

CLOSING THE KNOWLEDGE GAP IN CORPORATE ENTREPRENEURSHIP THROUGH STAGED COMMITMENT

STEVEN C. MICHAEL

Department of Business Administration, University of Illinois

***Abstract:** Corporate entrepreneurship requires senior executives to evaluate proposals for investment and projects from corporate entrepreneurs. Properties of technology make this evaluation difficult, creating a knowledge gap. Whether through opportunism, overconfidence, and overconfidence, corporate entrepreneurs are likely to induce overinvestment in projects, perhaps at the expense of corporate goals. In this paper we analyze this problem using the tools of agency theory, and identify a solution, staged commitment, used and useful in many areas of business.*

***Keywords:** agency theory, technical management, new product development, corporate strategy, corporate entrepreneurship.*

Introduction

By all accounts, corporate entrepreneurship is risky business. At the level of the proposed project, one category of risk is technological risk: once developed, technology will fail to meet specifications or fail to solve the required problem. A second category of risk is market risk, that the technology or the attributes it creates does not effectively differentiate the product in the minds of customers. Technology risk and market risk are much studied (Branscomb & Auerswald, 2001).

The purpose of this paper is to analyze another category of risk—agency risk. A manager is typically less informed about the potential and prospects of a particular technology and its associated products than the corporate entrepreneur, functioning as product champion. This knowledge gap creates agency risk in the context of technology investments: the risk that employees oversell the technology and its associated products, and perhaps use technology for personal rather than organizational gain. This overselling can be, but need not be, motivated by personal gain; other causes abound. Using the tools of agency theory, the problem can be analyzed more directly than in previous research. The risk of agency is a familiar one but the context is not. Most agency research has occurred in the context of corporate governance, and has focused on top management teams and board composition. In this paper we use agency theory to examine the problem of managing technical employees. A common solution, staged commitment, is then proposed to remedy the problem.

The managerial problem of judging the suitability of projects and products subject to the natural biases and enthusiasms the processes of corporate entrepreneurship create has been recognized has been recognized by previous researchers (Pralhad, Doz, & Angelmar, 1989; Dunham, 2002) but not analyzed theoretically. And the failure to adequately judge opportunities has significant consequences. As one example, Xerox Corporation failed to recognize the value created among many of its new technologies, giving rise to corporate spinouts whose ultimate market value exceeded that of Xerox by a wide margin (Chesbrough, 2002).

The Knowledge Gap of Corporate Entrepreneurship Creates a Problem

In the business press and the research literature, great emphasis is placed on the process of corporate entrepreneurship (Burgelman, 1983, 1984; Kanter, 1982, 1983; Markham & Griffin, 1998; Roberts, 2007). “Entrepreneurial processes are herein defined as those processes by which business opportunities are defined and support is garnered for their exploitation within an organizational setting. Product concept testing, venture ‘bootlegging,’ product championing, and business model experimentation, for example, might be considered entrepreneurial processes.” (Covin & Slevin, 2002: 319.) Such processes are usually described as variation and selection; in rough terms, generating ideas and passing judgment. (Covin & Miles, 1999.) These two tasks roles are almost always divided in the organization among two broad classes of employees (Burgelman, 1983, 1984; Kanter, 1982, 1983; Roberts, 2007). In the typical formulation, an individual employee or small group proposes a project to a senior executive, a team of executives, or an innovation council who in turn authorize the expenditure of time and resources. The process can be summarized with the definition of Stevenson & Jarillo (1990): 23: “Entrepreneurship is a process by which individuals – either on their own or inside organizations—pursue opportunities without regard to the resources they currently control.” Thus corporate entrepreneurship is the pursuit of opportunities by individuals enabled by the pursuit of resources allocated by individuals within the firm.

This process in use by management is remarkably amenable to the formal modeling suggested by organizational economics. According to the property rights school of organizational economics, the organization can be viewed as a nexus of contracts (Jensen & Meckling, 1976). The contracts within the firm allocate decision rights, and the allocation determines the efficiency of the organization. (Fama & Jensen, 1983a, 1983b) distinguish three groups of decision rights: decision management, decision control, and residual claims. Decision management is the right to initiate and implement decisions regarding the use of firm assets. Decision control is the right to approve and monitor these decisions. Residual claims are the profit stream that results from both sets of decision rights. Decision management can be united with or separated from decision control and residual claims, however.

