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AN EXAMINATION OF THE EFFECTS OF DOWNSIZING ON ORGANIZATIONAL PERFORMANCE

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A dissertation submitted to the Graduate School-Newark Rutgers, The State University of New Jersey in partial fulfillment of requirements for the degree of Doctor of Philosophy Graduate Program in Business Written under the direction of Professor Deborah Dougherty and approved by

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Newark, New Jersey

May, 2011
ABSTRACT OF THE DISSERTATION

An Examination of the Effects of Downsizing on Organizational Performance

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The purpose of this study is to develop greater understanding about how organizations can continuously adapt as their competitive landscapes continuously transform. Theories of organizational change emphasize episodic changes or slow transformation, but many organizations now face continued turbulence as their technologies, markets, and competitors shift unpredictably. I investigate the relationship between continual product innovation and repeated episodes of downsizing, two primary approaches for adapting to turbulent conditions that are often employed simultaneously, since an organization must introduce streams of new products to stay current with evolving markets, while at the same time must cut costs to respond to intense competition. However, downsizing and product innovation may be negatively correlated, which would create a significant tension in managing organizational adaptation. This research seeks to develop better theory for managing continual organizational adaptation by exploring how these potentially conflicting means for adaptation interact.

Through product innovation, organizations can continuously adapt to turbulent conditions by strengthening their position with product enhancements, and exploiting capabilities. To be capable of ongoing product innovation, organizations must maintain employee skills and capabilities for creating, combining, and recombining knowledge,
and working collaboratively in multifunctional networks. Downsizing may disrupt both employee capabilities and the strategic commitment necessary for product innovation. Research is unclear: while several studies suggest that downsizing reduces innovativeness, no study has specifically examined the actual effects of repeated downsizing on product innovation over time and the connections between these practices and ongoing innovation remains unexplained.

To sort out these divergent ideas about downsizing and innovation, I use data from a panel of 2174 product innovations that were initiated during a 39 month period at one telecommunications firm when the firm carried out downsizing events. This study found that the general effect of downsizing increases the likelihood of project withdrawal. Convergence protects radical innovations and buffers them from withdrawal; no effect on completion. Reorientation enhances the likelihood of starting new projects and this prospect increases for more radical product categories. Overall, it takes time for managers to get up to speed with the strategic implications of downsizing and resources are wasted, a potential pitfall for innovation.
ACKNOWLEDGMENT

I thank God for everything: the journey and the destination, the lessons taught and learned, the positive and constructive as well as the critical and unconstructive experiences, and the end result of it all because there were things that I did not want to happen but had to accept and endure, things that I did not want to know but had to learn and discover, and people I thought I could not live without but had to let go, allow to go, and release in order to be where I am still standing!

I wish to express my appreciation and gratitude to every person who motivated and uplifted me and assisted in the completion of this dissertation. I would like to thank my committee members, Dr. Susan Feinberg, Dr. James Wade, and Dr. Daniel Levin. Special thanks are extended to my advisor and committee chair, Dr. Deborah Dougherty, for her continued support and dedication of extra time throughout the entire Ph.D. process. Her efforts and guidance were greatly appreciated.

And finally, this dissertation is dedicated to my mother, Ms. Dorothy Heyward, and sons, Marq Daniel and Miqael David, for their unwavering and unconditional love and support that has carried me through the process of obtaining my Ph.D. and continues to be the source of my strength; and to my friends and family for believing in me and remaining as the foundation that has allowed me to achieve my goals and become Dr. Smith!
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CHAPTER 1 - INTRODUCTION

The question of how to build and maintain employee skills and capabilities that are needed for continuous product innovation while the firm also downsizes repeatedly is central to the viability of organizations in many industries. In industries such as telecommunications, switching, software, computers and electronics, biotechnology, pharmaceuticals, aircraft manufacturing, and automobiles, the technologies underlying products and operations are rapidly transforming and converging, which enable new, different, faster, and/or more cost-efficient product performance and service delivery. The shifting technologies transform markets, uses, and users, opening up new applications and modifying others. Transforming technologies also open markets to new entrants who introduce new capabilities that further challenge existing technologies and firms. Technology convergence and heightened competition often lead to industry consolidation as well, which can result in the intentional reduction of personnel or downsizing (Gibbs, 1993; Jensen, 1986; Mitchell & Mulherin, 1996; Montgomery & Wilson, 1986; Ikujiro Nonaka & Hirotaka Takeuchi, 1995; Andrei Shleifer & Summers, 1988; A. Shleifer & Vishny, 1991; Yin & Shanley, 2008). For example, as different technologies such as wireless and wireline in telecommunications converge, separate operating units merge and redundant employees are dismissed. Other businesses are transferred or divested, new activities are added, and other activities are outsourced, all of which also can lead to more downsizing (Bergh & Lawless, 1998; Bowman & Singh, 1993; Lichtenberg, 1992; C. C. Markides, 1992).

Managers rely on both ongoing product innovation and repeated downsizing to adapt to these turbulent conditions, but these approaches may conflict with each other,
perhaps even cancelling out the benefits. The purpose of this study is to examine the specific effects of different kinds of downsizing on different kinds of product innovation projects, and the possible accumulation of these effects over time as repeated downsizing events are implemented. Studies find that downsizing hinders product innovation (Dougherty and Bowman 1995), reduces employee creativity (T. Amabile & Conti, 1999; T. M. Amabile & Conti, 1995; Brockner, Grover, Reed, DeWitt, & O'Malley, 1987; Dougherty & Bowman, 1995), reduces the innovation propensity of R&D professionals (Bommer & Jalajas, 1999), disrupts the innovative environment (Brockner and Grover et al., 1987), and reduces the output of patents (Mellahi & Wilkinson, 2009). However, this research does not detail how, why, and for how long downsizing hinders innovation; it does not explore possible conflicts or complementarities between the two approaches to adaptation; and it does not identify conditions that may enhance or diminish the relationship between them (W. F. Cascio, Young, & Morris, 1997; Lawson, 2001; Love & Nohria, 2005).

I address these unexplored questions by exploring the relationship between reorientation and convergent downsizing and project withdrawal and completion, the interaction between reorientation and convergent downsizing and innovative project status and project withdrawal/completion, the relationship between reorientation/convergent downsizing and the number of new projects initiated, and the interaction between reorientation/convergent downsizing and innovative project status and the number of new projects initiated. These details on the effects of different kinds of downsizing will indicate which of the various ways to manage downsizing that the literature contains may be more appropriate under the different conditions, and also
suggest how these methods might be combined with innovation management to enhance adaptability.

The findings of this study will make three important contributions. First, managers continue to downsize despite the negative effects this practice may have on their organization’s long term survival. By detailing specific effects on product completion/withdrawal and initiation, the study will clarify to managers the possible costs and benefits of downsizing and inform them on whether and how to implement downsizing.

Second, researchers offer a variety of explanations for how and why downsizing affects organizations, suggesting that this form of strategic change is poorly understood despite decades of research. This study will refine theory on how, when, and why downsizing impacts innovation, in the sense of new projects themselves, and help develop new theory for managing this kind of adaptation, as called for by downsizing researchers (T. Amabile & Conti, 1999; Pinsonneault & Kraemer, 2002). If the costs of downsizing’s negative effects on innovation outweigh the savings, then theory must develop better and more specific insights for how to balance the opposing forces of turbulence. For example, can innovation activities be extended to create more kinds of competitive advantage that can outweigh the immediate cost savings, and if so how (S. L. Brown & Eisenhart, 1995; Cefis & Marsili, 2005; Dougherty, 1992; Hitt, Hoskisson, Johnson, & Moesel, 1996; M. Tushman & O'Reilly, 2002)? And, can more effective innovation provide more benefits than just revenues, such as helping firms decide what markets to enter or exit, and providing essential knowledge about possibilities for future
markets and venture survival (Heirman & Claysse, 2007; Ramaswamy, Flynn, & Nilakanta, 1993; A Subramanian, 1996)?

Third, conventional theories of change management have not caught up with the new competitive reality of continual organizational adaptation to continual transformations in competitive landscapes. Change theories tend to focus on occasional or punctuated changes rather than continuous transformation (Plowman et al 2007), on planned changes rather than unpredictable jolts, and on achieving equilibrium by imposing top down congruence (Tushman and O'Reilly 2002) rather than operating in disequilibrium by shaping bottom-up emergence (Chiles, Meyer, and Hench 2004). This study will contribute new insights to change management. I will also be able to contribute to change theory as it is currently failing to deal with continuously turbulent issues.

The empirical context for this study is telecommunications. In particular, I use the experience of one large, long-established telecom operating company with ongoing product innovation as it also downsizes repeatedly. This may be an extreme context of turbulence, but it helps to cast into high relief the challenges firms in turbulent environments face. Consolidation and transformation are ongoing simultaneously in the telecommunications, switching, software, security, and management systems sectors. Organizations in this sector are attempting to enter more markets, create more bandwidth, and generate more revenue, using merger and acquisition activities to consolidate operations, converge technologies (e.g., wireless and wireline) and transform their capabilities. There is no shortage of mergers and acquisitions. Convergence is the dominant theme where older suppliers not only want to enter into new technological
spaces and access the networks but also want to become powerhouses, with added capabilities and the capacity to become "one-stop" shops for varying services.

Mergers, acquisitions, portfolio diversification, network enhancements and entering into diverse activities signify that firms in this context must continually change and adapt their products to keep up with customer and technological changes. They are required to extend their reach, sometimes globally, to attempt to enter into new opportunities, learn about the prospects and how to meet the new requirements, and try to generate revenues continually as old sources of revenue disappear and new ones surface.

With mergers and acquisitions at the forefront, according to Light Reading’s Networking the Telecom Industry (2004), Tellabs Incorporated closed a merger with Advance Fibre Communications in November 2004, estimated at $1.5 Million. Also in November 2004, the BT Group acquired International services provider Infonet Services Corp, with the goal to reach into the North American and Asia/Pacific Markets. Two other major examples is that of 1) Tekelec Incorporated, a signaling software and gateway vendor that acquired Santera, Taqua, and VocalData Incorporated, and 2) Juniper Networks Incorporated that bought Netscreen Technologies, security vendor, in an estimated $4 billion in stock to create the integrated routing structure to help with their internal technological growth goals. These companies had the requirement to enter into new markets and did so through merging and acquiring the necessary resources of other companies.

With an eye on portfolio diversification, Ciena Corporation purchased Catena Networks, access business, for 75.9 million Ciena shares and Internet Photonics, for cable equipment availability, for 24.1 million shares. Telcordia Technologies Incorporated
purchased Granite Systems, inventory management systems vendor, where Telcordia was later sold by its parent company Science Applications International Corporation (SAIC) to take over Warburg Pincus and Providence Equity partners for $134 billion. Cisco Systems Incorporated delved into new markets, such as security and services and purchased Jahi Networks, NetSolve, Perfigo Incorporated, Twingo Systems, and, also, Procket Networks, for its software code. According to Cisco (2009), Cisco acquired Protego Networks Incorporated, BCN Systems Incorporated, dynamicsoft Incorporated, P-Cube Incorporated, Parc Technologies, Ltd., Actona Technologies Incorporated, and Riverhead Networks Incorporated to strengthen their technological portfolio.

With diversification, network enhancements, and convergence as dominant objectives, Lucent Technologies Incorporated purchased Telica, a switching vendor, estimated at a $295 million stock transaction. This brought to light Lucent's need for contemporary technology and their need to build up their networks, allowing the delivery of voice, video and data. Cisco acquired P-Cube, a developer of an innovative control platform, for $200 million. This purchased helped to legitimize the traffic management technology space. Finally, with the convergence of wireline and wireless networks, Cingular Wireless attained AT&T Wireless Services Incorporated to have coverage in 49 states and 97 of the top 100 markets. Sprint Wireless and Nextel Communications Incorporated merged in a $35 billion deal to form Sprint-Nextel.

With these transactions at the forefront of this industry, a primary relationship is Telecommunication's connection to the development to economic growth (Brynjolfsson & Kahin, 2000; Riaz, 1997), which is a critical linkage that supports the need for on-going technological and product development and the way in which it is managed. In this context, some problems are that the literature suggests telecommunications as an exogenous driver
of economic development (Riaz 1997), and the need to respond to the changing characteristics of information, computing, and communications (Brynjolfsson & Kahin, 2000). These issues relate to this study because they can be considered the preeminent driver of economic growth and these fundamental transformations. They reinforce the requirement to adapt procedures and policies, and for organizations to extend their view of how to manage their resources to enable managers in making wiser decisions on how to invest in research, products, or services in a new era. Two major ways firms attempt to adapt are though product innovation and downsizing. This study will focus on whether and how these two work together in a complementary fashion as some suggest, or if they actually conflict.

The dissertation is developed as follows. In the next section, I first review the literature on product innovation and describe the different strategies for adaptation underlying two types of product innovation: exploitative versus exploratory innovation. Then, I discuss the employee skills and capabilities that managers must build and maintain across the organization so the firm can engage effectively in ongoing product innovation. In the second section, I define downsizing in general and describe the different strategies for adaptation underlying two types of downsizing: convergent versus reorientation downsizing. I discuss the positive effects that some authors and managers presume that downsizing affords. Then, I summarize the insights as well as limits of the studies that examine how downsizing affects innovation. While all these studies find that downsizing hinders innovation in general, the specific effects are unclear. I turn to the broader literature on the general effects of downsizing on organizations and employee skills and capabilities. This literature suggests that downsizing can hinder skills and
capabilities needed for innovation, although these connections are not well made empirically.

In the third section, I develop hypotheses about how downsizing can affect product innovation to articulate specific effects that are only vaguely alluded to in the literature. The hypotheses will explore relative and continual changes over a span of time that has included multiple occurrences of downsizing activities. The hypotheses will take into account the accumulative affect of downsizing on product innovation.

In the last section, I explain the empirical context of this study more fully by outlining Telco’s history, then the telecommunications turbulence. Then, I describe the particular data I have and its limits as well as the positive attributes of these data. The beneficial things are that I am able to exclude all the diverse possibilities, and have specific outcomes. The limits are that I cannot evaluate relative slack but can only assume there is none left due to history of downsizing. Finally, I explain how each construct in the hypotheses is operationalized with the data, and the statistical methods to be employed to test the hypotheses.
CHAPTER 2 - LITERATURE REVIEW

In the first section of this chapter, I define product innovations and why they are important to adaptability, and then discuss the employee skills and capabilities that managers need to develop and maintain in order to enable ongoing product innovation. In the second section, I define downsizing and two different strategies for using downsizing to adapt to environmental turbulence. Then I review the divergent ideas on how downsizing can positively or negatively affect the organization’s innovativeness and adaptability. In the final section, I build on this literature to develop specific hypotheses about whether, how, and to what degree downsizing affects product innovation performance over time.

2.1 How Product Innovation Can Enhance Organizational Adaptation

2.2 Defining Product Innovation: All kinds of innovation are essential components of organizational strategy and strategic management (R. A. Burgelman, Christensen, & Wheelwright, 2004; Durand & European Institute for Technology and Innovation Management, 2004; Klein, 1998; Verona & Ravasi, 2003). Innovation is a primary means to achieve many competitive goals, and including innovation in the business’s plan of action requires long term investment in particular capabilities and technologies. There are many kinds of innovation, including administrative, process, ancillary, and product innovation (Wilson, Ramamurthy, & Nystrom, 1999). Administrative innovations alter a firm’s structure or administrative processes which are directly connected to the firm’s management and indirectly to the work activity of the firm (Kimberly & Evanisko, 1981), such as flexible work time or job rotation (Wilson et
al., 1999). Process innovation is defined as the adoption of a process that is new to an organization (Damanpour, Szabat, & Evan, 1989; J. Ettlie & Reza, 1992), and typically involves new manufacturing capabilities (e.g., flexible or agile manufacturing (Sanderson & Uzumeri, 1997), implementing Quality, ERP, or customer response systems, or transforming the supply chain (Hult, Ketchen Jr., & Slater, 2004; Spekman, Kamauff Jr, & Myhr, 1998)). Ancillary innovations are created to help the firm in its interrelationships and extend beyond the firm-environment boundary (Damanpour, 1987), such as joint training programs and cooperative advertising campaigns (Wilson et al., 1999).

This study focuses on product innovation, defined as the development of a new product or modifications to an existing product through introduction of new features to enhance its value (Dewar & Dutton, 1986; J. E. Ettlie, Bridges, & O'Keefe, 1984; Romano, 1990; Wilson et al., 1999). Research has established that effectively managed product innovation is central to organizational survival and viability. Effective management of product innovation centers on what Tushman and O'Reilly (2002) define as "streams of innovation," or the development and launch of different kinds of innovation over time. They argue that long-term success depends on the ability to manage a range of innovations, from exploitative to exploratory, simultaneously. Many other scholars concur (Abernathy & Clark, 1985; Benner & Tushman, 2003; Damanpour, 1991; Danneels, 2002; Dewar & Dutton, 1986; J. E. Ettlie et al., 1984; Hage, 1980; Kaluzny, Veney, & Gentry, 1974; Levinthal & March, 1993; McGrath, 2001; Moch & Morse, 1977; Nord & Tucker, 1987; Romano, 1990; Wilson et al., 1999).
2.3 Differentiating Strategic Alternatives for Product Innovation: These researchers emphasize the need to balance exploitative innovations with exploratory ones, since focusing on exploitation alone can trap the firm in current competencies and preclude the development of new technologies needed for emerging markets, while focusing on exploration alone can be too risky (March 1991). Small start-ups in emerging industries might engage in too much exploration, but established firms like the one studied in this research tend to focus too much on exploitation. The most effective balancing for each industry is unknown, but research demonstrates that firms with some balance enjoy greater long-term performance (Rosenkopf and Nerker 2002; He and Wong 2004). Each provides specific benefits for adaptation, while they also interact to generate enhanced knowledge and learning (McGrath 2001; Danneels 2002).

