emerging as a popular theoretical lens for analyzing a variety of organizational problems. Although some scholars have reservations about the utility of real options theory (e.g., Adner and Levinthal, 2004a, 2004b), proponents suggest it has value in part because it offers a systematic approach to analyzing the relative merits of alternatives (Folta, 2005). A core assumption is that current investments directly affect future investment opportunities (Bowman and Hurry, 1993). To maintain flexibility, managers often prefer to make small investments that enable them to postpone significant investments and preserve degrees of freedom for as long as possible. Thus, an executive possessing a real option has 'the ability, but not the obligation, to take advantage of opportunities available at a later date that would not have been possible without the earlier investment' (Sharp, 1991: 71).

Within real options theory, two key concepts are uncertainty and investment irreversibility. Uncertainty is a lack of knowledge (Thompson, 1967), while investment irreversibility is the degree to which investment costs are not fully recoverable (Kogut and Kulatilaka, 2001). These concepts are intertwined within real options theory. If uncertainty is minimal, executives can accurately predict the outcomes each of their alternatives would deliver. Under such conditions, irreversible investments are

not a source of concern because the value that can be derived from such investments is known. In the modern competitive arena, however, low-uncertainty situations are becoming less and less the norm.

The more likely scenario is that significant uncertainty will surround a decision (Hitt *et al.*, 2001; Ireland and Hitt, 1999). In the presence of such uncertainty, irreversible investments are a source of executive angst (Leiblein, 2003). Firms are wary of proceeding down a path that may result either in wealth-eroding projects or missed opportunities. Real options theory contends that when faced with uncertainty and investment irreversibility, firms are more likely to make small investments, rather than large investments, with the intention of possibly growing the investments at some point in the future (Myers, 1977). This reflects the contention that there is value in delaying irreversible investments in order to resolve uncertainty while maintaining the option to invest at a later time. If uncertainty is later reduced, an informed decision can be made to proceed with or abandon the opportunity (McDonald and Siegel, 1986). Maintaining the option of abandonment is crucial because it limits a firm's potential losses. By choosing abandonment, a firm can avoid heavier wealth erosion than it might have suffered via unproductive irreversible investments.

To the extent that real options is a valid approach for analyzing strategy, the theory has important implications for how large and small firms address strategic entrepreneurship, collaborative innovation, and wealth creation. For large firms, uncertainty in the environment highlights the need to enhance their opportunity portfolios. High levels of uncertainty denote a lack of clarity about what kinds of innovations will serve as the path to future wealth creation. From a real options perspective, a large firm should address this situation by capitalizing on its resource base to make a series of small investments, both internally and externally. Internally, a variety of R&D initiatives could be pursued. Externally, the firm could invest in a number of different collaborative networks, each of which has the potential to create wealth depending on how the environment evolves. Ownership of these various growth options provides large firms with a hedge against uncertainty.

Small firms generally lack resources and possess little slack. From a real options perspective, such firms will be wary of making large, irreversible investments. Thus, moves such as building manufacturing facilities and hiring large workforces will

be avoided. Instead, these firms will rely on their larger allies to provide such infrastructure. Wisely managing their options with their resource limitations in mind should enable small firms to maximize wealth creation.

IMPLICATIONS

In this section, we discuss the main implications of our theorizing for three groups interested in wealth creation: scholars, managers, and investors. For scholars, our ideas imply the need to approach the design of their studies from a broader perspective than is the norm. Many studies in the academic areas of strategy and entrepreneurship are aimed at explaining and predicting wealth creation. Those studies, however, tend to be limited in the scope of variables considered. For example, there is a huge literature on the wealth creation potential offered by related diversification strategies. The typical related diversification study focuses on the appropriation of value from existing businesses but ignores the wealth-creation role of opportunity seeking within a firm. Even within the domain of advantage seeking, related diversification is just one possible activity among many. Further, studies of related diversification typically adopt the firm as the sole level of analysis.

Considering the integration of strategic entrepreneurship and collaborative innovation suggests a much different approach. The concept of strategic entrepreneurship makes it clear that a scholar interested in explaining wealth creation will ideally capture both advantage seeking *and* opportunity seeking within a particular study's design. Further, the collaborative innovation concept highlights the fact that some of the most important aspects of advantage seeking and opportunity seeking take place outside the borders of individual firms. Thus, from our perspective, a study's set of wealth-creation antecedents is underspecified unless it captures four types of activities: opportunity-seeking activities within firms, opportunity-seeking activities between firms, advantage-seeking activities within firms, and advantage-seeking activities between firms. Ideally, a study would not only capture these four types but would also reflect their interactions. Realistically, one cannot expect every study to reflect such a broad conceptual scope. Resource constraints will, in most situations, make capturing all of the activities listed above impossible. However, when a study omits a

set of activities or assumes them away, this should be explicitly acknowledged, and the potential consequences of such omissions should be addressed.