Thus, in the language of agency theory, lower-level managers hold the right of decision management: they propose ideas, projects, and products. Senior level managers hold the right of decision control: they choose to invest in some but not all of the ideas, projects, and products proposed. In the context of corporate entrepreneurship and for this paper we term those senior-level managers “executives,” the junior level executives “corporate entrepreneurs,” or just entrepreneurs. In this formulation, the entrepreneur is the agent of the executive, the principal.¹

¹ The formulation is more general: senior executives are themselves “agents” of shareholders, exercising decision management with respect to the decision control of the Board of Directors. For our purposes we focus on the internal relationship for corporate entrepreneurship.

The executive's problem: information asymmetry

In a technical environment, the executive, as monitor, must evaluate whether corporate entrepreneurs are proposing projects or expenditures to advance their own goals at the expense of the company.

The central risk of principals is that agents will engage in unproductive and misdirected effort. To prevent misdirected effort, the principal engages in monitoring (Eisenhardt, 1989; Jensen & Meckling, 1976; Ouchi, 1979). But the effectiveness of monitoring hinges on a crucial assumption: the monitor must know as much as the monitored (Fama & Jensen, 1983a, 1983b; Sharma, 1997; White, 1985). In the extreme case, when the knowledge of the agent is the primary contribution to the value of the firm, the principal cannot effectively monitor (Allen & Sherer, 1995; Fama & Jensen, 1983a, 1983b; Sharma, 1997).

Whether the monitor knows as much as the monitored is an empirical question. In the context of certain manufacturing processes or routine clerical duties, such an assumption is perhaps justified. But monitoring technical projects is likely to be more difficult than nontechnical projects, however (Michael, 2012). For the monitor to know as much as the monitored, the general manager would be expected to have knowledge of, or access to knowledge about, technology in order to manage subordinate managers of technology. Monitoring technology requires “an ability to evaluate projects and programmes where the normal financial accounting techniques are often inoperable and inappropriate” (Pavitt, 1998: 445). For the monitor to know as much as the monitored, the general manager would be expected to have knowledge of, or access to knowledge about, technology in order to manage subordinate managers of technology.

A fundamental property of technology makes management of technology more difficult for executives. Technical knowledge contains “cumulative features” (Dosi, 1982): 154). Technical knowledge is organized into paradigms, defined as patterns of solutions to specific technical problems with specific principles and technologies (Dosi, 1982; Patel & Pavitt, 1997). A technical trajectory is the pattern of normal problem solving within a paradigm (Dosi, 1982). But the conclusions of these paradigms and trajectories cannot be easily obtained, acquired, or absorbed without possessing capabilities regarding these paradigms and trajectories (Brusoni, Prencipe, & Pavitt, 2001; Cohen & Levinthal, 1990; Dosi, 1982). As noted by Cohen & Levinthal, 1990: 128, “The ability to evaluate outside knowledge is largely a function of the level of prior related knowledge. . . . Prior related knowledge confers an ability to recognize the value of new information, assimilate it, and apply it to commercial ends.” Nor can the knowledge be easily summarized. The cumulative nature of technical knowledge is unlikely to allow a significant reduction of information to facilitate monitoring. By contrast, financial information is routinely summarized into one or a few metrics (e.g., Hoskisson, Hitt, & Hill, 1993).

Given the cumulative nature of technical knowledge, generalists will not easily acquire such knowledge without retraining. Thus the executive is often a poor monitor of the technical manager. In many cases, a reversal of agency will occur (White, 1985), by which the executive becomes the agent of the better-informed technical manager. In short, the executive must rely on the corporate entrepreneur for an understanding of core technologies or other information essential to the evaluation of the project. For reasons we discuss next, the entrepreneur operates with biases that may misinform the executive and lead to overinvestment in the project.

The agent's biases: opportunism, optimism, overconfidence

Because agents are assumed to be self-interested and to possess goals that diverge from the principal's goals, the principal must expend resources to insure that agents act in the principal's interests (Eisenhardt, 1989; Jensen, 1986; Jensen & Meckling, 1976). In the usual formulation of the agency problem, agents are presumed to put forth less than full effort into their tasks (Eisenhardt, 1989; Holmstrom & Tirole, 1989; Jensen & Meckling, 1976). Agents are characterized as shirking.

Corporate entrepreneurs are unlikely to be shirkers but they could be exploiting the problem of information to pursue their own goals. In particular, entrepreneurs can take actions to increase the value of their skills and abilities (Holmstrom & Ricart I Costa, 1986; Morck, Shleifer, & Vishny, 1990; Shleifer & Vishny, 1989). Individuals are heterogeneous in their human capital, and the returns to human capital depend in part on the activities the firm undertakes. If entrepreneurs can turn the firm's activities in a direction that is more complementary to their human capital, they stand to gain (Holmstrom, 1982; Morck et al., 1990). Or entrepreneurs may simply prefer to manage some projects over others (Demsetz, 1983; Holmstrom & Ricart I Costa, 1986). Research has suggested that scientists and engineers do have biases that favor technical competence, cutting edge research, and perfectionism in design and development that often work against business and organizational objectives (Allen, 2003; Kanter, North, Richardson, Ingols, & Zolner, 1991; Katz & Allen, 1997).