Exploratory/radical innovations meet the requirements of emerging markets or customers (Benner & Tushman, 2003; Danneels, 2002). Exploratory innovations present new designs, develop new channels of distribution, create new markets (Abernathy & Clark, 1985), meet new market challenges (S. Brown & Eisenhardt, 1995), and use new technologies (R. Burgelman, 1991). Exploratory innovations can significantly enhance long-term organizational survival and performance (Damanpour, 1991), because they enable the firm to build new capabilities and acquire new knowledge. Exploratory innovations diverge from existing knowledge (Benner & Tushman, 2003; Levinthal & March, 1993; McGrath, 2001) or contain a high degree of new knowledge (Abernathy & Clark, 1985; Dewar & Dutton, 1986; J. E. Ettlie et al., 1984), requiring more information processing (Cardinal, 2001). Exploratory innovation has been associated with enhanced revenues and more product innovations (Abernathy & Clark, 1985; Benner & Tushman,
finds that radical innovation has a high probability of failure but can generate more revenue and be more profitable than incremental innovation.

In contrast, exploitative/incremental innovations are designed to meet the needs of existing markets or customers, to add new benefits incrementally to meet shifting needs of these markets, and to increase the efficiency of existing distribution channels (Benner & Tushman, 2003; Danneels, 2002). Exploitatve product innovations leverage existing knowledge and skills, improve traditional designs, expand existing services and products, and/or increase the efficiency of current distribution channels (Abernathy & Clark, 1985). Exploitative innovations build on existing knowledge or contain a low degree of new knowledge, and reinforce existing skills, processes, and structures (Abernathy & Clark, 1985; Benner & Tushman, 2003; Dewar & Dutton, 1986; J. E. Ettlie et al., 1984; Levinthal & March, 1993; Lewin, Long, & Caroll, 1999; Romano, 1990; Wilson et al., 1999), requiring less information processing (Cardinal, 2001).

The ability to continually generate a range of product innovations from exploitive to exploratory is especially important for firms in very turbulent environments, because shifting technologies, performance requirements, and user needs continually generate altered as well as very new market needs. Streams of product innovations enable an organization to keep existing customers, attract new customers, and develop new opportunities. More generally, product innovations allow firms to tap into and gain experience with new markets, and increase their knowledge of new technologies. Learning how to use new technologies more efficiently and productively in different
ways and/or across generations can assist firms in maintaining their position in the marketplace.

2.4 Assessing Innovation Performance: To assess how well a firm develops a variety of product innovations in the long run, one would measure the revenue the new products generate, and assess how well the new products enable the firm to follow its competitive strategy, for example, holding a dominant position in particular markets, or opening up new markets, and/or staying abreast of technology developments. However, innovation management scholars have developed near-term performance measures that reflect how well a unit is managing its product innovations (Cooper, 1998). These performance measures enable immediate, in-process assessments of the product innovation system, and they flag problems with the process they arise so managers can deal with them. One performance measure is maintaining a balanced portfolio of exploitative and exploratory products (Brown and Eisenhardt 1998).

Additional performance measures are based on a well-managed system for product innovations that outlines review "gates" and development phases or stages (e.g., "stage-gate"). Even more exploratory products need to build on a strategic vision regarding how they fit with the business’s product lines and markets, have targets and priorities that are consistent with strategies and resources, and have clear roles and responsibilities for team members as well as senior managers (Khurana and Rosenthal 1997). For all but very exploratory projects, well managed innovation projects have times for completion, and can be measured on how well they meet these completion dates, and have reasonable product development cycle times. Innovation projects may change as unanticipated problems arise or as customers shift needs suddenly. But if a
well managed innovation system is in place, project team members from all the functions as well as the functional and business unit managers can orchestrate the changes and new resource flows, so that products still hit the market at an optimum time to keep marketplace momentum (Wheelwright and Clark 1992).

2.5 Enabling Innovation by Building Employee Skills and Capabilities: To build and maintain this ideal of a well-managed innovation process, studies indicate that the organization must build and maintain a variety of organizational capabilities. The very large literature on innovation management has identified a variety of employee skills and capabilities, cultural orientations, organizational designs, practices and procedures, leadership styles, and strategic approaches all at the project, process, and business unit levels that together support multi-functional teams working on new products (Bonnet, 1986; Child, 1972; Cohen & Levinthal, 1990; Damanpour, 1991; Dean & Susman, 1989; Dougherty, 1992, 1995, 2001, 2004; Dougherty & Bowman, 1995; Dougherty & Heller, 1994; Drazin & Rao, 2002; S. I. Freeman, 1994; Hargadon & Fanelli, 2002; J.J.P. Jansen, Bosch, & Volberda, 2008; Justin J.P. Jansen, Van den Bosch, & Volberda, 2005; Katila & Shane, 2005; Kogut & Zander, 1996; Pinsonneault & Kraemer, 2002; Wilson et al., 1999).

For this study, I highlight the employee skills and capabilities that underlie a well-managed innovation system, because downsizing research suggests that downsizing has its greatest effect on these skills and capabilities. The work of innovation is complex, judgment-related, and creative, because even very incremental innovative products encounter surprising problems as they are developed otherwise they would not be innovations. Employees who are regularly engaged in product innovation have been
described as professional practitioners, who artfully draw on deep tacit backgrounds of knowledge and actively reflect on their work and how to do it better (Schon, 1983; Orlikowski, 2002). An innovative organization’s employees need the skills and capabilities to recognize unanticipated problems, creatively set and solve these problems collaboratively with other experts, continually access and apply specialty knowledge to the collective work, and keep working on the projects energetically despite the complexities involved, all the while being mindful of the business strategy that frames their choices (Jelinek and Schoonhoven 1990; Dougherty 2006).

I highlight two sets of employee skills for innovation that researchers suggest are likely to be directly or indirectly affected by downsizing: the learning, interrelating, and networking skills needed to continually create, combine, and recombine knowledge for innovation; and the ability to work in several different multi-functional teams at once on different innovation projects. These skills are enabled by ongoing strategic management. The key insight, highlighted by many scholars over the years, is that employees with the right skills and capabilities are essential assets to ongoing revenue production via ongoing product innovation. An organization cannot generate streams of new products without employees with the necessary skills and capabilities.

One set of skills and capabilities concerns creating, combining, and recombining knowledge. Scholars note that innovation is based on knowledge creation and combination (Kogut and Zander, 1992; Nonaka and Takeuchi, 1995; Leonard-Barton, 1995; (Cohen & Levinthal, 1990; Drazin & Rao, 2002)). Hargadon and Fanelli (2002) acknowledge a primary research stream emphasizes that knowledge leads to the generation of novel organizational outcomes, such as new products. Smith, Collins, and
Clark (2005) find that knowledge-creating capabilities is the primary factor in the number of new products one firm produced. Product innovation is based on learning and using all of the associated applicable knowledge, and at least some of the knowledge is tacit and based on individual experience (March 1991; Argote 1999; (Armstrong & Mahmud, 2008)). Innovating employees also need T-shaped skills according to Iansetti (1993). The down stroke represents deep specialty knowledge and expertise (Damanpour 1991). The horizontal top stroke represents the ability to deeply appreciate the potential systemic impact of their expertise – that is, how their expertise interacts with that of other experts involved in building the new product. As Leonard-Barton (1995) puts it, innovators need to apply their expertise to the problem at hand, and not insist that the problem be formulated to fit their skills (as would the proverbial bureaucrat).

Another part of this creating, combining knowledge capability involves the interpersonal skills and capabilities of relating, interacting, and networking with others. Knowledge creation depends on communication within a firm’s community of experts (Boland & Tenkasi, 1995). Through exchange and combination, tacit existing knowledge is transformed into explicit knowledge (I. Nonaka & H. Takeuchi, 1995). Furthermore, useable knowledge is embedded in everyday practices (Nag, Corley, & Gioia, 2007), so inter-relating over the work of innovation enables people to surface and use this knowledge. Scholars also find that the number and strengths of relationships in an organization is positively related to its knowledge creation (Smith, Collins, & Clark, 2005). Significant evidence suggests that when relationships and connections are strong, individuals will be more willing to exchange information and cooperate for mutual benefit (Krackhardt, 1992). Internal networking is complemented by external networking
that provides access to technologies, knowledge, resources, or markets (Inkpen & Tsang, 2005); (Baum, Calabrese, & Silverman, 2000; Dyer & Nobeoka, 2000; Gupta & Govindarajan, 2000; Ingram & Baum, 1997; Nishiguchi, 1994). These knowledge-creating capabilities are enabled by "climates" that support risk-taking (Smith et al, 2005), and by cultures that empower individuals to make them more productive (Puffer, 2004b). It is logical to suggest that innovations depend on employees who have established connections with the various departments, have tacit knowledge of process, procedures and methods, and are familiar with the innovations under development.

A second set of skills and capabilities involves working effectively in multi-functional teams on new product projects, so that particular products actually get built and launched. Cooperative work from employees from varying backgrounds is essential for developing and completing innovations, and has been shown to be a factor in new product success (Bonnet, 1986; Dean & Susman, 1989). Dougherty (1992) suggests that collaboration enhances both the product’s design and improves the execution of the development process, because people from the different functions know different, often unique, things about the product’s design, and they also know things differently so they can add more perspectives.

While teamwork is a facet of good work relations, I highlight multi-functional team skills as a separate category because it involves several additional aspects of collective work. One is the ability to work heedfully with other functions. A team member needs to understand her own issues in her own function as well as challenges in other functions, so that problems can be solved quickly yet in a manner that accommodates every function’s issues. For example, engineers might encounter an
unexpected problem with achieving the planned level of performance. They need to solve this problem while also taking into account marketing’s challenges of revamping the benefits package, and operations’ challenges with implementing particular options. Close, continuous work on setting and solving problems with diverse others is not easy, and requires special skills. Moreover, innovators typically work on several projects at one time, deploying their specialties in different ways since the projects are different. A second aspect of multi-functional teams is that the whole unit must be structured so that the various functional specialists can work on multiple teams. Functional managers must keep the expertise of employees current, foster the function’s ongoing development (e.g., developing new training approaches in sales, enhancing the supply chain system in procurement), and also help employees work effectively on multiple projects, rather than focus on their own agenda (Adams 2003).

Strategic managers need to foster these complex employee skill sets for learning and teamwork. Because the work is complex and often emergent, people can lose sight of the "collective enterprise" (Burns and Stalker, 1961), and no longer pull together. As well, there are always conflicts over goals and options with innovation that must be resolved. Strategic managers’ active involvement in reviewing the projects, articulating the projects’ connections with the business strategy, and continually articulating the strategy itself helps to keep the projects coherent as they are developed (Cooper, 1998). Strategic managers also develop long term capabilities in R&D, technology, operations, and so on that the innovating teams can draw on readily, and orchestrate resources such as funds, time, and attention so they flow readily to projects. Senior managers need to assure that functional and business unit managers keep the strategic focus of product
innovation in mind, and not focus instead on local or "suboptimal" goals of functional needs or short-term revenue. Research has shown that large, established firms like operating telephone companies historically have not actively enabled and supported effective product innovation (Dougherty & Heller, 1994). Therefore, an active, concerted emphasis by strategic managers is needed to keep innovation a part of the everyday choices in work, and to incorporate product innovation activities into established systems (Leonard-Barton 1995). If the strategic focus on product innovation is reduced, then the other two complex skill sets will fall apart (Quinn, 2005).

In summary, enabling innovation requires the maintaining and building of employee skills and capabilities. Much of this is based on experience and everyday development of interpersonal relationships that presumably involve trust, an acknowledgement of individualized knowledge and expertise, and how this individualized expertise interacts with other experts engaged in developing new products. Cooperative work from employees from varying backgrounds, support of multi-functional teams and fostering ongoing development helps this enablement. Managers are required to promote, encourage and foster these complex employee skill sets for learning and teamwork. To support and uphold this standard of a well-managed innovation process, the organization must build and maintain the diversity of organizational capabilities.

2.6 How Downsizing Can Affect Organizational Adaptability

2.7 Defining Downsizing: While product innovations assist in generating new revenues, firms also find it necessary to cut costs via downsizing (W. Cascio, 2002). There are varying definitions of downsizing, but I will use Freeman and Cameron’s
(1993) widely accepted definition: downsizing is the *intentional reduction in personnel*. Downsizing is a deliberate choice taken, and involves reductions in the workforce with the objective to enhance organizational performance in the face of environmental pressures to adapt. Therefore, like product innovation, downsizing is a strategy for maintaining organizational viability in response to such changes as new competition, economic pressures, a changing marketplace, and/or new technologies for products as well as for operations (e.g., new IT systems or robots that replace workers). Downsizing has been linked to executive turnover, layoffs, the elimination of functions, jobs, hierarchical levels, or even entire units and departments (Bergh & Lawless, 1998; Cameron, Freeman, & Mishra, 1991; W. Cascio, 2002; W. F. Cascio, 2002; Wayne F. Cascio, 2005; Ghoshal & Bartlett, 1996; Hoskisson & Hitt, 1994; Pinsonneault & Kraemer, 2002).

Some of the lack of clarity on the effects of downsizing on adaptability in the literature arises from varying definitions of downsizing, so it is important to distinguish how the intentional reduction in personnel differs from other ideas. For instance, some scholars advise downsizing differs from non-adaptaption (reverse of adaptation) (Gilmore & Hirschhorn, 1983; Greenhalgh, 1983; McKinley, 1987; Weitzel & Jonsson, 1989), growth-in-reverse (opposite dynamics of organizational expansion, such as less specialization, and more centralization) (Behn, 1980; Gilmore & Hirschhorn, 1983; Krantz, 1985), layoffs (operational mechanisms used to implement a downsizing strategy) (Brockner, 1988; Gilmore & Hirschhorn, 1983) and decline, where decline does not necessarily produce a reduction in the workforce as firms have experienced decline in market share or revenues with no reduction in personnel (Hall, 1976). Freeman and
Cameron (1993) advise that downsizing and decline are distinct constructs. Organizations can downsize without declining, as when downsizing is used proactively to enhance competitiveness (Sutton & D'Aunno, 1989; Tomasko, 1987), and they can decline without downsizing. Downsizing may be a response to decline, but one should be careful not to confuse cause with effect (Levine, Rubin, & Wolohojian, 1981).

2.8 Differentiating Strategic Alternatives for Downsizing: Some of the lack of clarity on the effects of downsizing also arises from the failure to distinguish very different strategies for downsizing, since each may affect innovation differently. Downsizing is a deliberate strategic choice in general, but divergent strategic paths use downsizing for different strategic purposes. I briefly outline two strategic paths of downsizing that mirror the dichotomy between exploitative and exploratory innovation: convergent (Cameron, Kim, & Whetten, 1987; S. H. Freeman & Cameron, 1993b; S. I. Freeman, 1994; Levine, 1985; Pinsonneault & Kraemer, 2002; Robertson, 1987) and reorientation (Cameron, 1980; Connolly, Conlon, & Deutsch, 1980; Ferris, Schellenberg, & Zammuto, 1984; Pinsonneault & Kraemer, 2002; Zammuto, 1982). These approaches to downsizing are based on very different logics about the kinds of adaptations that are needed for different kinds of environmental pressures. Studies suggest that it is the configuration of strategies, types and amounts of slack in the organization, and timing that together determine the effects of downsizing (Voss, Sirdeshmukh and Voss, 2008). For example, Love and Nohria (2005) find that just cutting personnel without changing other aspects of strategy and structure reduces firm performance (measured as returns on assets), while more broad downsizing strategies implemented proactively increases firm performance.
Convergent downsizing involves fairly long time cycles of adaptation and is characterized by incremental change. Convergent downsizing requires less redesign and is based on a strategy of refining and enhancing existing structures, and improving the firm’s current mode of operation. The goal of convergent downsizing is to achieve greater consistency among the internal activities of the organization (Cameron, 1980; Connolly et al., 1980; S. H. Freeman & Cameron, 1993a; S. I. Freeman, 1994; Levine, 1985; Pinsonneault & Kraemer, 2002; Robertson, 1987; M. L. Tushman & Romanelli, 1985; Zammuto, 1982). During convergent periods, organizations concentrate on protecting the market share of their primary businesses, with the primary responsibility for adjusting and refining the organization’s systems and structures falling to middle management (S. I. Freeman, 1994). Stability in the upper echelon of management and in technology and systems is maintained. Convergent downsizing emphasizes stability and control (S. H. Freeman & Cameron, 1993b).