The ideas summarized in Figures 1 and 2 also offer implications for scholars. In developing these figures, we assumed that multi-firm collaborative innovation complements a firm's internal innovation efforts. This is a strong assumption, one that seemingly warrants empirical examination. Given that firms face resource constraints, there may be important tradeoffs between collaborative and firm innovation programs. It is possible that by having engaged in collaborative innovation in time period t , a firm will spend resources that, if deployed internally, would have generated greater wealth for the firm in time period $t + 1$. We believe research devoted to discovering under what conditions such trade-offs should tilt preferences either toward or away from collaborative innovation is likely to be fruitful. We also encourage inquiry devoted to understanding how executives should evaluate and resolve such potential trade-offs within the context of key constraints, such as a firm's stock of strategic resources and its path dependencies.

For managers, the ideas we have presented imply that their firms need to succeed at all four sets of activities. This is a daunting challenge; one that suggests managers at different levels may need to adopt certain roles. In addressing needs during strategic renewal, Floyd and Lane (2000) consider ratifying, recognizing, and directing to be important roles for top-level managers. For middle-level managers, championing, synthesizing, facilitating, and implementing are critical roles, while lower-level managers are thought to concentrate on the behaviors associated with the experimenting, adjusting, and conforming roles. The integration of strategic entrepreneurship and collaborative innovation we have described is, in essence, a process of continuous strategic renewal. As such, building on Floyd and Lane's (2000) arguments to discuss how various managers should devote their efforts appears to have merit.

In particular, we suggest that to pursue strategic entrepreneurship and collaborative innovation, top managers should focus on developing a culture that encourages and rewards behaviors consistent with the requirements of both. A firm's vision, for example, should emphasize both advantage-seeking and opportunity-seeking aspirations, as well as the value of both firm and multi-firm efforts. At the other end of the managerial pyramid, lower-level

managers are the 'boots on the ground' that actually direct the four sets of activities. They must turn abstract plans into workable day-to-day operations and devise creative solutions when problems arise. Middle managers are perhaps the most critical players; they are charged with using information as the foundation for seeking out suitable partners, building network relationships, and selling the need for strategic entrepreneurship and collaborative innovation both inside and outside their own firm. All of these roles are complex and multi-faceted, and the prospect of role overload and role conflict looms large. If managerial roles are not carefully designed and orchestrated, the results can include excessive stress, poor job performance throughout the executive ranks, and, ultimately, wealth erosion (c.f. Upson, Ketchen, and Ireland, 2007).

Finally, our ideas on how the integration of strategic entrepreneurship and collaborative innovation can influence wealth creation may have implications for the investment community. In recent years, exchange-traded funds (ETFs) have become popular investment vehicles. ETFs are shares of a basket of stocks. Perhaps the best known ETF is 'PowerShares QQQ,' which reflects the stocks of the 100 largest nonfinancial companies listed on the NASDAQ exchange. QQQ is one of the most traded NASDAQ investments, with well over 100 million shares changing hands on a typical day. Other broad ETFs consist of shares of the stocks within Standard and Poor's 500 ('SPY') and the 30 stocks that compose the Dow Jones Industrial average ('DIA'). A wide array of more specialized ETFs exists as well. For example, investors can buy shares of funds devoted to pharmaceutical companies, energy firms, and water utilities.

Currently, an investor who believes in the wealth creation potential of a multi-firm collaborative network cannot make investments based on this belief, except by buying shares of individual companies. This is costly and inefficient. As more firms integrate strategic entrepreneurship and collaborative innovation, such indirect investment opportunities may be judged as inadequate. We envision ETFs being created to allow investors to buy and sell shares, not of exchanges or industries, but of multi-firm networks. For example, purchasing shares of an ETF focused on the Warrior Training Alliance would provide a buyer with an ownership stake in Raytheon, Computer Science Corporation, and all other small (e.g., Adacell) and large (e.g., Rockwell Collins, Symantec) publicly traded firms among

the 67 collaborative network members. This would provide a convenient, low-cost investment method for an investor who believes in the wealth creation potential of a particular multi-firm network.

CONCLUSION

Building on network, learning, resource-based, and real options theories, we have argued that collaborative innovation—the creation of innovations across firm boundaries through the sharing of ideas, knowledge, expertise, and opportunities—can enable both small and large firms to successfully engage in strategic entrepreneurship. Individual firms struggle to produce the continuous stream of innovations required by strategic entrepreneurship. We depicted collaborative innovation as a means to supplement the innovative efforts of individual firms in order to maintain continuous innovation. As such, we contend that collaborative innovation can enable firms to close the gap between the level of innovation they have and the level they need to have. Looking to the future, ongoing trends in globalization and advanced information technology promise to make competition even more complex and dynamic than it is today. If so, this will increase the value of firms that are able to integrate strategic entrepreneurship and collaborative innovation.

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