Such a conclusion is redolent of opportunism, defined as self-interest seeking with guile, common to agency theory (Fama & Jensen, 1983a, 1983b) and transaction cost economics (Williamson, 1985). Although sufficient, the strong assumption of opportunism is not the only cause for concern by management; alternatives include challenges of overconfidence and optimism as well. Corporate entrepreneurs must use initiative and discretion to propose a project, and the framing and shaping of a project will surely be affected by his experience, education, skills, and career—in short, his human capital (e.g., Barker & Mueller, 2002; Dearborn & Simon, 1958; Hambrick & Mason, 1984; Kor, Mahoney, & Michael, 2007; Wiersema & Bantel, 1992). Experience within a firm can generate core rigidity (Leonard-Barton, 1992) or a competency trap (Levitt and March, 1988). The usual inferential tools of data analysis are difficult to use in many organizational settings because “history is not generous with experience” (March, Sproull and Tamuz, 1991). New product development appears to generate this overconfidence in that empirical research has documented that new product performance declines within a firm as experience grows (Michael & Palandjian, 2004). In short, corporate entrepreneurs may overestimate the effectiveness of their effort, an “honest incompetence” (Hendry, 2002).

This natural tendency of individuals to develop overconfidence as a result of organizational experience will only be exacerbated by another tendency of entrepreneurs generally: optimism. Optimism might be a personality trait that differentiates entrepreneurs from the rest of the population. A recent study shows that entrepreneurs are more optimistic about future prospects than the general population (Åstebro, Jeffrey, & Adomdza, 2007). Similarly, a comparison of entrepreneurs and managers finds that entrepreneurs typically are overconfident (Busenitz & Barney, 1997). Even though entrepreneurs recognize high failure rates of new ventures, they typically believe that they can beat the odds (Hayward, Shepherd, & Griffin, 2006). In a related vein, entrepreneurs accept risk as given and seek to mitigate risk while bankers and investors are more likely to avoid risk (Sarasvathy, Simon, & Lave, 1998).

In summary, there is empirical evidence that entrepreneurs might be more overconfident and optimistic than others. Although not specifically investigated as the subject of research, corporate entrepreneurs are likely to display the same traits. It is worth noting that public narratives and accounts all suggest that a certain confidence and optimism is required for successful product championing behaviors (e.g., Dunham, 2002; Kanter, 1982, 1983; Kidder, 1981).

Regardless of intention, whether generated by opportunism, overconfidence, or optimism, the result is the same: executives face a challenge in evaluating proposals from corporate entrepreneurs. The trinity of opportunism, optimism, and overconfidence suggest that, in general, managers will hear proposals that are structurally designed to oversell and to underdeliver.

The problem created by the knowledge gap is well summarized at a managerial level by Dunham (2002): 380: “Project managers [entrepreneurs] are the proponents of the project by definition. They have to maintain an energy level that stems from a real belief in the importance of the opportunity. They have to prove the case to the investor [executive] and request the resources for successive stages of the project. This advocacy role makes it particularly tough for project managers [entrepreneurs] to quickly come to terms with risks that can threaten the continuation of the project. Indeed, it is because many project managers [entrepreneurs] are such ardent advocates that program managers [executives] frequently have trouble killing no-go projects.” It is to the solution of this problem that we now turn.

Solution to the Knowledge Gap: Staged Commitment

In the modern economy, a division of labor is also a division of knowledge (Sharma, 1997). As described above, executives must monitor corporate entrepreneurs, whose knowledge, skills and abilities are superior to their own. In the language of agency theory, principals supervise agents with hidden knowledge, and must induce them to employ that knowledge in products, services, and projects. A number of practices to supervise knowledge workers have evolved in different industry settings. Although these practices differ in detail, when viewed together a common pattern emerges, which has been informally termed “staged commitment.” Before we state more precisely what staged commitment is, it is useful to give several examples that illustrate its wide generality.