Reorientation downsizing is strategically focused on developing new businesses and activities or doing similar activities in an innovative way (S. H. Freeman & Cameron, 1993b; S. I. Freeman, 1994). This type of downsizing is characterized by short, discontinuous, and radical changes, and is undertaken when environmental threats are severe (Pinsonneault & Kraemer, 2002). This downsizing strategy aims to reduce organizational costs while also increasing effectiveness, and involves major shifts in strategy, work processes, staffing, formal structures, and/or culture (S. H. Freeman & Cameron, 1993b; S. I. Freeman, 1994). Freeman (1994) proposes that reorientation periods involve simultaneous and abrupt shifts in strategy, power distribution, structure and control systems. Top management instigates transformation and also negotiates
between forces for inertia and competitive or technological forces for fundamental change. This approach may consist of replacing or redesigning organization structures and processes as well as transforming the firm's alignment of power or business mix overall (Bailey & Szerdy, 1988; Ferris et al., 1984), and so involves more and more radical downsizing approaches. Firms may choose to bring in new top management to combat resistance to the redirection, reduce the number of hierarchal levels, make acquisition or merger deals that develop the firm's new direction, and depart from businesses that are inconsistent with the new strategy or are low performing. Reorientation also involves new inter-organizational relationships such as joint ventures, networks, alliances, or consortia. According to Freeman & Cameron (1993b), reorientation emphasizes flexibility and adaptability.

Managers may have difficulty choosing between these two downsizing strategies in continually transforming competitive conditions, and may mix up the theoretically divergent elements of each strategy. If the theory is correct that these two strategies play out differently, then managers may actually create more problems if they mix the two logics in their downsizing. Each downsizing strategy emphasizes a different kind of innovation — convergent downsizing presumes more exploitative innovation projects, while reorientation downsizing presumes more exploratory projects. This study will include these types of downsizing so that their relative effects on innovation can be determined and their co-mingling can be assessed. Table 4.2, presented on page 51, summarizes the two downsizing approaches.

With these definitions and strategies set out, I now turn to the more confusing literature on the effects of downsizing on the employee skills and capabilities needed for
continual product innovation. My intent is to make the case that a more precise study of specific relationships between downsizing and product innovation is necessary because the existing literature, despite its vast size, leaves too much room for inference.

2.9 The Positive Effects of Downsizing for Innovation: I begin with the positive benefits that some argue accrue from downsizing, because these form the background of justification for using downsizing strategies to adapt to turbulence. When managers announce a downsizing, they typically assert that it will have positive benefits on the firm’s performance but one would not expect otherwise. Some researchers argue that downsizing allows for resources to be designated more usefully (Jensen, 1986), because downsizing eliminates duplication and slack that generate longer response times and less flexibility (Cameron et al., 1991). This enhanced use of resources and heightened flexibility arise, it is presumed, because of the theory that excess resources breed inefficiency and inhibit innovation (Leibenstein, 1969). Moreover, downsizing is said to lower overhead, reduce bureaucracy, speed up decision making, smooth communications, enhance entrepreneurship, and increase productivity (Heenan, 1989). All these positive effects would enhance the capabilities for innovation by moving resources around effectively, and enabling more effective work relations and access to knowledge.

Downsizing is also said to enrich jobs and expand career opportunities for remaining employees (Hackman & Oldham, 1980; Ross, 1974). For example, after a downsizing activity, employees have greater chances to advance vertically and horizontally. And because of the reduced personnel, remaining employees may need to expand their skills by becoming proficient in other areas of the business, which should expand their shaped skills for product innovation as well as their multi-functional
team skills. The pressures on time to carry out tasks can enhance people’s creativity up to a point, as Andrews and Farris (1972) suggest is the case with R&D scientists. Some researchers find that a fairly small amount of workforce reduction favors innovation by developing multi-faceted and skilled groups or teams, improved jobs for the remaining employees, and fewer hierarchal structures (Baumol, Blinder, & Wolff, 2003; Love & Nohria, 2005). Downsizing therefore can develop an internal environment that is more encouraging to the development and survival of new innovative projects or ideas.

Some argue that downsizing can refocus strategies, enhance control, and improve performance (Bergh & Lawless, 1998; Hoskisson & Turk, 1990; A. Shleifer & Vishny, 1991), and productivity and/or competitiveness (Cameron, 1994; Eaton, 1996; Sutton & D'Aunno, 1989; Tomasko, 1987, 1993). If true, then downsizing would also bolster the strategic commitment to innovation that is necessary to maintain the skills and capabilities. All together, these arguments indicate that downsizing should enhance continued product innovation, since it is argued to enhance the skills and capabilities that are needed to innovate.

Unfortunately, there remains considerable debate over whether or not downsizing improves performance at all. Love and Nohria (2005), in a study of the 100 largest firms over time, find that downsizing has no main effect on firm performance, measured as return on assets. Cascio, Young, and Morris (1997) likewise find no main effect for downsizing, while other studies find a negative effect (see summaries in Love and Nohria 2005:1089; who conclude from these studies that: “most downsizing organizations did not meet their cost-savings and efficiency-improvement expectations”).
The conceptual argument that downsizing will improve performance is based on agency theory arguments of slack, which are that agents (managers) accumulate excess slack and mis-use it, and that slack is always bad. Organization theory about slack build on Cyert and March's (1963) arguments that slack can facilitate adaptation, innovation, or risk-taking by providing resources for experimentation, and enhance decision making by providing resources or conflict resolution (Singh 1986; Lawson 2001). A surplus of resources, up to a point, is assumed to have a positive influence on innovation (Bourgeois III, 1981; Cheng & Kesner, 1997; Mohr, 1969; Singh, 1986). Reducing this slack too much can hinder people’s power and ability to innovate (T. Amabile & Conti, 1999; T. M. Amabile & Conti, 1995; Bommer & Jalajas, 1999; Brockner, 1988; Brockner et al., 1987; Dougherty & Bowman, 1995). Love and Nohria (2005) find that downsizing improves the performance of organizations that have more absorbed slack (measured as sales, general and administrative expenses as a fraction of sales), but only up to a point, and only when a proactive and broad downsizing strategy is used. They also find that when organizations do not have slack, downsizing negatively affects their performance when the downsizing is reactive and based only on cutting personnel. That is to say, the lack of slack is bad for downsizing.

2.10 The Negative Effects of Downsizing for Innovation: There is also a literature that finds that downsizing reduces or otherwise hinders product innovation. First, Dougherty and Bowman (1995) find that product innovators working in firms that were also undergoing downsizing solve fewer problems of linking their projects to the firm’s strategy and resources. They suggest that downsizing hinders product innovation by disrupting the network of informal relationships used by innovators to work out
strategic linkages and access resources. Using surveys over a two year period as one large computer manufacturer repeatedly downsized, Amabile and Conti (1999) find that the levels of creativity, productivity, and invention disclosures submitted decline considerably during and following downsizing. They argue that negative changes in work environment accounts for the negative relationships, and that work group instability was particularly related to these negative effects of downsizing. They also find that the effects on creativity dissipate over two years, but note that the organization suffered from fewer product innovations during the two years. Mellahi and Wilkinson (2009) find that excessive downsizing has significant and temporary effects on innovation, indicating that there is a critical period (two years after downsizing) during which small downsizing has a positive, although very weak, influence on innovation and large downsizing has its greatest negative impact on innovation (disappearing after the second year).

Studies that look at general outcomes infer that downsizing can negatively affect innovation. Kulkarni (2008) finds that downsizing negatively affects the human resource management policies and the research and development. He infers that downsizing can affect the behavior of remaining employees, such that they tend to follow rules and regulations more strictly (Staw, Sandelands, & Dutton, 1981), and become less willing to push the envelope of innovation. They argue that severe downsizing contributes to the increased workload which may affect the time and amount of energy employees spend on the pursuit of innovation. Subramanian and Nilakanta (1996) suggest that large downsizing triggers inflexibility of decision-making processes and readiness for risk-taking, thus stifling innovation or making employees less willing to push the envelope of innovation. Cheng and Kenser (1997) also find that a major reduction in workforce is
associated with a rapid decrease in organizational innovation ability, because of the loss of a significant level of skills.

2.11 General Negative Effects of Downsizing on the Organization: Finally, most of the research on downsizing’s effects does not specifically examine innovation except by inference. Rather, these studies either find or suggest that downsizing has a variety of negative effects on the organization and the employees which might also negatively affect the skills and capabilities needed for innovation. For organizations, the negative effects can be loss of goodwill, depleted rating of the firm, loss of trust among employees, an unhealthy environment in the firm, loss of productivity, failing to hold on to talented personnel, and failing to attract good candidates (Kulkarni, 2008). Downsizing also violates employee trust, which, in turn, decreases productivity (Andrei Shleifer & Summers, 1988). Trevor and Nyberg (2008) find that downsizing triggers additional voluntary turnover that is not intended, and may exacerbate the understaffing. March’s (1991) model of knowledge retention and exploration in the organization suggests that too much turnover impairs both. The negative effects found on employees are adverse psychological effects such as anxiety, mental tension, stress, breakup of social life, social stigma of losing a job, depression, breaking of psychological contract with the organization, difficulty in getting another job, etc. (Kulkarni, 2008). Scholars argue that the anxiety and anger among surviving employees can stifle innovation (De Meuse, Vanderheiden, & Bergmann, 1994). Major downsizing of 30-50 per cent has been linked to a considerable decrease in employees’ morale and commitment and a considerable increase in job-related stress (Cody, Hegeman, & Shanks, 1987).
All together, these studies and theories suggest a variety of possible effects on the employee’s skills and capabilities necessary for ongoing product innovation, and on the strategic commitment that is necessary to bolster these capabilities. Regarding individual skills needed for learning, it is possible that experienced employees with the tacit understanding of how to apply specialist knowledge and move products through the organization may be eliminated. Regarding the interpersonal relationships needed for learning, networking relationships can be disrupted as well, as some individuals in the network or with whom remaining employees interact are removed. Cascio (2005) suggests that when one considers the multiple relationships that one individual has, if many individuals are pulled out of the system the overall set of interactions can fall apart, and significant chunks of organizational memory can be lost. The collective work methods, procedures, and processes may also be disrupted as the established employees from various departments can be interrupted. Regarding multi-functional teamwork, team members will be lost, and remaining employees may be more locally focused on functional work as they pull their heads in and concentrate on their immediate tasks. Finally, if downsizing is often mismanaged, then one can suspect that the strategic commitment to innovation may also fall apart and strategic managers juggle all the ensuing complexities of downsizing.

However, when it comes to actually understanding the effects of continuous downsizing on continuous product innovation, all this work has two major limitations. The first is that the research or conceptual arguments are based on very broad, generic ideas, inputs, or outcomes. While the preponderance of empirical suggests a negative relationship between downsizing and innovation, the research is vague enough that one
can infer a variety of specific causes for reduced innovation instead of downsizing. The fact that managers repeatedly downsize despite these negative effects on innovativeness indicates that they do not believe that the two are associated, or feel that they have no choice but to downsize anyway. In either case, more precise understandings of whether or not to downsize, and how to do so will enhance management theory and practice. The second limitation is that the relationship between downsizing and innovation is in fact a process that unfolds over time; studies that look at one-time outcomes, or at one of a variety of possible inputs to innovation, do not capture the actual complexities of this interrelationship over time, as multiple downsizings affect multiple products.

The fact that firms often do not achieve the productivity or cost savings they forecast from downsizing, but continue to downsize nonetheless, suggests that theory about how to manage continuous but complex adaptation strategies has room for improvement. In particular there is need for better theory on how and why downsizing has what effects on ongoing innovation projects, and what managers can do about the effects. Can remaining employees continue with their innovation projects and meet pre-planned milestones for completion? Are exploratory innovation projects enhanced or disabled after downsizing more, given their longer term and riskier benefits? Is convergent downsizing more or less likely to reduce innovation performance? All these questions and more remain unaddressed.

The approaches or the divergent and opposing options will be sorted out by this study. The downsizing literature on how to deal with this specific type of change strategy suggests varying approaches such as the popular practitioner’s approaches of 1) not to worry or prolong the process, and do it quickly, 2) not to implement downsizing at all, or
at least leave the change process as a last resort, 3) implementation should be done slowly and methodically, and 4) ensuring that there is a set of strategic organizational capabilities that are in place before downsizing can be beneficial. I will leverage these different approaches in my findings and based on my findings, I will recommend which approaches are best.

Researchers propose various approaches to how to manage downsizing. Cascio (1994) argues that firms should support remaining employees effectively so that they do not become hesitant to take risks (W. F. Cascio, 1993), or develop greater levels of stress and burnout. Organizations should support remaining employees so that they do not develop greater levels of stress and burnout (Appelbaum, Everard, & Hung, 1999). It has been continuously argued that for the success of any downsizing, the approach of the downsizing, perceived fairness of the process, and treatment of survivors is extremely necessary as employees may find it quite challenging to complete their work activities and remain innovative since workload is often increased.

Some scholars argue that downsizing should be used as the final option rather than the first choice (Lavelle, 2001), and there should be selective downsizing (Wayne F. Cascio, 2005; Martin & Bartol, 1985), such that leading performers and those who have special skills and talents are preserved because these individuals may be more difficult to replace (Wayne F. Cascio, 2005; Martin & Bartol, 1985). Because assessments of organizational downsizing have revealed that few firms have achieved the productivity or cost savings increases they forecasted, some researchers advise that organizations should consider their employees as assets to be developed, a source of strategic advantage, and not just simply as costs to be cut (W. F. Cascio, 2002; Harris, 1993). Pfeffer (1995,
2005) argues that attaining competitive success through individuals means achieving success by working with them versus replacing them or restricting the range of their activities, and firms that value this different viewpoint are often able to successfully survive over their competitors (Pfeffer, 1995, 2005). Some successful organizations have chosen to offer partially paid sabbaticals, lend employees to nonprofit organizations for a specified term, minimize the expense budget, delay new-hire start dates, cut the pay of top executives, revoke job offers, reduce work hours, freeze salaries, offer unpaid vacations, freeze promotions, and allow voluntary unpaid leaves as a way to steer away from reducing their workforce (W. Cascio, 2002; W. F. Cascio, 2002; Wayne F. Cascio, 2005).

On the other hand, some researchers suggest that although a minimal workforce reduction decreases the level of excess human resource and the remaining employees are required to function with a greater workload, the minimal increase in workload can be handled appropriately and employees may competently manage the new roles and responsibilities without being sidetracked from carrying out activities associated with innovation (Moore, Kuhrik, Kuhrik, & Katz, 1996). Then again, as the amount of downsizing activities rise so does the excess of job-related tasks (DeRue, Johnson, Ilgen, & Jundt, 2008; Maslach, 2003) until the level of downsizing reaches a point beyond which the remaining employees’ ability to accomplish the daily tasks and still be able to innovate declines.

Managers should ensure that they drive reductions in personnel through broader changes in processes, structures, and strategies (Love & Nohria, 2005), and be proactive.
According to Trevor and Nyberg’s (2008) study, downsizing can set off an exodus among the remaining employees that in some cases is much greater than the reduction realized through the layoffs. These researchers propose that the downsizing-turnover relationship suggests a gloomy irony in that employees become jobless by organizations that may subsequently find themselves understaffed. Also, to the extent that turnover rates hinder and inhibit organizational performance, the performance of downsizing companies may well suffer further through the leaving behavior that the layoffs create (Trevor & Nyberg, 2008).

However, in the event that reducing personnel becomes the strategic choice, there are ways in which to minimize the negative setback to employees and damaging and unconstructive outcomes of the action, especially as firms try to improve their competitive positions. With the change literature, it is understood that firms which have successfully downsized have used strategies like open communication, encompassing verbal communication, notices, circulars, individual letters, appropriate compensation, post-downsizing services (i.e. out placement agencies, etc.), involvement of family members in the downsizing process, taking a humane approach towards employees laid off, commitment and participation of top management, and providing help to the survivors in the form of training, guidance, counseling, etc. (Kulkarni, 2008).

If firms plan their transformations in a controlled, methodical way, versus rapid and hasty reactions to respond swiftly, they can improve their positions (W. F. Cascio, 2002; Wayne F. Cascio, 2005). They can choose to value instead of manipulating employees (Puffer, 2004a), communicate honestly and candidly (Darling & Nurmi, 1995; Mishra, Spreitzer, & Mishra, 1988) about the downsizing activity, manage those who are
affected by the layoffs with dignity and respect (Barrionuevo, 2001), consider allowing employees the opportunity to participate in the downsizing decisions (Mirvis, 1997), avoid having employees feel betrayed, clearly explain new roles and responsibilities of the remaining employees (Appelbaum et al., 1999), and pay attention to the employees to avoid counter-productive behaviors (Wagar, 2001). Workplace conflict should be monitored, increased grievances should be avoided, greater absenteeism rates should be managed, and, where applicable, a decline in the relations between union members and management should be avoided. Additionally, organizations should consider the effects on their stakeholders, with restructuring results examined, and the organization learning from mistakes (Wayne F. Cascio, 2005).

Organizations that want to survive will require strong research and development to maintain either their monopoly or quality of their product. In addition, it is believed that high-quality employees make high-quality organizations; therefore, organizations perceive that high-quality human resource management practices were very important for the survival of organizations in an unstable environment. It can also be suggested that competent employees give better results in research and development and high-quality human resource management practices help in retention of such employees. Industries in different sectors changed their human resource management policy differently when faced with downsizing. Thus, all the major human resource management factors like recruitment, compensation, performance appraisal, and transfers are significantly affected by downsizing (Kulkarni, 2008).

Firms can be flexible or effective without compromising core competencies. There is a need for organizations to take advantage of synergies (C. Markides &
Charitou, 2004), alter the business model (Quinn, 2005), transform to a framework that can handle complicated, multi-dimensional processes to permit managers to compete more effectively through individualized approaches, seeking economies of scale, and unique identities in the marketplace (Cummings & Angwin, 2004). The most important role for middle management involves the planning and allocation of resources among different groups, and the concept of linking groups appears to drive the middle manager's work (Kraut, Pedigo, McKenna, & Dunnette, 2005). Successful product development requires the orchestration of multi-faceted resources and processes, and the understanding of the various approaches to how to manage downsizing.
CHAPTER 3 - HYPOTHESES DEVELOPMENT

All types of innovation are vital elements of organizational strategy and strategic management (R. A. Burgelman, Christensen, & Wheelwright, 2004; Durand & European Institute for Technology and Innovation Management, 2004; Klein, 1998; Verona & Ravasi, 2003). I focus on product innovation as a primary way organizations achieve their competitive objectives because including product innovation in the business’s plan of action dictates that the firm invest in, develop, and maintain longer-term capabilities and technologies. First, I will identify general effects on innovation and then I will specify particular effects downsizing will have on product innovation, and draw attention to two types of downsizing. No one has said exactly what these effects are but I can hypothesize from the theory.

Knowledge-based processes such as knowledge creation and absorption, knowledge integration and knowledge reconfiguration are all based on a reasonable mix of organizational resources (Verona & Ravasi, 2003) and play a part in continuous product innovation. Continuous product innovation is crucial to the organization that must continuously adapt and transform. But what happens to the innovations, the time it takes to get these innovations to the marketplace, and the managers’ ability to complete the innovations when the organization is trying to maintain its viability in a turbulent marketplace? Research demonstrates that firms with some balance between radical and incremental product developments benefit from greater long-term performance (Rosenkopf and Nerker 2002; He and Wong 2004). Each provides specific advantages for adaptation,
while they also interact to produce improved knowledge and learning (McGrath 2001; Danneels 2002).

The orchestration and execution of the product development cycles requires the encouragement of supporting both radical and incremental product developments through its associated projects. Managers often engage in risk reducing actions to help all types of projects successfully complete the product development stages in order for both radical and incremental products to enter into the marketplace for existing and new markets. For example, a risk-reducing action that managers take is to sort out projects, identify the radical (new product developments) and non-radical (enhancing product developments) projects, and make decisions they feel can help assist in the completion of projects. Another risk-reducing action managers take is to assess product-related risk through the identification of which product families or groups projects belong to. This evaluation of product groups begins by determining the “parent” product group of each project. The manager assesses the size of the product category of each focal project in two ways. First, size of the product family is captured by identifying revenue associated with it. Then, the manager highlights the number of projects in each of the product categories. Capturing the size of the product family and determining how long each of the projects have been on the radar for development within the product category helps managers minimize overall product-associated risks. The assessments become even more valuable when the environment changes and requires decisions to be made expediently.

A primary factor in sustaining competitive advantage in organizations remains in the ability to continue to develop, maintain, and promote innovation (Kay 1993). While organizational support is necessary, the time it takes to bring a new product to market is dependent upon various variables such as whether or not the technology is available
internally or from a vendor, or whether the testing team has the expert available to test the specific device during the optimal time required. As a result, radical products are often more prone to adjusted timelines. The interrelationships are crucial as many moving parts of the process are working independently and are interdependent upon all functions carrying out their duties in a timely fashion. Under the best circumstances, there are a variety of variables and uncontrolled factors that can cause delays in the initial timeline of the new product being completed for the marketplace. However, the organization's requirements are often less lenient. The innovators and managers often make decisions that would salvage their resources. In other words, when deadlines are missed and target dates for completion of stages within the development process are missed, managers, innovators, and various members of the innovation team come together and decide how best to handle radical projects that may be crucial to the firm but are currently delayed. Under normal conditions, radical projects tend to cause tensions within the development cycles and tie up resources that can be used for other less radical products and projects. The resources such as manpower can be shifted to the less radical projects and then once those are completed, the manpower can be redirected back to the radical projects if they are still pending.

Then again, it is often strongly proposed that radical or more innovative projects from larger product groups are less likely to be withdrawn because of the relative power of large product groups and their significance within the organization. These larger product groups may have more resources available to them because of their importance to the organization and they may have a stronger history of growth, or a greater revenue-producing impact. It may be simpler for these larger product families to keep their
manpower, funding, commitment and support, and technological resources more intact. Managers try to urge the organization to keep radical projects that may produce longer-term positive outcomes within the organization and argue that the risk factor is moderated because of the focal project’s connection to a larger product family. With a dedication to these types of projects, they justify their actions by suggesting that these specific projects in such product families may have a better record of completion. Therefore, in general, I hypothesize that:

_Hypothesis 1a: Radical projects are more likely to be withdrawn._

_Hypothesis 1b: Radical projects are less likely to be completed._

_Hypothesis 2a: Radical projects from larger product groups are less likely to be withdrawn._

_Hypothesis 2b: Radical projects from larger product groups are more likely to be completed._

Apart from the general effects, what happens to the innovations, the time it takes to get these innovations to the marketplace, and the managers’ ability to complete them when the organization undergoes multiple downsizings, layoffs, and transformational activities?

Theories of organizational change stress slow transformation, but within a turbulent marketplace, the relationship between on-going product innovation and frequent episodes of downsizing becomes more crucial to investigate as change theory in its present state does not deal with continuously turbulent issues. My goal in this study is to
help develop better theory for managing the two together more effectively. Through product innovation or, specifically, innovation projects, adaption to turbulent conditions can enhance an organization’s marketplace position through the delivery of completed projects that enhance existing products, exploit current capabilities, and experiment with new designs and opportunities. To accomplish this, organizations must take care of employee abilities, skillfulness, and capabilities for functioning collaboratively in multi-faceted and -functional teams and their connections to others. These connections allow for the continual knowledge flow to remain in the organization to get projects done.

In addition, employees must be able to continue the complex and creative work of innovation without constant disruptions. The familiarity with others and of the processes and systems amongst those already aware of the current projects can allow for the increased ability to complete projects. This can also allow for shorter turn-around times for the various stages of a project to be completed. However, downsizing can possibly disrupt both the employee resources and the strategic dedication necessary for product innovation.

Research is still unclear as it offers a variety of broad ways to implement downsizing, with the relationships between practices and continual innovation remaining unexplained. While no study has specifically examined the actual effects of frequent occurrences of downsizing on product innovation over time, research has established that innovation processes disintegrate, innovation activities are interrupted, the atmosphere becomes one that is not enabling to innovation, and the process to complete projects can become fragmented.
The management of innovation is very crucial to the U.S. economy and has been hampered with many laws, regulations, and industry shifts (Carrier, 2009). It is also critical in the practice of successful organizations in many sectors (Conway & Steward, 2009). However, with the competitive climate and multiple downsizing initiatives taking place in the same organization, what happens to the accumulation of these actions and when will the effects dissipate? Will repeated downsizing exacerbate negative effects and, thus, accumulate?

Often the organization is not adequately prepared for the hindrance of product innovation that typically surfaces from downsizing (Dougherty and Bowman, 1995), or the consequences of the inadequately executed and improperly supervised projects during downsizing (Cameron, 1994a; Freeman, 1994). In general, projects can consist of new product developments (radical or exploratory projects) or enhancing existing products (incremental or exploitative projects). However, there must be a balance of both types of product innovations within the organization as focusing on one type such as exploitative products alone can confine the organization to its current competencies and hinder it from developing new technologies for emerging markets (March 1991).

Taking care of both radical and incremental product developments through its associated projects requires the organization to support two major employee capabilities that are crucial, not easily replaceable, and hard to obtain and maintain within the product development process: 1) the learning and interrelating skills needed to continually create, combine and recombine knowledge for innovation, and 2) the ability to work in several different multifunctional teams at one time on different innovation projects. The learning and interrelating skill and capability allows for new products to be developed because knowledge leads to the creation of novel organizational outcomes, such as new products (Hargadon
Innovations depend on employees who have established links and a network with a variety of departments, tacit knowledge of process, methods and procedures, are familiar with the products and projects under development, and possess the ability to interrelate to others with tacit knowledge. Employees need specialized and focused knowledge, expertise, and the skill and talent to comprehend and realize how their expertise interacts with that of other experts involved in improving existing products or creating the new ones. This allows for tacit knowledge to transform into explicit knowledge. Similar to scholars who have argued that innovating employees also require T-shaped skills (Lansetti, 1993), an understanding of how their expertise interacts with that of other experts involved in building the new product, employees should also possess the ability to work in several different multifunctional teams at once on different innovation projects.

The ability to work in several different multi-functional teams is important because cooperative and collaboration work from employees from different backgrounds has been shown to be a factor in new product success and is very crucial for developing and completing innovations. This is not easy and often many projects are worked on at the same time which requires the employee to morph their skills and specialties to accommodate the projects. This morphing ability is imperative because this can allow for innovators to solve problems with diverse others deploying specialties in different ways, understand individualized issues in their distinct functions as well as challenges in other functions, so that problems can be alleviated and solved quickly yet in a manner that accommodates every function's issues.

Cooperative work from employees from an array of backgrounds is vital for creating and completing innovations, and has been shown to be a reality in new product success
(Bonnet, 1986; Dean & Susman, 1989). Furthermore, collaboration improves both the product's design and makes better the execution of the development process because people from distinctive functions know different, often unique and exclusive attributes about the product's design, and they also recognize, discern, and are familiar with things differently so they can add more perspectives (Dougherty, 1992). If the strategic focus on product innovation is lowered, then the two complex skill sets will disintegrate. To this end, employees with the right skills and capabilities are assets to ongoing revenue production through ongoing product innovation and the organization cannot generate streams of new products without employees with the necessary skills and capabilities. After all, the overarching goal is to sustain the organization. However, downsizing eliminates the people with tacit knowledge of projects, relationships and often the teams, units, and innovators start over.

To lessen such downsizing challenges, managers engage in project- and product-related risk assessments and take risk-reducing actions. Some of these actions include withdrawing projects and making the decision to not support some projects. The goal of this action is to enable support of some projects and for the resources (funds, assets, and manpower) to be redistributed in a timely fashion to those projects that become of higher priority. The aim is to allow those projects that remain in the development pipeline to have a better chance of getting completed. However, I suggest that downsizing impedes the flow and ease of resource redistribution and the resources are not necessarily shifted to where it should be in a timely matter even though evaluations of where resources should go have been made. As the marketplace shift requirements or as unanticipated issues arise, a properly managed innovation system is critical within the firm because innovators and managers from a number of functions need to orchestrate the changes and
new resource flows, so that products still are introduced to the marketplace at the most advantageous or optimum period to maintain marketplace momentum (Wheelwright and Clark 1992).

In addition, I argue that downsizing affects the organization's ability to hold on to the tacit knowledge and the two skills and capabilities previously mentioned that are crucial to the product development process, and to maintain projects that are under development and in the product development pipeline. Successful product development involves the orchestration of multi-faceted resources, and the awareness of the numerous approaches to how to manage downsizing. Also, the interpersonal relationships needed for networking relationships and learning can be disrupted because some individuals in the network or with whom remaining employees interact are removed. Cascio (2005) suggests that when one considers the multiple relationships that one person has, if many individuals are removed out of the system the overall arrangement of interactions can disintegrate, and substantial ‘hunks’ of organizational memory can be lost. The collective work processes, methods, system, approaches and procedures may also be disrupted as the established employees from a number of departments can be shifted. Multi-functional teamwork can also be interrupted as team members will leave and remaining employees may be less aware of the multiple interactions required to continue the projects left from those who leave and they may only focus on their immediate tasks. Downsizing disrupts the well-managed innovation projects that often have a promising start of actually completing the development-to-launch phases and have reasonable product development cycle times. It also disrupts the orchestration of the changes and new resources flow. Therefore, I theorize:
Hypothesis 3a: Projects are more likely to be withdrawn during periods of downsizing.

Hypothesis 3b: Projects are less likely to be completed during periods of downsizing.

More exploratory and radical products must be founded on a strategic vision regarding how they mesh within the business’s product lines, and have targets that remain consistent with resources (Khurana and Rosenthal, 1997). Managers implementing projects are fostering new ideas and there are varying tools that enable this process but having a clear understanding of how to manage innovation projects is not always apparent within the organization. Radical or exploratory product groups have a greater level of risk associated with them as the associated projects are pushing the envelope of innovation.

These radical innovations meet the needs of emerging markets or customers (Benner & Tushman, 2003; Danneels, 2002), present new designs, develop new channels of distribution, create new markets (Abernathy & Clark, 1985), transform to meet new market challenges, demands (S. Brown & Eisenhardt, 1995), and technologies (R. Burgelman, 1991). Radical innovations are a significant determinant of organizational survival and performance (Damanpour, 1991) and require divergence from existing knowledge (Benner & Tushman, 2003; Levinthal & March, 1993; McGrath, 2001) or contain an elevated degree of new knowledge (Abernathy & Clark, 1985; Dewar &
Dutton, 1986; J. E. Ettlie et al., 1984), requiring more information processing (Cardinal, 2001).

Since failure is a greater possibility during times of change, managers must actively decide how much risk is allowable during the transforming process. The ability of managers to collaborate, continue to build on capabilities while adapting to organizational shift is crucial to the success of the projects involved. Constant evaluation of product families and those variables affecting the product families are crucial to ultimately making the right decision of which projects to keep, retire, or maintain. Whether the best decision was made is often only revealed in time. Understanding the organizational priorities and concerns of managers, taking judicious action, and making timely decisions, ultimately, determines bottom-line sustainability.

Therefore, when to allow the implementation of new radical projects becomes a product of the manager’s tacit knowledge and specific experience. The manager’s knowledge of the ongoing adjustments necessary of when to initiate and how to complete projects is significant but the specific type of downsizing can agitate this process differently. In addition, approaches to downsizing are based on very distinctive logics about the types of adaptations that are required for different kinds of environmental pressures and demands. Studies suggest that it is the arrangement and design of strategies, kinds and amounts of slack in the firm, and timing that together shape the effects of downsizing (Voss, Sirdeshmukh and Voss, 2008).

To start, reorientation downsizing is one primary type proposed within literature. Reorientation is differentiated by short, discontinuous, and radical changes and downsizing. This type of change requires restructuring and often when an organization
merges with or takes over another, the next deliberate step is to re-arrange duties of the management team and eliminate redundancies. In order to be more effective, the redesign is typically aimed at redefinition of the organizational mission and strategy in order to drive the technology, systems, and management of the business in a different direction. The overall drive for this type of change to make the organization more flexible and adaptable can mean that many more innovations must enter the development pipeline.

Because larger downsizings are harsher, more shocking, appalling, and threatening than a smaller downsizing activity, some scholars argue that large downsizing activity is expected to curb innovation (Trevor & Nyberg, 2008). In general, research has made it clear that only a few developments are realized out of a great number initiated. While there are many factors that may contribute to this reality, it is logical to believe that downsizing can undoubtedly be one. It can also be logically concluded that managers would want to take advantage of an opportunity to drive innovations when so many innovative developments fail. When the restructuring and reorientation downsizing takes place, managers can seek this time as an opportunity to promote products and projects that they may otherwise be too afraid to take the risk to do.

In addition, with reorientation, managers may choose to push exploratory innovations because they sense this may be what is required for major transformation. Radical or exploratory innovation (Abernathy & Clark, 1985; Benner & Tushman, 2003; Danneels, 2002; Levinthal & March, 1993; McGrath, 2001) has been associated with enhanced revenues and more product innovations and risk-promoting climates encourage innovation and can be related to how radical an innovation is (Souder, 1987).
Theoretically, additional exploratory projects would be acceptable in time of major organizational transformations. Reorientation presumes more radical projects. But, where would reorientation leave radical projects? How would reorientation downsizing affect those product groups that are radically innovative? With an emphasis on higher level and more radical and severe downsizing approaches, and with movement to a product, rather than process structure, I posit the following:

*Hypothesis 4a:* More new projects are initiated during reorientation downsizing.

*Hypothesis 4b:* More radical product groups initiate a greater number of projects during reorientation downsizing.

Convergent downsizing is another leading type proposed within the literature, with fairly long time cycles of adaptation, moderate downsizing, and management concentrating on protecting the market share of their primary businesses. During convergence, organizations concentrate on keeping their current customers, with the primary responsibility for adjusting falling to middle management (S. I. Freeman, 1994). Convergence presumes incremental projects and exploitative products. Exploitative product innovations leverage existing knowledge and skills, enhances established designs, and expand existing services and products (Abernathy & Clark, 1985). Exploitative innovations build on existing knowledge, and strengthen existing skills and processes (Abernathy & Clark, 1985; Benner & Tushman, 2003; Dewar & Dutton, 1986; J. E. Ettlie et al., 1984; Levinthal & March, 1993; Lewin, Long, & Caroll, 1999; Romano, 1990; Wilson et al., 1999).
During convergence, the firm’s mission and strategy are reinforced in order to try to become more efficient. Managers may view this time as a way to focus on already available products which do not require a new product to be developed or on products and projects that require less risk to implement so that the current processes can be used more efficiently. The employees’ skills and capabilities, network relationships, connections to multiple innovators, vendors, suppliers, and their ability to collaborate and maintain innovation is adjusted to meet the firm’s needs during this time of transformation. Often in this time, there is a reduction in the number of employees performing the same task. Turnover, resulting from downsizing, ruins the retention of knowledge in organizations (Schulz, 2002). Risk-taking is stifled (W. F. Cascio, 1993; Staw et al., 1981; A. Subramanian & Nilakanta, 1996). In addition, there is employee anxiety, anger (De Meuse et al., 1994), job-related stress (Appelbaum et al., 1999), and considerable decrease in their morale and commitment (Cody et al., 1987), which all stifles innovation.