- Most firms use a “stage gate” system for managing technical products and projects (Cooper, 2001). Rather than a single effort, “develop a new product and launch it,” projects and products are broken into a series of activities that are then organized into stages. As activities within a stage are completed, a stage is reviewed at a gate. At the gate, the product manager can pass the project to the next stage, return the project to the same stage for more activities, or kill the project outright. Criteria used at the gate can include technical specifications but also includes timeliness and market criteria as well.
- Venture capital frequently proceeds in rounds, with the VC infusing a sum of money to move the product one step closer to market (Gompers & Lerner, 1999). Rather than turning over funds for an entrepreneur to take a product to market, investments are made in rounds. A first round of funding might allow the development of a prototype, the second round to allow for scale-up of the concept, and the third for rollout. A new round requires the entrepreneur to complete certain steps to which the entrepreneur and the VC have previously agreed.

- Production of a new television series does not proceed by a network giving funds to a producer to develop a full set of 26 episodes required for a season's viewing. Instead, one or several pilots are made (Vogel, 2007). A television pilot is a test episode of an intended television series. Networks use pilots to discover whether an entertaining concept can be successfully realized, and to see how the various themes and characters interact. After seeing this sample of the proposed product, networks will then determine whether the expense of additional episodes is justified.
- A homeowner contracts with a carpenter to remodel his kitchen. The homeowner makes only partial payment while the work is in progress, and retains the right not to pay in full until the carpenter accomplishes the work to the homeowner's satisfaction.

Following the advice to build theory inductively (Locke, 2007), examining these dissimilar situations we find a common structure. In each case, the principal, who must monitor the agent, has some knowledge of *what* needs to be done, but is ignorant of *how* the work can be done. Subject to Jensen's curse, the monitor does not know as much as the monitored. Yet the solution to the problem is staged commitment. In each case the principal, as monitor, effectively commissions the monitored agent to engage in a creative act. The monitor then judges the efficacy of the attempt, and chooses whether to release the project to a subsequent stage. In each case, the monitor sets objectives for the agent to meet. If those objectives are met, the monitor then pays the agent—an incentive is left for completion.

Two important amplifications need to be made.

First, whether the objectives are met is left exclusively to the judgment of the principal. There is no explicit contract with specific objective criteria that requires the principal to release the product and pay the agent. Instead, the judgment is subjective, usually based in part based upon market criteria that the principal can judge. This uncertainty induces a best effort from the agent, and prevents "gaming the system" by satisfying, for example, technical criteria that may have no effect on market needs or demand. It also gives the monitored agent an incentive to reveal at least some information to develop a better-informed principal.

Second, the incentive for the agent may be cash, or it might be the release of the product into the next stage of development, and ultimately the marketplace. In cases where agents are paid through royalty or other "percentage of sales" compensations, denying the product access to the market costs the agent. Or releasing the product may simply offer the incentive of publicity, use, and fame to generate future business opportunities or internal satisfaction for the agent. Thus the incentive can be but need not be financial.

It is also important to note that a system of staged commitment need not yield an optimal outcome. Indeed, it is quite likely that agents may continue to indulge themselves in some way. However, consistent with the general principle of comparative institutional analysis (Demsetz, 1969; Williamson, 1985), staged commitment systems need only generate enough savings—from reducing agency risk, and perhaps market and technology risk as well—to justify the added cost. In other words, staged commitment must be cheaper than alternative institutional arrangements. The widespread use of staged commitment in multiple and varied settings testifies to the likelihood that it is successful. Indeed, research into the stage gate system suggests that overall it is cheaper than other methods for organizing product development (Cooper, 2001).

Staged commitment is a particular control for agency that has not been analyzed before. The above four examples have not been analyzed together theoretically. Thus it is important to examine the relationship of staged commitment to existing theories of organization.

One existing explanation for such behavior might be real options reasoning, specifically as the application of the principle of waiting to invest (Mahoney, 2005). Such theory has been offered to explain the rounds of venture capital investment (Gompers & Lerner, 1999). Rather than making a single upfront investment, the VC makes a series of staged investments in order to reduce risk. At each step, more information is revealed, and technology risk and/or market risk declines. The VC reevaluates the proposed venture to determine whether it is worth a further investment. This is the prevailing explanation for this practice.

Undoubtedly, staged commitment reduces technology risk or market risk if uncertainty is resolved through the passage of time or the completion of stages of the product. However, the system of staged commitment also reduces agency risk, and prevents the reversal of agency. Nowhere is this more evident than in the last example. Remodeling a kitchen is not really subject to significant technical or market risk—the only explanation for the practice can be agency risk. In addition, projects within companies vary in their degree of technical and market risk, yet all use stage gate systems.