Another concern is that as resources diminish, the battle for remaining resources intensifies and innovative projects are disrupted (Love & Nohria, 2005). In spite of this, radical projects must still be cared for in this time of change as during convergence there may be a bit more slack available to finish up projects. There may be radical projects in the development pipeline that are necessary to continue and complete in order for previous technological commitments to be realized. Minimal increase in workload can be handled appropriately and employees may competently manage the new roles and responsibilities without being sidetracked from carrying out innovation (Moore et al., 1996). Convergent downsizing will have less negative effects overall because it is slower...
and less severe. But, where would this type of change leave the manager’s eagerness to take risks to initiate projects? How would managers view projects already in the developing pipeline and, more specifically, radical projects and their associated product families?

The ability to support the duality of convergence and innovation, and pull through these potentially conflicting means of adaptation, requires the continual alignment and management of resources. It requires refining the organization’s systems and structures, using the data obtained from the manager’s project-to-product linking assessments efficiently, and understanding the resources that are currently available. It demands managers to draw from the knowledge base that is available through the employee connections that remain, and provide the commitment and support in such a way that the resources are not over-stretched and are utilized in a competent, useful and well-organized manner. Therefore, I hypothesize:

*Hypothesis 5a:* Fewer new projects are initiated during convergent downsizing.

*Hypothesis 5b:* More radical product groups initiate a fewer number of projects during convergent downsizing.

*Hypothesis 6a:* Radical projects are less likely to be withdrawn during periods of convergent downsizing.

*Hypothesis 6b:* Radical projects are more likely to be completed during periods of convergent downsizing.
CHAPTER 4 – METHODS

This chapter discusses the data source, the variables used in the analyses, and the nature of the analyses that will be conducted. Each variable included in the analyses is discussed, along with how it will be measured and coded. Finally, the analytic technique used and relevant methodological issues are presented.

4.1 Data

4.2 Empirical context

CompA is an organization that comprises three primary business units. However, the formation of CompA is the result of multiple downsizing, merger, acquisition, and transformational activities. Approximately a quarter of a century ago, many companies were split almost equally from its parent company. At that juncture, CompA was one of the largest private business enterprises in the world, encompassing millions of potential customers. Over the years, companies agreed to merge their operations in multi-billion dollar business deals.

This specific new organization was widely recognized as one of the first to welcome the new competitive era codified by government regulations. In addition, this organization’s CEO articulated a business dream for the Information Superhighway made achievable by the Internet. Nearing the end of the century, regulators did not want to allow CompA to have operational control over all of their new businesses. Years later, CompA revealed that it had to enhance its ability to deliver the benefits of converged communications, information and entertainment around the world. Transactions valued at billions were often at the forefront of this organization.
For this study, the data derives from the operational arm of the organization. Organizational shifts due to the mergers, acquisitions and transformational efforts continue to take place and have been the on-going story for this organization. There are efforts to build teamwork, employee skills, improved processes, and to develop and streamline processes and utilize product synergies across units for innovation. In addition, the data for this study begins in December 2004, at which time there was an on-going absorption of the turbulence of the latest business transaction. The changes of the downsizing period are taking place. There are changing technologies. There is greater variation in the amounts and types of innovations undertaken as compared with earlier periods. The project data spans about three years and ends in March 2008. This time period covers two distinct downsizing periods.

Overall, within this current organization, a case can be made that there will be little or no slack left. Based on Love and Nohria (2005), CompA is in a bad or less than ideal state. Some good things about this case for the study are that it illustrates an extreme version of turbulence but not at a “bankruptcy” state, it highlights all the issues about innovation and about downsizing, and provides great examples of both together over time. A primary limitation is that by focusing on one type of organization, I might be confining the transferability of future findings, or will not be able to claim that the results would necessarily hold for all organizations. However, both the specific findings and the proposed theory are applicable to many organizations, confronted with ever-increasing pressures to stay on the progressive innovative and technological road while simultaneously retaining market share and competing in the global economy.
4.3 Database

The database that will be used in this dissertation is the product development tracking system for the organization. The data set begins in December 2004, and spans about three years, ending in March 2008. The data set specifically includes data identifying the product hierarchical levels, product name, product number, month, year, revenue, year over year growth, the total budget, the Order Of Magnitude (OOM), the Level of Effort (LOE), whether the project falls within a downsizing time frame, the type of downsizing the project falls within, the number of projects that were started, ongoing, completed, or withdrawn, as well as the number of projects that were started, ongoing, completed or withdrawn and were radical. It is not a "patent" warehouse/repository, or a financial tracking system (a system that follows the planning and tracking of financial transactions from end to end). It is not a Stage Gate system, a conceptual and operational roadmap for moving a new-product project from idea to launch which divides the effort into distinct stages separated by management decision gates (gatekeeping) where cross-functional teams must successfully complete a recommended and imposed set of related cross-functional activities in each stage before receiving management approval to proceed to the next stage of product development. This database houses every single new product project undertaken by CompA's business unit that has been formally approved. This means that all of the innovations have what is initially required for development for deployment into the marketplace, provided that all facets of the product development stages are completed. Looking at only initially approved projects is a good thing because it means that all of the projects are starting at the same base of initial approval.
4.4 Dependent Variables

Three dependent variables were examined in this study. On the project-level, the two dependent variables consisted of project completion and project withdrawal. On the product-level, the dependent variable consisted of the number of initiated projects. Project completion was operationalized as whether the particular project in question was completed on that particular project-month. Similarly, project withdrawal was operationalized as whether the particular project in question was withdrawn on that particular project-month. On the product-level, the number of initiated projects was operationalized as the total number of initiated projects for that particular product category on that particular month. Along with a number of other important factors, innovation was focused upon in this study. In this study, product innovation is defined as the development of a new product or modifications to an existing product through the introduction of new features designed to enhance its value. Projects which developed a new product were defined as radical, while those that include related improvements were not. The following table, Table 4.1, presents a summary of the dependent variables included in the analyses presented in this dissertation.
Table 4.1: Descriptions of Dependent Variables

<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Completion</td>
<td>Whether a project had been completed, as compared with withdrawn.</td>
<td>Whether a project was completed or not on that particular project-month. This variable is utilized as a dependent variable in one of the two project-level regression analyses, which utilized a data set in which each case represented a different project-month.</td>
</tr>
<tr>
<td>Project Withdrawal</td>
<td>Whether a project had been withdrawn, as compared with completed.</td>
<td>Whether a project was withdrawn or not on that particular project-month. This variable is utilized as a dependent variable in one of the two project-level regression analyses, which utilized a data set in which each case represented a different project-month.</td>
</tr>
<tr>
<td>Number of Initiated Projects</td>
<td>The sum total of the number of initiated projects on the basis of product category.</td>
<td>The total number of initiated projects within that specific product category for a specific month. This variable is utilized as a dependent variable in the product-level regression analysis, which utilizes the data set in which each case represented a different product-month.</td>
</tr>
</tbody>
</table>

Table 4.2 presented serves to compare and contrast reorientation and convergent downsizing.
Table 4.2: Reorientation and Convergent Downsizing

<table>
<thead>
<tr>
<th></th>
<th>Convergence</th>
<th>Reorientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incremental downsizing and redesign; Organizational size decreased through changes requiring little or no restructuring (i.e. reduce the number of employees performing the same task)</td>
<td>Discontinuous downsizing and redesign; Organizational size decreased primarily through extensive changes requiring restructuring (i.e. divestitures of subunits that no longer fit organizational mission; Move to product rather than process structure)</td>
<td></td>
</tr>
<tr>
<td>Moderate downsizing strategies</td>
<td>Workload decreased mostly through alterations in work (i.e. elimination of tasks)</td>
<td>More severe downsizing strategies</td>
</tr>
<tr>
<td>Internally directed, driven by efficiency challenges</td>
<td>Redesign aimed at reinforcing organizational mission and strategy; conduct business better</td>
<td>Externally directed, driven by effectiveness challenges</td>
</tr>
<tr>
<td>Stability in the upper echelon of management, technology and systems</td>
<td>Transformation in the upper echelon of management, technology and systems</td>
<td></td>
</tr>
<tr>
<td>Emphasis on lower level, less radical downsizing approaches</td>
<td>Emphasis on higher level, more radical downsizing approaches</td>
<td></td>
</tr>
<tr>
<td><strong>Success associated with convergence</strong>: Use of interorganizational relationships is not required</td>
<td><strong>Success associated with reorientation</strong>: Requires use of interorganizational relationships</td>
<td></td>
</tr>
<tr>
<td><strong>Success associated with convergence</strong>: Emphasis on stability and control</td>
<td><strong>Success associated with reorientation</strong>: Emphasis on flexibility and adaptability</td>
<td></td>
</tr>
</tbody>
</table>

4.5 Independent Variables

The independent variables included in the project-level and product-level analyses consisted of variables relating to a number of factors, the most important being the factor
of downsizing. In the three regression analyses conducted as part of this dissertation, two variables relating to downsizing were included as independent variables in the multivariate analyses. These variables consisted of dummy variables representing reorientation downsizing and convergent downsizing. Reorientation downsizing focuses upon the development of new businesses and activities or doing similar activities in an innovative way. This type of downsizing is characterized by abrupt radical changes and is aimed toward the reduction of organizational costs while increasing effectiveness. This study operationalizes reorientation downsizing as short intervals of discontinuous change. The company studied announced that this period of downsizing would take place from October 2005 through December 2005. They announced that downsizing would take place during this period with extensive changes, transformational activities, and restructuring and subunits that no longer fit the organizational mission would be eradicated. Therefore, this time frame was classified as reorientation downsizing for the purposes of this study; hence, any projects that were initiated during the months of October 2005, November 2005, or December 2005 were categorized as being initiated during reorientation downsizing, and were coded as "1" for the purposes of this variable. Additionally, projects that were initiated outside of these months were coded as "0" for this variable.

In contrast to reorientation downsizing, convergent downsizing involves long periods of adaptation and is characterized by change that is more ongoing and less abrupt. The goal of convergent downsizing is a greater consistency in an organization's internal activities. Convergent downsizing was operationalized as long time periods of adaptation and incremental change. The company studied announced this period of downsizing
would take place from December 2006 through March 2007. They announced that downsizing would take place during this period with a minimum of or no restructuring activities and employees performing the same task would be asked to leave the organization. Therefore, based on this description, this time frame was classified as convergent downsizing. Therefore, any projects that were initiated during December 2006, January 2007, February 2007, or March 2007 were categorized as being initiated during convergent downsizing, and hence were coded as "1" for this variable. Any projects that fell outside of this time period were coded as "0".

In regard to the project-level analyses that were conducted for this dissertation, variables that were included as independent variables in the two regression analyses conducted consisted of reorientation downsizing, convergent downsizing, a variable representing age of the project, a dummy variable representing whether or not the project was innovative, the lagged natural log of revenue, the interaction between the innovative dummy variable and revenue, the interaction between the innovative dummy variable and convergent downsizing, the interaction between the innovative dummy variable and reorientation downsizing, the lagged number of projects ongoing, and a series of dummy variables representing the year. Additionally, these analyses were clustered on the basis of product category. Table 4.3 presents a summary of all the independent variables included in the two project-level regression analyses.
<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reorientation Downsizing</td>
<td>Discontinuous downsizing and redesign; Reorientation downsizing comprises periods that are relatively short intervals of discontinuous change.</td>
<td>Reorientation downsizing will be measured by considering short intervals of discontinuous change. Specifically, when the company announced that downsizing would take place with extensive changes, transformational activities, and restructuring, and subunits that no longer fit the organizational mission would be eradicated. If there was this type of discontinuous change then a value of 1 would be assigned to this variable. A score of 0 would be otherwise assigned to this variable.</td>
</tr>
<tr>
<td>Convergent Downsizing</td>
<td>Incremental downsizing and redesign; Involves periods that are fairly long time periods of adaptation and incremental change.</td>
<td>Convergent downsizing will be measured by considering long time periods of adaptation and incremental change. Specifically, when the company announced that downsizing would take place with a minimum of or no restructuring activities, and employees performing the same task would be asked to leave the organization. If there was this type of incremental change then a value of 1 would be assigned to this variable. A score of 0 would be otherwise assigned to this variable.</td>
</tr>
<tr>
<td>Age of the Project</td>
<td>The age of the project in months.</td>
<td>Age of the project is measured as the number of months between the initiation of the project and the current month. Age of the Project was included in the model as a control variable to control for whether the likelihood of project withdrawal or completion increases as the age of the project increases.</td>
</tr>
<tr>
<td>Radical Innovations</td>
<td>Innovative projects include the development of a new product. Radical innovations contain a high degree of new knowledge</td>
<td>Projects that were new innovations/products were considered to be radical innovations and were given a value of 1, while projects that were enhancements to existing</td>
</tr>
</tbody>
</table>
and include an introduction of new products into the marketplace. Innovations were assigned a value of 0.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>The total dollar amount of the total revenue made by a specific product category.</td>
<td>Revenue is measured as the revenue of the product category of which the focal project was a member. In the analysis, the lagged natural log of this variable will first be taken, and this transformed version of this variable will be included in the analysis. Revenue was included in the model as a control variable to control for whether the likelihood of project withdrawal or completion increases as the revenue increases.</td>
</tr>
<tr>
<td>Radical*Revenue</td>
<td>The product (interaction) between the radical and revenue variables.</td>
<td>This variable consists of the product between the radical variable and the revenue variable. The inclusion of this variable in the model serves to test whether there is a significant interaction between innovative project status and the corresponding product category revenue.</td>
</tr>
<tr>
<td>Radical*Convergent</td>
<td>The product (interaction) between the radical and convergent downsizing variables.</td>
<td>This variable consists of the product between the radical variable and the convergent downsizing variable. The inclusion of this variable in the model serves to test whether there is a significant interaction between innovative project status and convergent downsizing.</td>
</tr>
<tr>
<td>Radical*Reorientation</td>
<td>The product (interaction) between the radical and reorientation downsizing variables.</td>
<td>This variable consists of the product between the radical variable and the reorientation downsizing variable. The inclusion of this variable in the model serves to test whether there is a significant interaction between innovative project status and reorientation downsizing.</td>
</tr>
<tr>
<td>Projects Ongoing</td>
<td>The number of projects currently ongoing in a particular product-month.</td>
<td>This variable consists of a measure of the total number of ongoing projects within the project's corresponding product category. In the analysis, this variable will first be lagged before its inclusion in the model. Projects</td>
</tr>
</tbody>
</table>
| Age of the Project | was included in the model as a control variable to control for whether the likelihood of project withdrawal or completion increases as the age of the project increases. Revenue was included in the model as a control variable to control for whether the likelihood of project withdrawal or completion increases as the revenue increases. Projects Ongoing was included as a control variable in the model in order to help control for whether projects which are members of product categories with a greater number of ongoing projects have a greater likelihood of withdrawal or completion. Year was included in the model as a control variable to control for whether the year is associated with a higher likelihood of project withdrawal or completion.

Next, in the product-level regression analysis that was conducted for this dissertation, variables that were included as independent variables consisted of reorientation downsizing, convergent downsizing, the lagged natural log of revenue, the percentage of radical projects within that particular product category, the interaction |
between reorientation downsizing and the percentage of radical projects, the interaction between convergent downsizing and the percentage of radical projects, as well as a series of dummy variables controlling for the effect of year. Table 4.4 presents a summary of all the independent variables included in the product-level regression analyses.

Table 4.4: Descriptions of Independent Variables: Product-Level Analyses

<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
<th>Measure</th>
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<tbody>
<tr>
<td>Reorientation Downsizing</td>
<td>Discontinuous downsizing and redesign; Reorientation downsizing comprises periods that are relatively short intervals of discontinuous change.</td>
<td>Reorientation downsizing will be measured by considering short intervals of discontinuous change. Specifically, when the company announced that downsizing would take place with extensive changes, transformational activities, and restructuring, and subunits that no longer fit the organizational mission would be eradicated. If there was this type of discontinuous change then a value of 1 would be assigned to this variable. A score of 0 would be otherwise assigned to this variable.</td>
</tr>
<tr>
<td>Convergent Downsizing</td>
<td>Incremental downsizing and redesign; Involves periods that are fairly long time periods of adaptation and incremental change.</td>
<td>Convergent downsizing will be measured by considering long time periods of adaptation and incremental change. Specifically, when the company announced that downsizing would take place with a minimum of or no restructuring activities, and employees performing the same task would be asked to leave the organization. If there was this type of incremental change then a value of 1 would be assigned to this variable. A score of 0 would be otherwise assigned to this variable.</td>
</tr>
<tr>
<td>Radical %</td>
<td>Radical Innovation projects are the development of a new product. Radical innovations contain a high percentage of radical innovation projects within that particular product category.</td>
<td>This variable is operationalized as a percentage of radical innovation projects within that particular product category.</td>
</tr>
<tr>
<td><strong>degree of new knowledge and include an introduction of new products to the marketplace.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Revenue</strong></td>
<td>The total dollar amount of the total revenue made by a specific product category.</td>
<td>Revenue is measured as the revenue of the product category. In the analysis, the lagged natural log of this variable will first be taken, and this transformed version of this variable will be included in the analysis. Revenue was included in the model as a control variable to control for whether the likelihood of the number of initiated projects increases as the revenue increases.</td>
</tr>
<tr>
<td><strong>Convergent*Radical %</strong></td>
<td>The product (interaction) between the radical and convergent downsizing variables.</td>
<td>This variable consists of the product between the radical variable and the convergent downsizing variable. The inclusion of this variable in the model serves to test whether there is a significant interaction between innovative project status and convergent downsizing.</td>
</tr>
<tr>
<td><strong>Reorientation*Radical %</strong></td>
<td>The product (interaction) between the radical and reorientation downsizing variables.</td>
<td>This variable consists of the product between the radical variable and the reorientation downsizing variable. The inclusion of this variable in the model serves to test whether there is a significant interaction between innovative project status and reorientation downsizing.</td>
</tr>
<tr>
<td><strong>Year</strong></td>
<td>The year in which the project was initiated.</td>
<td>In the regression analyses, year will be included as a series of dummy variables as a control. Year was included in the model as a control variable to control for whether the year is associated with a greater number of initiated projects.</td>
</tr>
</tbody>
</table>
was included in the model as a control variable to control for whether the year is associated with a greater number of initiated projects.

4.6 Analysis

The focus of the study is on project completion and withdrawal, and the number of new projects initiated. While project completion and withdrawal will be studied on the project-level, the number of new projects initiated will be studied on the product-level. The analyses conducted for this dissertation will focus on whether a number of factors, including reorientation and convergent downsizing, innovation, and revenue, predict project completion and withdrawal as well as the number of new projects initiated. A number of interaction effects will also be studied as part of these analyses. Initially, univariate statistics will be conducted and presented in order to better describe the dependent variables included in these analyses. Next, a series of three multivariate analyses will be conducted in order to estimate the impact of our project-level independent variables on the likelihood of project completion and withdrawal, and to estimate the impact of our product-level independent variables on the number of initiated projects. These multivariate analyses will consist of three regression analyses. In regard to the project-level analyses, two logistic regression analyses will be conducted in which the project-month is the unit of analysis. These analyses will be clustered on the basis of product category number. In regard to the product-level analysis, a random effects Poisson regression model will be conducted. The project-level analyses serve to answer the following research question: How does downsizing affect the probability that a given project, once started, will be withdrawn or completed? Additionally, the project-level analyses aim to test the following hypotheses:
Hypothesis 1a: Radical projects are more likely to be withdrawn.

Hypothesis 1b: Radical projects are less likely to be completed.

Hypothesis 2a: Radical projects from larger product groups are less likely to be withdrawn.

Hypothesis 2b: Radical projects from larger product groups are more likely to be completed.

Hypothesis 3a: Projects are more likely to be withdrawn during periods of downsizing.

Hypothesis 3b: Projects are less likely to be completed during periods of downsizing.

Hypothesis 6a: Radical projects are less likely to be withdrawn during periods of convergent downsizing.

Hypothesis 6b: Radical projects are more likely to be completed during periods of convergent downsizing.

In addition, the product-level analyses serve to answer the following research question:

*How does downsizing affect the number of new projects that will be initiated in a given product category?*

Also, the product-level analyses aim to test the following hypotheses:

Hypothesis 4a: More new projects are initiated during reorientation downsizing.

Hypothesis 4b: More radical product groups initiate a greater number of projects during reorientation downsizing.

Hypothesis 5a: Fewer new projects are initiated during convergent downsizing.
Hypothesis 5b: More radical product groups initiate a fewer number of projects during convergent downsizing.

Before these analyses can be conducted, the data will first be transformed into a panel data format separately as a project-month level data set and as a product-month level data set. In the project-month level data set, each case will represent one particular project for one particular calendar month during the time period in which the project was ongoing. In the product-month level data set, each case will represent one particular product category for one particular calendar month. Panel data is a particular type of data in which cases are observed at multiple time periods. Here, the multiple cases consist of the various projects or product categories included in the study, while the multiple time periods consist of aggregating the data on the month level.
CHAPTER 5 – RESULTS

5.1 Univariate Analyses

Project-Level Analyses

Initially, a set of univariate, or descriptive statistics were conducted in order to
first get a better sense of the distribution of the variables of interest before conducting
any inferential statistical analyses. The first set of descriptive statistics, presented in this
section, focuses on the project-month level data.

First, the following table focuses on withdrawn projects. As these analyses were
conducted on the project-month level data, each case represents a single project for one
particular month in which the project was ongoing. Projects were withdrawn in 2.3% of
project-months, while there were no withdrawn projects in 97.7% of project-months.

Table 5.1: Withdrawn Projects

<table>
<thead>
<tr>
<th>Category</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Withdrawn</td>
<td>18953 (97.70%)</td>
</tr>
<tr>
<td>Withdrawn</td>
<td>446 (2.30%)</td>
</tr>
</tbody>
</table>

Next, the following table focuses upon completed projects. Projects were completed in
10.4% of project-months, while there were no project completions in 89.6% of project-
months.

Table 5.2: Completed Projects

<table>
<thead>
<tr>
<th>Category</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Completed</td>
<td>17381 (89.60%)</td>
</tr>
<tr>
<td>Completed</td>
<td>2081 (10.40%)</td>
</tr>
</tbody>
</table>

Next, the following table focuses upon radical projects. The data show that 11.67% of
project-months were defined as radical, while 88.33% of project-months were not.
Finally, the following table presents a summary of continuous variables included in the project-level regression analyses. Specifically, this consisted of lag LN revenue and lag projects ongoing. While tables presenting the number and percentage of cases in each response category are appropriate in the case of categorical variables, a different approach must be taken when focusing on descriptive statistics relevant to continuous variables. In this case, the mean of these two variables was calculated, along with the standard deviation, and minimum and maximum scores. The purpose of calculating the mean is to get a sense of the central tendency, or average score for these variables, while the standard deviation, minimum, and maximum scores serve to provide a sense of the variability of these measures.

First, the variable measuring the lag of the natural log of revenue had a mean of 11.268, along with a fairly small standard deviation and range. Finally, the variable measuring the lag of projects ongoing had a mean of 74.812 projects. This mean value indicates that there was close to 75 ongoing projects, on average, in any given project-month.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lag LN Revenue</td>
<td>11.268 (.548)</td>
<td>8.506</td>
<td>13.581</td>
</tr>
<tr>
<td>Lag Projects Ongoing</td>
<td>74.812 (74.090)</td>
<td>1.000</td>
<td>279.000</td>
</tr>
</tbody>
</table>
**Product-Level Analyses**

The following table presents descriptive statistics related to the continuous variables included in the product-level analyses. In sum, this consisted of the number of projects, lag LN revenue, and the percentage of radical projects. These three variables are important to control for in this study because it shows whether revenue increases based on whether the percentage of radical projects are increased in the product category. Initially, in regard to the number of currently initiated projects, this was found to have a mean of 1.727 on the product-month level. This indicates that the average product-month had approximately two initiated projects. Next, lag LN revenue was found to have a mean of 11.427. The average value for the proportion of radical projects was 17.3%, indicating an average of slightly over 17% of radical projects on the basis of product category.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Projects</td>
<td>1.727 (5.217)</td>
<td>0.000</td>
<td>60.000</td>
</tr>
<tr>
<td>Lag LN Revenue</td>
<td>11.427 (.520)</td>
<td>8.506</td>
<td>13.581</td>
</tr>
<tr>
<td>Radical %</td>
<td>.173 (.335)</td>
<td>0.000</td>
<td>1.000</td>
</tr>
</tbody>
</table>

**Introduction of Figures**

In order to obtain an initial understanding of the relationship between radical project status and the other variables focused upon in this study, a series of figures were constructed in order to help illustrate these relationships. The first section, presented below, focuses upon the project-level data and variables and Table 5.6 serves as a summary of these figures.
Table 5.6: Summary of Selected Project-Level Figures Data

<table>
<thead>
<tr>
<th></th>
<th>Not Radical</th>
<th>Radical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
</tr>
<tr>
<td>Not Withdrawn</td>
<td>16731 (97.64%)</td>
<td>2222 (98.14%)</td>
</tr>
<tr>
<td>Withdrawn</td>
<td>404 (2.36%)</td>
<td>42 (1.86%)</td>
</tr>
<tr>
<td>Not Completed</td>
<td>16438 (95.93%)</td>
<td>2174 (96.02%)</td>
</tr>
<tr>
<td>Completed</td>
<td>697 (4.07%)</td>
<td>90 (3.98%)</td>
</tr>
<tr>
<td>Lag Projects Ongoing (Mean)</td>
<td>80.656</td>
<td>30.500</td>
</tr>
</tbody>
</table>
Project-Level Figures

This section focuses upon the project-level variables and data. Some of the findings deserve a brief mention here. First, the relationship between project withdrawal and radical project status indicates that the likelihood of withdrawal on any given month was slightly higher among non-radical projects as compared with radical projects.

![Diagram showing the relationship between Radical Project Status and Withdrawal.](image)

**Figure 5.1: Radical Project Status and Withdrawal, Project-Level Data Set**
Next, the relationship between project completion and radical project status indicates that on average, there was basically no difference between the likelihood of non-radical versus radical projects being completed on any given month.

Figure 5.2: Radical Project Status and Completion, Project-Level Data Set
Figure 5.3 focuses on the relationship between radical project status and lag projects ongoing. As indicated, on average there were 81 non-radical projects ongoing and 31 radical projects ongoing.

Figure 5.3: Radical Project Status and Projects Ongoing, Project-Level Data Set
Product-Level Figures

In this section, figures relating to the product-level variables and data were focused upon. The first figure, presented below, illustrates the relationship between the proportion of radical projects and the mean number of projects on the basis of product category. Figure 5.4 illustrates a clearly bimodal distribution in regard to the average number of projects on the basis of the proportion of radical projects present within the product category.

![Graph showing the relationship between proportion of radical projects and mean number of projects](image.png)

Figure 5.4: Proportion of Radical Projects and Projects within Product Categories, Product-Level Data Set
Next, Figure 5.5 illustrates the relationship between the proportion of radical projects and reorientation downsizing. During periods of reorientation downsizing, on average, a slightly higher percentage of projects were radical versus when reorientation downsizing was not occurring.

![Figure 5.5: Reorientation and Proportion of Radical Projects, Product-Level Data Set](image-url)
Next, Figure 5.6 presents the relationship between convergent downsizing and the percentage of radical projects. On average, there was no major difference between the percentages of radical projects during convergent downsizing versus when convergent downsizing was not occurring.

Figure 5.6: Convergence and Proportion of Radical Projects, Product-Level Data Set
The final figure, Figure 5.7, presented below, illustrates the relationship between the percentage of radical projects and lag LN revenue. As shown in the figure, on average, as the proportion of radical projects increase within the product categories, the revenue increases.

Figure 5.7: Proportion of Radical Projects and Revenue, Product-Level Data Set
Next, the following section will focus upon the bivariate, or correlational analyses conducted between these sets of project-level and product-level variables.

The following Table 5.7 presents the correlations between all dependent and independent variables included in the project-level regression analyses. Some of the correlations between the independent variables and the dependent variables deserve a brief mention here. First, in regard to project withdrawal, the strongest correlates were found to be the time-series variable and convergent downsizing. Both of these correlations were found to be significant and positive. The significance of the time-series variable illustrates the importance of including this as a control in the regression analysis because when important predictors are excluded from an analysis, this creates "omitted variable bias" in a regression which will skew the results. Next, regarding project completion, this variable had the strongest correlation with reorientation downsizing, 2005, and 2007. The correlations with reorientation downsizing and 2005 were found to be positive, while the correlation with 2007 was found to be negative. The significance of the year dummy variables further suggests the importance of including these variables as controls in the regression analysis.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
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<tr>
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<td>.12*</td>
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<td>-.15*</td>
<td>-.23*</td>
<td>-.26*</td>
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</tbody>
</table>

Notes: *p<.05
Table 5.8 presented below illustrates the results of the correlational analyses conducted between the dependent variable, number of projects, and all independent variables included in the product-level regression analysis. Focusing on initiated projects, this variable had the strongest correlations with lag LN revenue, 2007, and the percentage of radical projects. All three of these correlations were found to be negative. The significance of the year dummy variables suggests the importance of including these variables as controls in the regression analysis.
Table 5.8: Correlations of Variables Included in Product-Level Regression

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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Projects</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
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</tr>
<tr>
<td>Lag LN Revenue</td>
<td>11.427</td>
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<td>-.11*</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reorientation*Radical %</td>
<td>-</td>
<td>-</td>
<td>.00</td>
<td>.42*</td>
<td>-.04</td>
<td>-.04</td>
<td>.27*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convergent*Radical %</td>
<td>-</td>
<td>-</td>
<td>.04</td>
<td>.04</td>
<td>.46*</td>
<td>-.01</td>
<td>.29*</td>
<td>-.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>-</td>
<td>-</td>
<td>.06*</td>
<td>.46*</td>
<td>-.21*</td>
<td>.04</td>
<td>.00</td>
<td>.20*</td>
<td>-.09*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>-</td>
<td>-</td>
<td>.05</td>
<td>-.14*</td>
<td>-.05</td>
<td>.09*</td>
<td>.01</td>
<td>-.06*</td>
<td>-.01</td>
<td>-.31*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>-</td>
<td>-</td>
<td>-.09*</td>
<td>-.23*</td>
<td>-.28*</td>
<td>-.09*</td>
<td>-.01</td>
<td>-.10*</td>
<td>.12*</td>
<td>-.50*</td>
<td>-.50*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>-</td>
<td>-</td>
<td>-.00</td>
<td>-.07*</td>
<td>-.11*</td>
<td>-.05</td>
<td>.00</td>
<td>-.03</td>
<td>-.05</td>
<td>-.16*</td>
<td>-.16*</td>
<td>-.26*</td>
<td></td>
</tr>
</tbody>
</table>

Notes: *p<.05
5.2 Multivariate Analyses: Introduction and Project-Level Analyses

Two sets of multivariate analyses were conducted in order to test the hypotheses presented earlier. These two sets of analyses focus upon different levels of analysis, with one set focused on the project-level, and the other focused on the product category level. In the first set of analyses, which focused on the project as the unit of analysis, observations were included for every month and year from the beginning of the study until project completion, withdrawal, or the end of the sampling period. In cases in which the end of the observation consisted of the end of the sampling period, the date of withdrawal/completion was right-truncated as in these cases, the observation period ended before it could be determined whether the project was in fact completed or withdrawn.

First, the results of the analyses conducted in which the project was included as the unit of analysis serves to answer the following question: *How does downsizing affect the probability that a given project, once started, will be withdrawn or completed?* Additionally, the following hypotheses were examined through the use of the project-level regression analyses:

Hypothesis 1a: Radical projects are more likely to be withdrawn.

Hypothesis 1b: Radical projects are less likely to be completed.

Hypothesis 2a: Radical projects from larger product groups are less likely to be withdrawn.

Hypothesis 2b: Radical projects from larger product groups are more likely to be completed.
Hypothesis 3a: Projects are more likely to be withdrawn during periods of downsizing.
Hypothesis 3b: Projects are less likely to be completed during periods of downsizing.

Hypothesis 6a: Radical projects are less likely to be withdrawn during periods of convergent downsizing.
Hypothesis 6b: Radical projects are more likely to be completed during periods of convergent downsizing.

In these analyses, two dependent variables were focused upon. This consisted of the probability that a project would be completed as well as the probability that a project would be withdrawn. Initially, a large number of regression models were estimated; however, only two models were included in the final set of results. While these final regression models contain a large number of interaction terms, for each of the interaction terms included in the models, separate regressions were estimated in which main effects and the interactions were entered separately: this was done in order to ensure that including the large set of interactions in a single model was not problematic. The results of the models estimated in which main effects and the interactions were estimated separately were compared with the results of the models estimated in which all interactions were included in a single regression model. This comparison found the results to be the same between these analyses, indicating that including the full set of interaction effects in a single regression model was appropriate.

In the first regression analysis, which consisted of a logistic regression and in which the project was the unit of analysis, the dependent variable included in the model consisted of the probability that a given project ("the focal project") will be withdrawn.
As independent variables, this analysis included reorientation downsizing, convergent downsizing, a variable representing age of the project, a dummy variable representing whether or not the project was innovative, the lagged natural log of revenue, the interaction between the innovative dummy variable and revenue, the interaction between the innovative dummy variable and convergent downsizing, the interaction between the innovative dummy variable and reorientation downsizing, the lagged number of projects ongoing, and a series of dummy variables representing the year. Additionally, this analysis was clustered on the basis of product category. The results of this analysis are presented in the following table.

The following table presents the results of two regression analyses in which project withdrawal was focused upon as the dependent variable. These two analyses were both conducted on the project-month level. Initially, a regression analysis was conducted which included all predictor variables of interest, but omitted all interaction effects from the model. These results are presented in the first column in the following Table 5.9. Following this, a second analysis was conducted in which three interaction effects, which consisted of the interaction between radical project status and revenue, radical project status and convergent downsizing, and radical project status and reorientation downsizing, were included as predictors of project withdrawal. These results are presented in the final column in the Table 5.9.
First, the effect of reorientation downsizing on project withdrawal was found to be statistically significant. Specifically, reorientation downsizing was associated with a greater probability that the focal project would be withdrawn (i.e., projects had a greater likelihood of being withdrawn in situations in which reorientation downsizing is present).