Others might argue that this is a simple application of property rights theory from economics (Mahoney, 2005). In the face of incomplete contracts, property rights theorists argue that residual claimant status falls to the party with the largest sunk cost investment. In other words, the party that makes the larger investment in a transaction-specific asset should, for the sake of inducing efficient investment, own the asset in the long run. Although such an assessment is correct, the theory of staged commitment adds several important pieces to this analysis. First, in the traditional property rights formulation, the dynamics of the problem are ignored. By contrast, staged commitment specifically introduces the dynamics, stating the temporal sequence of investment. The dynamics highlight an important part of the incentive structure, which is more likely to induce information from agents. Second, it highlights the role of ex post incentives, and highlights that the release of the product to the marketplace is itself a motivation. Creative people want to see their work used. Third, it demonstrates the logic in use by managers and uses that to develop theory to provide a base for further analysis.

A different scholarly community will note that staged commitment has long been used as arguably the crucial ingredient in stage gate systems, as described above. For many years, executives have been making the tripartite decision of go / no go / kill that are in fact staged commitments. Thus there is nothing new here.

It is undeniably true that staged commitment has been in practical use for many years through stage gate systems and other practices. Yet the explanation and the purported gains from the use of staged commitment has not included the reduction of what we are terming agency risk. Explanations for the power of stage gate typically include better teamwork, less recycling and rework, earlier detection of failures, better launch, and a more efficient use of time and money (e.g., Cooper, 2001, Cooper, 1994). The human factor—the risk of agency as we have described it—is distinctly missing. In addition, by viewing stage gate as an especially sophisticated and ingenious implementation of staged commitment, we have placed some additional theoretical structure underneath stage gate systems. Additional theory offers the power of focusing research attention on other aspects of stage gate, of linking disparate phenomena such as TV pilots and stage gate. And it offers the possibility of bringing stage gate system into a much wider application. For example, because they too run staged commitment processes, venture capitalists

might benefit from the rich body of knowledge, experience, results, and measures that new product development scholars have created.

In short, existing research has suggested stage commitment as a solution to exogenous market and risk, a way to delay decisions until information is revealed about the future. We are suggesting it has a second use, to induce agents to use their knowledge, to reveal information, to control an endogenous risk involving behavior. From the examples and the theory suggested above, controlling for agency risk, or endogenous risk, may be at least as valuable as controlling for exogenous risk.

Amplification and Implications

From Star Trek V: The Final Frontier:

Starship Captain Kirk: "Tell me, Mr. Scott. Why do you always multiply your repair estimates by a factor of four?"

Starship Chief Engineer Scott: "To preserve my reputation as a miracle worker, Sir!"

The requirement that the “monitor must know as much as the monitored” implies that specialized technical knowledge used by entrepreneurial scientists and engineers present a major challenge to the executive charged with deciding on their projects. Call it Jensen’s curse. It is unlikely that executives can understand the technological frontier as well as the corporate entrepreneurs whose schemes they are charged to evaluate and manage. Yet manage they must.

Controlling agency requires a more sophisticated approach than simply monitoring by uninformed executives. In this paper, we maintain that staged commitment in various forms is an important theoretical solution to the problem of agency risk, as well as contributing to the mitigation of technical risk or market risk.

Staged commitment specifically introduces the dynamics, emphasizing the temporal sequence of investment. The dynamics highlight an important part of the incentive structure, which is more likely to induce information from technical managers. Second, it highlights the role of ex post incentives, and highlights that the release of the product to the marketplace is itself a motivation. Creative people want to see their work used. Third, it demonstrates the logic in use by managers and uses that to develop theory to provide a base for further analysis.

It is hoped that this contribution brings together several strands of literature from corporate entrepreneurship, new product development, and agency theory to suggest the theory of staged commitment which can then be more widely used in theory and practice. Existing research in stage gate systems has not identified the link to the dispersed knowledge that must be accessed, instead relying on the efficacy of formal processes over ad hoc systems. Corporate entrepreneurship has emphasized the need for autonomous behavior by individuals but has not examined the possibility that people could be systematically biased in favor of their own projects. Staged commitment offers a further tool for corporate management. Equally importantly, it suggests future directions for research to access expertise and knowledge.

As one example, agency theory suggests a further control for the knowledge gap. Judgments regarding projects should, in most cases, be made by committee rather than by one individual. Committees are much less subject to agency costs than individuals (Congleton, 1984; Bainbridge,

2002). Multiple points of view are likely to provide a check against opportunism, optimism, and overconfidence. Such committees might even consider including outsiders to add perspective. The success of this approach depends on whether external forces can evaluate internal technology, which, in turn, depends upon whether the technical trajectory is public or private. A loss of decision making speed must be considered, however.