Next, convergent downsizing was also found to have a significant effect on project withdrawal. As with reorientation downsizing, this coefficient was found to be positive, indicating, in this case, that projects have a greater likelihood of being withdrawn when convergent downsizing is present. These results serve to support Hypothesis 3a.

Next, the age of the project (measured in months) was included in the model as a control variable. This variable was found to be statistically significant, and was positively related to project withdrawal, indicating that the likelihood of project
withdrawal increases as the age of the project increases. Next, the dummy variable representing whether projects were radical was also found to be statistically significant. This coefficient was found to be positive, indicating that projects deemed to be radical are significantly more likely to be withdrawn as compared with those which were not radical. This result serves to support Hypothesis 1a. Next, the revenue variable included in this model consisted of the revenue of the product category of which the focal project was a member. This effect was not found to be significant, indicating no significant relationship between the revenue of the project's product category and the likelihood of project withdrawal. The number of ongoing projects included in the product category of which the focal project was a member was included as a control variable in this analysis in order to help control for the effect of size (as with revenue). The effect of this variable was found to be statistically significant, and as the coefficient was positive, that indicates that projects which are members of product categories with a greater number of ongoing projects have a greater likelihood of withdrawal.

Next, as mentioned previously, a number of interaction effects were also included in this analysis. First, the interaction between innovative projects and product category revenue was found to be statistically significant and negatively related to project withdrawal. Although it was found that radical projects have a greater likelihood of being withdrawn, this effect is also moderated by the size of the product category of which the focal project is a member. Specifically, radical projects which are members of product categories with higher revenue have a lower likelihood of being withdrawn. This effect may be due to the relative power, or voice, of large product groups as well as their importance within the organization. These larger product groups may have a better
record of project completion or may possibly be better able to lobby the organization in
order to keep their radical projects. Next, the interaction between radical projects and
convergent downsizing was also included in the analysis. This interaction effect was also
found to be significant, and was found to be negatively related to project withdrawal.
While radical projects are more likely to be withdrawn, and while convergent downsizing
also increases the likelihood of project withdrawal, this finding suggests that radical
projects are less likely to be withdrawn during periods of convergent downsizing. This
finding supports Hypothesis 6a. This finding may be due to the effect of product groups
making a special effort to lobby for radical projects during periods of downsizing. This
analysis has determined that radical projects from large product groups are less likely to
be withdrawn, supporting Hypothesis 2a, and it may be the case that large product groups
focus upon particular efforts in order to save certain projects that they deem to be of high
importance during periods of downsizing. Additionally, it may also be the case that the
organization imparts a greater value to radical projects in a general sense, but also
protects them during periods of downsizing; however, this phenomenon would not
necessarily explain the positive main effect found for radical projects, unless the
organization also makes a particularly strong effort during periods of downsizing to
protect radical projects. Finally, the interaction between radical projects and
reorientation downsizing was not found to be statistically significant at the .05 level.
While not significant, this finding does suggest a potentially important difference
between reorientation and convergent downsizing when contrasted with the results found
for the interaction effect between radical projects and convergent downsizing. Finally,
dummy variables representing year were also included in this analysis as a control. The
errors of these variables were clustered in order to account for correlation within product categories.

The second analysis conducted using the project as the unit of analysis included the probability of project completion as the dependent variable. This analysis included the identical set of independent variables as was included in the previous regression model just discussed. As with project withdrawal, two models were analyzed in total. Additionally, these two analyses were also conducted on the project-month level. Initially, a model was conducted in which no interaction effects were included, followed by a model which included the same three interaction effects included in the analysis focusing upon project withdrawal. The results of these two analyses are included within the following Table 5.10.

Table 5.10: Project-Level Analyses: Project Completion

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standard Deviation</th>
<th>Without Interactions</th>
<th>With Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reorientation Downsizing</td>
<td>.249</td>
<td>.568***</td>
<td>.643***</td>
</tr>
<tr>
<td>Convergent Downsizing</td>
<td>.305</td>
<td>.714***</td>
<td>.736***</td>
</tr>
<tr>
<td>Age of Project</td>
<td>5.100</td>
<td>.149***</td>
<td>.149***</td>
</tr>
<tr>
<td>Radical</td>
<td>.321</td>
<td>-.034</td>
<td>-1.752</td>
</tr>
<tr>
<td>Lag LN Revenue</td>
<td>.548</td>
<td>.199**</td>
<td>.201**</td>
</tr>
<tr>
<td>Radical*Revenue</td>
<td>i</td>
<td>i</td>
<td>.156</td>
</tr>
<tr>
<td>Radical*Convergent</td>
<td>i</td>
<td>i</td>
<td>-.140</td>
</tr>
<tr>
<td>Radical*Reorientation</td>
<td>i</td>
<td>i</td>
<td>-.366</td>
</tr>
<tr>
<td>Lag Projects Ongoing</td>
<td>74.090</td>
<td>.002***</td>
<td>.002**</td>
</tr>
<tr>
<td>2005</td>
<td>_</td>
<td>2.730***</td>
<td>2.733***</td>
</tr>
<tr>
<td>2006</td>
<td>_</td>
<td>2.022***</td>
<td>2.043***</td>
</tr>
<tr>
<td>200</td>
<td>_</td>
<td>.156</td>
<td>.156</td>
</tr>
<tr>
<td>Constant</td>
<td>_</td>
<td>-8.293***</td>
<td>-8.317***</td>
</tr>
</tbody>
</table>

Notes: *p<.05, **p<.01, ***p<.001; No Interactions: N=19285; Wald $\chi^2=2032.88$, $df=9$, $p<.001$; Pseudo $R^2=.118$; With Interactions: Notes: N=19285; Wald $\chi^2=2144.92$, $df=12$, $p<.001$; Pseudo $R^2=.117$
As in the first logistic regression analysis, the main effects of both the reorientation and convergent downsizing variables were found to be positive, which indicates that projects are more likely to be completed when there is downsizing (both in cases of convergent as well as reorientation downsizing). These results do not support Hypothesis 3b. Also, the main effect for age of the project, a control variable, was also found to be positive. As would be expected, projects that have been ongoing for a longer period of time are also more likely to be completed. In contrast to the previous regression analysis, in this analysis, innovative projects were neither more likely nor less likely to be completed. This result fails to support Hypothesis 1b. Additionally, also in contrast to the previous regression, projects which are members of product categories having higher revenue were found to be more likely to be completed. Similar to the previous analysis, projects which are members of product categories which had a greater number of ongoing projects were also more likely to be completed, as would be expected, as a greater number of projects also signify a greater number of completions and withdrawals. In contrast to the previous regression analysis, none of the interaction effects included in the model was found to be statistically significant. While many different regression models were run which included project completion as the dependent variable, the interaction effects were not found to be significant in any case. This means that neither Hypothesis 6b nor Hypothesis 2b were supported on the basis of this analysis.

In sum, these analyses illustrated the fact that project withdrawal was easier to predict as compared with project completion. These first two regression analyses illustrate a number of important differences between reorientation and convergent downsizing. First, in the regression analysis conducted which included withdrawal as the
dependent variable, clear differences were found between convergent and reorientation downsizing and their respective effects on the likelihood of withdrawal for innovative projects. Secondly, when comparing the two logistic regression analyses, it can be clearly seen that different factors predict the withdrawal of projects versus the completion of projects. This contrast is particularly true in the case of innovative projects. Specifically, the likelihood of withdrawal for innovative projects is affected by downsizing as well as the importance of the product category in which the particular project resides within the organization, as measured by size. In contrast, innovative projects are neither more nor less likely to be completed, with this effect not being altered by the effect of downsizing or the characteristics of the product category in which the particular project resides.

5.3 Multivariate Analyses: Product-Level Analyses

The third regression analysis conducted included product category as the level of analysis. At this higher unit of analysis, this regression model was conducted in order to answer the following question: How does downsizing affect the number of new projects that will be initiated in a given product category? Additionally, this analysis serves to test the following hypotheses:

Hypothesis 4a: More new projects are initiated during reorientation downsizing.

Hypothesis 4b: More radical product groups initiate a greater number of projects during reorientation downsizing.

Hypothesis 5a: Fewer new projects are initiated during convergent downsizing.

Hypothesis 5b: More radical product groups initiate a fewer number of projects during convergent downsizing.
In this regression model, the dependent variable consisted of the count of new projects initiated. First, a number of differences can be noted between this current regression model and the two previous regression models discussed focusing on the project as the unit of analysis. First, in regard to the current regression model, the variable measuring whether projects were deemed radical or not can no longer be used, as this variable only applies to specific projects within broader product categories. In order to account for this difference, a new variable was created which serves to measure the number of radical projects divided by the total number of projects within each product category. This variable measures the overall percentage of radical projects, out of all projects, within each specific product category. Additionally, the variable measuring the number of projects ongoing was also not included in this current regression model. While this variable can be appropriately included in a model focused on the project-level, in which it explores whether projects from product categories having a greater number of ongoing projects are more or less likely to be withdrawn or completed, its meaning changes when the focus shifts to the level of the product. As in the current regression model, the dependent variable consists of a count of new projects on the basis of product category, and the variable measuring the number of projects ongoing is the count of ongoing projects on the basis of product category, these two variables evidenced a very high correlation at the level of the product and cannot be reasonably interpreted.

This current regression analysis consisted of a random effects Poisson regression model. This model included, as independent variables, reorientation downsizing, convergent downsizing, the lagged natural log of revenue, the percentage of innovative projects within that particular product category, the interaction between reorientation
downsizing and the percentage of innovative projects, the interaction between convergent downsizing and the percentage of innovative projects, as well as a series of dummy variables controlling for the effect of year.

Table 5.11 presented below illustrates the results of the analyses conducted on the number of projects initiated. These analyses were conducted on the product-month level. The first model conducted included no interaction effects, while the second analysis included two interaction effects in total, the interaction between reorientation downsizing and the percentage of radical projects, and between convergent downsizing and the percentage of radical projects.

Table 5.11: Product-Level Analyses: Projects Initiated

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standard Deviation</th>
<th>Without Interactions</th>
<th>With Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reorientation Downsizing</td>
<td>.240</td>
<td>.266**</td>
<td>.222*</td>
</tr>
<tr>
<td>Convergent Downsizing</td>
<td>.332</td>
<td>-.155</td>
<td>-.132</td>
</tr>
<tr>
<td>Lag LN Revenue</td>
<td>.520</td>
<td>-.229^a</td>
<td>-.240*</td>
</tr>
<tr>
<td>Radical %</td>
<td>.335</td>
<td>.103</td>
<td>.126</td>
</tr>
<tr>
<td>Reorientation Radical %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convergent Radical %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>i</td>
<td>1.538***</td>
<td>1.533***</td>
</tr>
<tr>
<td>2006</td>
<td>i</td>
<td>1.559***</td>
<td>1.556***</td>
</tr>
<tr>
<td>2007</td>
<td>i</td>
<td>-.346***</td>
<td>-.349***</td>
</tr>
<tr>
<td>Constant</td>
<td>i</td>
<td>2.948*</td>
<td>3.068*</td>
</tr>
</tbody>
</table>

Notes: *p<.05, **p<.01, ***p<.001; No Interactions: N_{obs}=1192, N_{groups}=59; Wald $\hat{G}^2=423.88$, df=7, $p<.001$; ^a=p=.055; With Interactions: N_{obs}=1192, N_{groups}=59; Wald $\hat{G}^2=428.18$, df=9, $p<.001$; ^b=p=.051

These results found that the main effect of reorientation downsizing was statistically significant and positive, indicating that product categories initiate a greater number of projects during periods of reorientation downsizing. This finding serves to
support Hypothesis 4a. Convergent downsizing was not found to have a significant effect on the number of new projects initiated by product category. This finding fails to support Hypothesis 5a. The findings in regard to revenue were somewhat surprising, with product groups having higher revenue being found to initiate fewer new projects. This finding serves to lend some insight into the previous comment regarding revenue versus the number of projects ongoing. Having a greater number of projects ongoing does not necessarily correlate with higher revenue: the exact correlation between revenue and the number of projects ongoing was found to in fact be negative and significant at the .05 level, further indicating that in fact, product categories with higher revenue tend to have a smaller number of projects ongoing. Next, the main effect of the percentage of radical projects was not found to be significant, while the interaction between the percentage of radical projects and reorientation downsizing was found to be positive. This indicates that during reorientation downsizing, product groups that were found to be radical tend to initiate a greater number of new projects, lending support to Hypothesis 4b. No support for Hypothesis 5b was found. In conclusion, at the product level, reorientation downsizing was found to have an important effect, leading to a greater number of new projects being initiated, particularly so by product groups found to be radical.
CHAPTER 6 – DISCUSSION and CONCLUSION

In reviewing the divergent ideas on how downsizing can positively or negatively affect the organization’s innovativeness and adaptability, I sort out findings from past scholars and extend this research area with findings from this study. Some scholars argue that the positive effects of downsizing on innovation is that it allows for resources to be used more efficiently (Jensen, 1986), because downsizing rids slack (Cameron et al., 1991). If true, then downsizing would also strengthen the strategic commitment to product innovation that is required to maintain the skills and capabilities to innovate. Conversely, some researchers argue that downsizing hinders product innovation. Dougherty and Bowman (1995) find that product innovators in firms undergoing downsizing solve fewer problems of connecting their projects to the firm’s resources and strategy, and downsizing obstructs product innovation by interrupting the network of informal relationships innovators use to access resources. Kulkarni (2008) finds that downsizing negatively shapes research and development. Subramanian and Nilakanta (1996) advise that large downsizing hampers risk-taking readiness and decision-making processes, therefore restraining employees’ innovativeness. These studies propose effects on the employee’s skills and capabilities required for ongoing product innovation, and on the strategic dedication required to enhance these capabilities.

Some of the lack of clarity on the effects of downsizing arises from the failure to make the distinction between very different downsizing strategies, given that each may affect innovation differently. Divergent suggestions and implications now exist in the literature. In general, downsizing is moderated by two specific strategic paths or types:
convergent or reorientation. Based on this study, what can managers do now about managing these two different approaches to adaptation?

To assist managers, researchers, practitioners, and scholars, this study highlights three particular nuances in its findings. First, downsizing increases the likelihood of projects being withdrawn out of the innovation development pipeline. Next, convergence protects radical innovations and buffers the associated projects from being withdrawn from the development cycle. Lastly, reorientation increases the likelihood of project initiation and this prospect of project initiation increases even more for radical product categories. Therefore, the next three sections aim to sort out first the general effects, then the conflicting assertions and divergent conclusions relating to convergence, reorientation, and innovation.

6.1 Implications: General Effects on Withdrawal and Completion

Withdrawing a project from the development cycle is considered a failed attempt at innovation and indicates wasted resources because it is approved only after a vigorous elimination process where funds, assets, and manpower are assigned to it from a very limited pool of resources for development. Exploratory innovations can considerably enhance long-term organizational survival and performance (Damanpour, 1991) since they enable the firm to build new capabilities and acquire new knowledge. In general, projects that included a new product introduction (radical innovations) are significantly more likely to be withdrawn as compared with those which are enhancing an existing product (exploitative innovations). This finding suggests that, in general, shorter-term returns of the firm’s innovations are achieved and longer-term innovation support is needed. However, radical projects which are members of product categories having
higher revenue are less likely to be withdrawn, suggesting there is a tendency for larger product groups to make a special effort to support radical projects that are of high importance.

Employees who are often engaged in product innovation, professional practitioners, artfully draw on deep tacit backgrounds of knowledge and vigorously reflect on their work and how to improve it (Schon, 1983; Orlikowski, 2002). Product innovation is founded on learning and applying all of the related applicable knowledge, and some of the knowledge is tacit and based on individual experience (March 1991; Argote 1999; (Armstrong & Mahmud, 2008)). Through exchange and combination, tacit existing knowledge is transformed into explicit knowledge (I. Nonaka & H. Takeuchi, 1995). Innovators manage the projects and over time clearly understand the importance of projects they are developing that have been approved to engage in the development process stages. This study found that the general effect of downsizing increases the likelihood of project withdrawal. Therefore, employees who are engaged in product innovation may lose the chance to artfully draw on deep tacit backgrounds of knowledge because those exchanges are severed within the network when individuals leave the organization.

In contrast, completion suggests projects that are not withdrawn receive timely resources. This study found that downsizing and higher revenue or larger product groups are associated with a greater likelihood of project completion, perhaps, suggesting that resources are shifted in a timely manner to remaining projects once projects are pulled out of the development cycle. In addition, projects belonging to larger product groups or families were more apt to be completed, indicating that larger product groups have the
required support for innovation. However, managers should proceed with caution as there is no effect on radical projects completion in general or when downsizing is present, suggesting that there is room for support improvement specifically for radical projects. New product development often cannot be rushed to completion since it can be dependent upon new devices and technologies being available in the marketplace and, therefore, longer-term support is required. The following section reviews convergence and presents the nuanced finding in relation to its effect on innovation.