Agency theory often focuses analysis on compensating individuals, and compensating individuals based upon their contribution is a powerful idea, one used with success in many management settings. However, the problem of corporate entrepreneurship is that it does not facilitate “ex post settling up” (Fama, 1980), where entrepreneurs bear some risk of loss if their project or product fails. The role of alternative incentives, including further participation, development of reputation, and simply allowing creative people to see their work used, is highlighted through the process of staged commitments. Such additional incentives can and should be more explicitly studied by researchers and employed by managers.

It would also seem that an important research question is to establish whether opportunism, optimism, or overconfidence represents the largest challenge. On the one hand, managers need to be confident in their skills and their people, and they need to believe that solutions to problems the company faces can use their skills. In Jensen’s terms, they need to propose solutions. On the other hand, how much should one discount the enthusiasm for a technical project? On the other hand, to claim that all such investment is free of opportunism seems to strain our knowledge of human behavior.

Finally, at a managerial level, solving the knowledge gap is crucial to managers seeking successful innovation. As Pavitt (1998): 433 notes, “Firms rarely fail because of an inability to master a new field of technology, but because they do not succeed in matching the firm’s systems of coordination and control to the nature of the available technological opportunities.” This research has identified at least one specific challenge in managing the process of staged commitment. The process requires both an intellectual and emotional commitment from executives. Creating the atmosphere necessary to induce individuals and groups to bring forth ideas is a major challenge to leaders seeking to use entrepreneurship for corporate renewal (Covin & Slevin, 2002). The culture and organizational identity will require, on the one hand, an optimism to encourage variation while a skepticism to facilitate selection. The advice of Quinn & Mueller, (1963): 59 captures the problem:

- Establish a motivational environment which actively stimulates technological progress and its associated organizational change.
- Develop tough-minded top-management attitudes, policies, and long-term controls which foster—rather than hinder—the production and use of new technologies.

It is easy to foresee conflicts emerging in these two roles. At the level of individual leadership, an individual executive may be better suited to one role rather than the other, and perhaps cannot effectively do both roles. At the organizational level, disappointment at not being selected can translate into cynicism among entrepreneurs and deter further projects from emerging. Managing this tension is a crucial task for the long term success of a program of corporate entrepreneurship. Ideally this tension would be embedded into the organization, as part of the culture, structure, and systems that can create and maintain an entrepreneurial orientation within the firm (Covin & Slevin, 1991).

Conclusion

Agency theory has attracted research attention to the information and incentives of individuals within organizations. The role of incentives has been extensively studied, and has led to a number of normative prescriptions. In addition to incentives, however, economic actors must also have sufficient information, a less studied implication of agency theory.

In order to manage technologists, general managers and executives must manage a process that causes individual engineers as corporate entrepreneurs to reveal information regarding technology. The combination of information asymmetry for the executive and opportunism, optimism, and overconfidence in the entrepreneur create a knowledge gap. This research has identified the problem, suggested solutions, and used the analysis to further develop theory, termed staged commitment. The principles of staged commitment can only become more valuable, both for theory and for practice, as the division of knowledge in the economy rises.

References

- Allen, K. R. (2003). *Bringing new technology to market*. Upper Saddle River, N.J.: Prentice Hall.
- Allen, F., & Sherer, P. D. (1995). The design and redesign of organizational form. In E. Bowman & B. Kogut (Eds.), *Redesigning the Firm* (pp. 183-196). New York: Oxford University Press.
- Ástebro, T., Jeffrey, S. A., & Adomdza, G. K. (2007). Inventor perseverance after being told to quit: the role of cognitive biases. *Journal of Behavioral Decision Making*, 20(3), 253-272.
- Bainbridge, S. M. 2002. Why a board? Group decisionmaking in corporate governance. *Vanderbilt Law Review*, 55(1): 1-55.
- Barker, V. L., III, & Mueller, G. C. (2002). CEO characteristics and firm R&D spending. *Management Science*, 48(6), 782-801.
- Branscomb, L. M., & Auerswald, P. E. (2001). *Taking technical risks : how innovators, executives, and investors manage high-tech risks*. Cambridge, Mass.: MIT Press.
- Brusoni, S., Prencipe, A., & Pavitt, K. (2001). Knowledge specialization, organization coupling, and the boundaries of the firm: Why do firms know more than they make? *Administrative Science Quarterly*, 46(4), 597-621.
- Burgelman, R. A. (1983). Corporate Entrepreneurship and Strategic Management: Insights from a Process Study. *Management Science*, 29(12), 1349-1364.
- Burgelman, R. A. (1984). Managing the internal corporate venturing process: Recommendations for practice. *Sloan Management Review*, 25(2), 33-48.
- Busenitz, L. W., & Barney, J. B. 1997. Differences between entrepreneurs and managers in large organizations: Biases and heuristics in strategic decision-making. *Journal of Business Venturing*, 12(1): 9-30.
- Chesbrough, H. (2002). Graceful exits and missed opportunities: Xerox's management of its technology spin-off organizations. *Business History Review*, 76(4), 803-837.
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128-152.
- Congleton, R. D. 1984. Committees and Rent-seeking Effort. *Journal of Public Economics*, 25(1-2): 197-209.
- Cooper, R. G. (1994). Third generation new product processes. *Journal of Product Innovation Management*, 11, 3-14.
- Cooper, R. G. (2001). *Winning at new products : accelerating the process from idea to launch* (3rd ed.). Cambridge, Mass.: Perseus Pub.
- Covin, J. G., & Miles, M. P. (1999). Corporate entrepreneurship and the pursuit of competitive advantage. *Entrepreneurship Theory and Practice*, 23(3), 47-64.
- Covin, J. G., & Slevin, D. P. (1991). A conceptual model of entrepreneurship as firm behavior. *Entrepreneurship: Theory & Practice*, 16(1), 7-25.

CLOSING THE KNOWLEDGE GAP IN CORPORATE ENTREPRENEURSHIP THROUGH STAGED COMMITMENT

- Covin, J. G., & Slevin, D. P. (2002). The entrepreneurial imperatives of strategic leadership. In M. A. Hitt, R. D. Ireland, S. M. Camp, & D. L. Sexton (Eds.), *Strategic entrepreneurship : creating a new mindset* (pp. 309-327). Oxford, UK; Malden, MA: Blackwell.
- Dearborn, D. C., & Simon, H. A. (1958). Selective perception: A note on the departmental identifications of executives. *Sociometry*, 21(2), 140-144.
- Demsetz, H. (1969). Information and efficiency: Another viewpoint. *Journal of Law & Economics*, 12(1), 1-22.
- Demsetz, H. (1983). The structure of ownership and the theory of the firm. *Journal of Law & Economics*, 26(2), 375-390.
- Dosi, G. (1982). Technological paradigms and technological trajectories: Determinants and directions of technical change. *Research Policy*, 11(3), 147-162.
- Dunham, D. J. (2002). Risk management: The program manager's perspective. In P. Belliveau, A. Griffin, & S. Somermeyer (Eds.), *The PDMA toolbook for new product development* (pp. 377-408). New York: John Wiley & Sons, Inc.
- Eisenhardt, K. M. (1989). Agency theory: An assessment and review. *Academy of Management Review*, 14(1), 57-74.
- Fama, E. (1980). Agency problems and the theory of the firm. *Journal of Political Economy*, 88(2), 288-307.
- Fama, E. F., & Jensen, M. C. (1983a). Agency problems and residual claims. *Journal of Law and Economics*, 26(2), 327-349.
- Fama, E. F., & Jensen, M. C. (1983b). Separation of ownership and control. *Journal of Law and Economics*, 26(2), 301-325.
- Gompers, P. A., & Lerner, J. (1999). *The venture capital cycle*. Cambridge Mass.: MIT Press.
- Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, 9(2), 193-206.
- Hayward, M. L. A., Shepherd, D. A., & Griffin, D. (2006). A hubris theory of entrepreneurship. *Management Science*, 52(2), 160.
- Hendry, J. (2002). The principal's other problems: Honest incompetence and the specification of objectives. *Academy of Management Review*, 27(1), 98-113.
- Holmstrom, B. (1982). Moral hazard in teams. *Bell Journal of Economics*, 13(2), 324-340.
- Holmstrom, B., & Ricart I Costa, J. (1986). Managerial incentives and capital management. *Quarterly Journal of Economics*, 104, 835-860.
- Holmstrom, B., & Tirole, J. (1989). The theory of the firm. In R. Schmalensee & R. D. Willig (Eds.), *The Handbook of Industrial Organization* (Vol. 1, pp. 61-133). New York: Elsevier Science Publishers B.V.
- Hoskisson, R. E., Hitt, M. A., & Hill, C. W. L. (1993). Managerial incentives and investment in R&D in large multiproduct firms. *Organization Science*, 4(2), 325-341.
- Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance and takeovers. *American Economic Review*, 76(2), 323-329.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360.
- Kanter, R. M. (1982). Middle manager as innovator. *Harvard Business Review*, 60(4).
- Kanter, R. M. (1983). *The change masters: innovations for productivity in the American corporation*. New York: Simon and Schuster.
- Kanter, R. M., North, J., Richardson, L., Ingols, C., & Zolner, J. (1991). Engines of progress: Designing and running entrepreneurial vehicles in established companies; Raytheon's new product center, 1969-1989. *Journal of Business Venturing*, 6(2), 145.
- Katz, R., & Allen, T. J. (1997). Managing dual ladder systems in RD&E settings. In R. Katz (Ed.), *The Human Side of Managing Technological Innovation* (pp. 545-559). Oxford: Oxford University Press.
- Kidder, T. (1981). *The soul of a new machine* (1st ed.). Boston: Little, Brown.
- Kor, Y., Mahoney, J. T., & Michael, S. C. (2007). Resources, capabilities and entrepreneurial perceptions. *Journal of Management Studies*, 44(7), 1187-1212.
- Leonard-Barton, D. 1992. Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development. *Strategic Management Journal*, 13(Summer Special Issue): 111-125.
- Levitt, B., & March, J. G. 1988. Organizational Learning. In W. R. Scott (Ed.), *Annual Review of Sociology*, Vol. 14: 319-340. Greenwich, CT: JAI Press.
- Locke, E. A. (2007). The case for inductive theory building. *Journal of Management*, 33(6), 867-890.
- Mahoney, J. T. (2005). *Economic foundations of strategy*. Thousand Oaks, CA: Sage.
- March, J. G., Sproull, L. S., & Tamuz, M. 1991. Learning from Samples of One or Fewer. *Organization Science*, 2(1, Special Issue: Organizational Learning: Papers in Honor of (and by) James G. March): 1-13.

- Markham, S. K., & Griffin, A. (1998). The breakfast of champions: Associations between champions and product development environments, practices, and performance. *Journal of Product Innovation Management*, 15(5), 436-454.
- Michael, S. C. (2012). "Monitoring technical managers: Theory, evidence, and prescriptions," *Journal of High Technology Management Research* 23(1): 36-47.
- Michael, S. C., & Palandjian, T. P. (2004). Organizational learning and new product introductions. *Journal of Product Innovation Management*, 21(4), 268-276.
- Morck, R., Shleifer, A., & Vishny, R. W. (1990). Do managerial objectives drive bad acquisitions? *Journal of Finance*, 45(1), 31-48.
- Ouchi, W. G. (1979). A conceptual framework for the design of organizational control mechanisms. *Management Science*, 25(9), 833-848.
- Patel, P., & Pavitt, K. (1997). The technological competencies of the world's largest firms: Complex and path-dependent, but not much variety. *Research Policy*, 26(2), 141-156.
- Pavitt, K. (1998). Technologies, products and organization in the innovating firm: What Adam Smith tells us and Joseph Schumpeter doesn't. *Industrial and Corporate Change*, 7(3), 433-452.
- Prahalad, C. K., Doz, Y., & Angelmar, R. (1989). Assessing the scope of innovation: A dilemma for top management. In R. S. Rosenbloom & R. A. Burgelman (Eds.), *Research on Technological Innovation, Management, and Policy* (Vol. 4, pp. 257-281). Greenwich, CT: JAI Press.
- Quinn, J. B., & Mueller, J. A. (1963). Transferring research results to operations. *Harvard Business Review*, 41(1), 49-66.
- Roberts, E. B. (2007). Managing invention and innovation. *Research Technology Management*, 50(1), 35-54.
- Sarasvathy, D. K., Simon, H. A., & Lave, L. (1998). Perceiving and managing business risks: Differences between entrepreneurs and bankers. *Journal of Economic Behavior & Organization*, 33(2), 207-225.
- Sharma, A. (1997). Professional as agent: Knowledge asymmetry in agency exchange. *Academy of Management Review*, 22(3), 758-798.
- Shleifer, A., & Vishny, R. W. (1989). Management entrenchment: The case of manager-specific investments. *Journal of Financial Economics*, 25(1), 123-139.
- Stevenson, H. H., & Jarillo, J. C. (1990). A paradigm of entrepreneurship - entrepreneurial management. *Strategic Management Journal*, 11, 17-27.
- Vogel, H. L. (2007). *Entertainment industry economics: a guide for financial analysis* (7th ed.). Cambridge ; New York: Cambridge University Press.
- White, H. C. (1985). Agency as control. In J. W. Pratt & R. J. Zeckhauser (Eds.), *Principals and Agents: The Structure of Business* (pp. 187-224). Boston, MA: Harvard Business School Press.
- Wiersema, M. F., & Bantel, K. A. (1992). Top management team demography and corporate strategic change. *Academy of Management Journal*, 35(1), 91-121.
- Williamson, O. E. (1985). *The Economic Institutions of Capitalism*. New York: The Free Press.