**6.2 Implications: Convergence and Innovation**

Since effective management of product innovation centers on what Tushman and O’Reilly (2002) define as “streams of innovation,” long-term success depends on the ability to manage a range of innovations, from exploitative to exploratory, simultaneously. Many other scholars concur (Abernathy & Clark, 1985; Benner & Tushman, 2003; Damanpour, 1991; Danneels, 2002; Dewar & Dutton, 1986; J. E. Ettlie et al., 1984; Hage, 1980; Kaluzny, Veney, & Gentry, 1974; Levinthal & March, 1993; McGrath, 2001; Moch & Morse, 1977; Nord & Tucker, 1987; Romano, 1990; Wilson et al., 1999), and when downsizing is present, it disrupts this required ability.

There has to be a balance of exploitative/incremental and exploratory/radical innovations within an organization because focusing on exploitation alone can confine a firm into its current competencies and hinder new technologies from being developed for emerging markets (March 1991). While each downsizing strategy emphasizes a different kind of innovation, convergent downsizing presumes more exploitative innovation projects and management concentrates on protecting the market share of their primary businesses (S. I. Freeman, 1994). Key findings within this study are that convergence
protects radical innovations or new product developments and buffers them from withdrawal, and convergence has no effect on radical project completion. These results suggest two important factors in the product development process.

First, since convergence protects radical innovations and buffers the associated projects from being withdrawn, the organization is continuing on the development path that has been put in place prior to the convergent downsizing activity. In other words, there are projects already approved and in the pipeline to be developed. When convergent downsizing activity occurs, these radical projects will continue to remain in the pipeline. The implication is that managers protect these particular projects in anticipation of a longer-term return on the resource investment. This reinforcement of the current mission, through these specific projects, emphasizes stability and aligns with the convergent strategy (S. H. Freeman & Cameron, 1993b). This nuanced discovery is especially significant to both researchers and practitioners since projects that have met requirements and were deemed viable in general are more likely to be withdrawn during periods of downsizing overall, implying that the number and range of projects becomes too demanding during downsizing.

Second, in order to successfully complete radical projects, it requires the time necessary to fulfill the required stages of the product development phases of the radical projects. It also requires a detailed approach to the project that often comes with the experience and tacit knowledge, and internal and external connections of innovators to get the project done. Therefore, it is understandable and not improbable why there is no effect of convergence on the completion of radical projects. The completion of the development of new products can often depend on factors such as a new device being
available in the marketplace from a specific vendor or a new manager learning what is required to complete the process since the manager with tacit knowledge of the process and project may have left the firm due to downsizing.

Finally, this study found no evidence to suggest that radical product families initiate a fewer number of projects during convergence or that fewer projects in general are initiated during convergence. The implication is that if an organization must execute a downsizing strategy, managers can consider using convergence as a buffer for radical projects rather than a way to increase the initiation of innovation. These findings offer managers a way to assist their organization in achieving their long-term strategic objectives. On the other hand, if downsizing must take place, reorientation, the alternate strategic path, may be considered and the implications are presented in the next section.

6.3 Implications: Reorientation and Innovation

There has to be a balance of radical and incremental innovations within an organization, support for the projects in the development pipeline, and appropriate resources for innovations to be developed. Also, new product developments are considered radical and there is a need for innovators to have radical projects engaged in the process. Reorientation presumes radical projects, a redefinition of the organizational mission, and conducting business differently (S. H. Freeman & Cameron, 1993b; S. I. Freeman, 1994). As a result, the finding in this research that reorientation enhances the likelihood of initiating projects has crucial implications for managers. For example, if reorientation is being considered, the risk assessments that are customarily a part of the downsizing cycle of events should take into account the required personnel for the projects very seriously. The specific knowledge-base of those leaving the organization
should be regarded as crucial assets for the increased workload resulting from more projects being started.

In addition, the prospect of project initiation increases even more for radical product categories is marginally supported and is near significance by this research. The combination of these two findings means that not only does reorientation make it more likely to start new projects, but it is especially true if the project resides in a radical or exploratory product category. This finding coincides with seminal work relating to reorientation (Bailey & Szerdy, 1988; Ferris et al., 1984; S. H. Freeman & Cameron, 1993b; S. I. Freeman, 1994), suggesting the transformation of technology and systems.

Making the distinction between the strategic alternatives for downsizing can change the firm’s direction as it affects innovation differently because each of the strategic paths is used for different purposes. Do product groups make a particular effort to support radical projects during periods of downsizing? Since there are a greater number of projects during reorientation downsizing, and the effect on the number of projects is even stronger when there is a higher percentage of innovative projects, a nuanced finding, aligns with reorientation theory and indicates support of radical changes (Pinsonneault & Kraemer, 2002) and adaptability (Freeman & Cameron, 1993b). Exploratory/radical innovations meet the needs of emerging markets or customers (Benner & Tushman, 2003; Danneels, 2002), present new designs, develop new channels of distribution, create new markets (Abernathy & Clark, 1985), meet new market challenges (S. Brown & Eisenhardt, 1995), and use new technologies (R. Burgelman, 1991).
These findings reframe theory because there are no effects from reorientation on innovation in terms of completion of projects. More products are initiated during reorientation, which supports the attempts to create more innovations, as theory suggests. Theory also suggests that reorientation would affect innovativeness positively, but this study does not support that assertion. Since reorientation increases initiation, but also increases withdrawals and completions, the implication is that the attempt to innovate is being made but the managers are not strategic in all of their decisions since resources were wasted on the withdrawn projects. However, the shifts in resources seemingly assist managers that are overloaded to complete some projects.

Whether an organization has delved into new markets for a new software enhancement, or merged to strengthen their technological portfolio, with diversification, network enhancements, and convergence as dominant objectives, this study sheds light on the nuances between convergent and reorientation downsizing as change strategies used for adaptation. While there are some positive and negative effects that downsizing affords, this study provides specific insight to the limits of how downsizing affects innovation. Through empirically examining product innovation projects, I extend the broader literature on the general effects of downsizing on organizations and employee capabilities as seminal literature suggests that downsizing can hinder capabilities required for innovation.
REFERENCES


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Management Executive, 19(1), 90-105.


8, 209-223.
## APPENDICES

### Appendix 1: Descriptions of Dependent Variables

<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Completion</td>
<td>Whether a project had been completed, as compared with withdrawn.</td>
<td>Whether a project was completed or not on that particular project-month. This variable is utilized as a dependent variable in one of the two project-level regression analyses, which utilized a data set in which each case represented a different project-month.</td>
</tr>
<tr>
<td>Project Withdrawal</td>
<td>Whether a project had been withdrawn, as compared with completed.</td>
<td>Whether a project was withdrawn or not on that particular project-month. This variable is utilized as a dependent variable in one of the two project-level regression analyses, which utilized a data set in which each case represented a different project-month.</td>
</tr>
<tr>
<td>Number of Initiated Projects</td>
<td>The sum total of the number of initiated projects on the basis of product category.</td>
<td>The total number of initiated projects within that specific product category for a specific month. This variable is utilized as a dependent variable in the product-level regression analysis, which utilizes the data set in which each case represented a different product-month.</td>
</tr>
</tbody>
</table>
## Appendix 2: Reorientation and Convergent Downsizing

<table>
<thead>
<tr>
<th>Convergence</th>
<th>Reorientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incremental downsizing and redesign; Organizational size decreased through changes requiring little or no restructuring (i.e. reduce the number of employees performing the same task)</td>
<td>Discontinuous downsizing and redesign; Organizational size decreased primarily through extensive changes requiring restructuring (i.e. divestitures of subunits that no longer fit organizational mission; Move to product rather than process structure)</td>
</tr>
<tr>
<td>Moderate downsizing strategies</td>
<td>More severe downsizing strategies</td>
</tr>
<tr>
<td>Workload decreased mostly through alterations in work (i.e. elimination of tasks)</td>
<td>Workload decreased mostly through alterations in structure (i.e. rearrange duties of the upper echelon of the management team and eliminate redundancies)</td>
</tr>
<tr>
<td>Internally directed, driven by efficiency challenges</td>
<td>Externally directed, driven by effectiveness challenges</td>
</tr>
<tr>
<td>Redesign aimed at reinforcing organizational mission and strategy; conduct business better</td>
<td>Redesign aimed at redefinition of organizational mission and strategy; conduct business differently</td>
</tr>
<tr>
<td>Stability in the upper echelon of management, technology and systems</td>
<td>Transformation in the upper echelon of management, technology and systems</td>
</tr>
<tr>
<td>Emphasis on lower level, less radical downsizing approaches</td>
<td>Emphasis on higher level, more radical downsizing approaches</td>
</tr>
</tbody>
</table>

**Success associated with convergence:** Use of interorganizational relationships is not required  
**Success associated with reorientation:** Requires use of interorganizational relationships

**Success associated with convergence:** Emphasis on stability and control  
**Success associated with reorientation:** Emphasis on flexibility and adaptability
### Appendix 3: Descriptions of Independent Variables: Project-Level Analyses

<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reorientation Downsizing</td>
<td>Discontinuous downsizing and redesign; Reorientation downsizing comprises periods that are relatively short intervals of discontinuous change.</td>
<td>Reorientation downsizing will be measured by considering short intervals of discontinuous change. Specifically, when the company announced that downsizing would take place with extensive changes, transformational activities, and restructuring, and subunits that no longer fit the organizational mission would be eradicated. If there was this type of discontinuous change then a value of 1 would be assigned to this variable. A score of 0 would be otherwise assigned to this variable.</td>
</tr>
<tr>
<td>Convergent Downsizing</td>
<td>Incremental downsizing and redesign; Involves periods that are fairly long time periods of adaptation and incremental change.</td>
<td>Convergent downsizing will be measured by considering long time periods of adaptation and incremental change. Specifically, when the company announced that downsizing would take place with a minimum of or no restructuring activities, and employees performing the same task would be asked to leave the organization. If there was this type of incremental change then a value of 1 would be assigned to this variable. A score of 0 would be otherwise assigned to this variable.</td>
</tr>
<tr>
<td>Age of the Project</td>
<td>The age of the project in months.</td>
<td>Age of the project is measured as the number of months between the initiation of the project and the current month. Age of the Project was included in the model as a control variable to control for whether the likelihood of project withdrawal or completion increases as the age of the project increases.</td>
</tr>
<tr>
<td>Radical Innovations</td>
<td>Innovative projects include the development of a new product. Radical innovations contain a high degree of new knowledge</td>
<td>Projects that were new innovations/products were considered to be radical innovations and were given a value of 1, while projects that were enhancements to existing...</td>
</tr>
</tbody>
</table>
and include an introduction of new products into the marketplace. Innovations were assigned a value of 0.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>The total dollar amount of the total revenue made by a specific product category.</td>
<td>Revenue is measured as the revenue of the product category of which the focal project was a member. In the analysis, the lagged natural log of this variable will first be taken, and this transformed version of this variable will be included in the analysis. Revenue was included in the model as a control variable to control for whether the likelihood of project withdrawal or completion increases as the revenue increases.</td>
</tr>
<tr>
<td>Radical*Revenue</td>
<td>The product (interaction) between the radical and revenue variables.</td>
<td>This variable consists of the product between the radical variable and the revenue variable. The inclusion of this variable in the model serves to test whether there is a significant interaction between innovative project status and the corresponding product category revenue.</td>
</tr>
<tr>
<td>Radical*Convergent</td>
<td>The product (interaction) between the radical and convergent downsizing variables.</td>
<td>This variable consists of the product between the radical variable and the convergent downsizing variable. The inclusion of this variable in the model serves to test whether there is a significant interaction between innovative project status and convergent downsizing.</td>
</tr>
<tr>
<td>Radical*Reorientation</td>
<td>The product (interaction) between the radical and reorientation downsizing variables.</td>
<td>This variable consists of the product between the radical variable and the reorientation downsizing variable. The inclusion of this variable in the model serves to test whether there is a significant interaction between innovative project status and reorientation downsizing.</td>
</tr>
<tr>
<td>Projects Ongoing</td>
<td>The number of projects currently ongoing in a particular product-month.</td>
<td>This variable consists of a measure of the total number of ongoing projects within the project's corresponding product category. In the analysis, this variable will first be lagged before its inclusion in the model. Projects</td>
</tr>
</tbody>
</table>
Ongoing was included as a control variable in the model in order to help control for whether projects which are members of product categories with a greater number of ongoing projects have a greater likelihood of withdrawal or completion.

<table>
<thead>
<tr>
<th>Year</th>
<th>The year in which the project was initiated.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In the regression analyses, year will be included as a series of dummy variables as a control. Year was included in the model as a control variable to control for whether the year is associated with a higher likelihood of project withdrawal or completion.</td>
</tr>
</tbody>
</table>
Appendix 4: Descriptions of Independent Variables: Product-Level Analyses

<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reorientation Downsizing</td>
<td>Discontinuous downsizing and redesign; Reorientation downsizing comprises periods that are relatively short intervals of discontinuous change.</td>
<td>Reorientation downsizing will be measured by considering short intervals of discontinuous change. Specifically, when the company announced that downsizing would take place with extensive changes, transformational activities, and restructuring, and subunits that no longer fit the organizational mission would be eradicated. If there was this type of discontinuous change then a value of 1 would be assigned to this variable. A score of 0 would be otherwise assigned to this variable.</td>
</tr>
<tr>
<td>Convergent Downsizing</td>
<td>Incremental downsizing and redesign; Involves periods that are fairly long time periods of adaptation and incremental change.</td>
<td>Convergent downsizing will be measured by considering long time periods of adaptation and incremental change. Specifically, when the company announced that downsizing would take place with a minimum of or no restructuring activities, and employees performing the same task would be asked to leave the organization. If there was this type of incremental change then a value of 1 would be assigned to this variable. A score of 0 would be otherwise assigned to this variable.</td>
</tr>
<tr>
<td>Radical %</td>
<td>Radical Innovation projects are the development of a new product. Radical innovations contain a high degree of new knowledge and include an introduction of new products to the marketplace.</td>
<td>This variable is operationalized as a percentage of radical innovation projects within that particular product category.</td>
</tr>
<tr>
<td>Revenue</td>
<td>The total dollar amount of the total revenue made by a specific product category.</td>
<td>Revenue is measured as the revenue of the product category. In the analysis, the lagged natural log of this variable will first be taken, and this transformed version of this variable</td>
</tr>
</tbody>
</table>
Revenue was included in the model as a control variable to control for whether the likelihood of the number of initiated projects increases as the revenue increases.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convergent*Radical %</td>
<td>The product (interaction) between the radical and convergent downsizing variables.</td>
<td>This variable consists of the product between the radical variable and the convergent downsizing variable. The inclusion of this variable in the model serves to test whether there is a significant interaction between innovative project status and convergent downsizing.</td>
</tr>
<tr>
<td>Reorientation*Radical %</td>
<td>The product (interaction) between the radical and reorientation downsizing variables.</td>
<td>This variable consists of the product between the radical variable and the reorientation downsizing variable. The inclusion of this variable in the model serves to test whether there is a significant interaction between innovative project status and reorientation downsizing.</td>
</tr>
<tr>
<td>Year</td>
<td>The year in which the project was initiated.</td>
<td>In the regression analyses, year will be included as a series of dummy variables as a control. Year was included in the model as a control variable to control for whether the year is associated with a greater number of initiated projects.</td>
</tr>
</tbody>
</table>
Appendix 5: Withdrawn Projects

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Withdrawn</td>
<td>18953</td>
<td>(97.70%)</td>
</tr>
<tr>
<td>Withdrawn</td>
<td>446</td>
<td>(2.30%)</td>
</tr>
</tbody>
</table>
Appendix 6: Completed Projects

<table>
<thead>
<tr>
<th>Category</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Completed</td>
<td>17381 (89.60%)</td>
</tr>
<tr>
<td>Completed</td>
<td>2081 (10.40%)</td>
</tr>
</tbody>
</table>
### Appendix 7: Radical Projects

<table>
<thead>
<tr>
<th>Category</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Radical</td>
<td>17135 (88.33%)</td>
</tr>
<tr>
<td>Radical</td>
<td>2264 (11.67%)</td>
</tr>
</tbody>
</table>
## Appendix 8: Continuous Project-Level Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lag LN Revenue</td>
<td>11.268 (.548)</td>
<td>8.506</td>
<td>13.581</td>
</tr>
<tr>
<td>Lag Projects Ongoing</td>
<td>74.812 (74.090)</td>
<td>1.000</td>
<td>279.000</td>
</tr>
</tbody>
</table>
Appendix 9: Continuous Product-Level Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Projects</td>
<td>1.727 (5.217)</td>
<td>0.000</td>
<td>60.000</td>
</tr>
<tr>
<td>Lag LN Revenue</td>
<td>11.427 (.520)</td>
<td>8.506</td>
<td>13.581</td>
</tr>
<tr>
<td>Radical %</td>
<td>.173 (.335)</td>
<td>0.000</td>
<td>1.000</td>
</tr>
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### Appendix 10: Summary of Selected Project-Level Figures Data

<table>
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<tr>
<th></th>
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</tr>
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<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
</tr>
<tr>
<td>Not Withdrawn</td>
<td>16731 (97.64%)</td>
<td>2222 (98.14%)</td>
</tr>
<tr>
<td>Withdrawn</td>
<td>404 (2.36%)</td>
<td>42 (1.86%)</td>
</tr>
<tr>
<td>Not Completed</td>
<td>16438 (95.93%)</td>
<td>2174 (96.02%)</td>
</tr>
<tr>
<td>Completed</td>
<td>697 (4.07%)</td>
<td>90 (3.98%)</td>
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<tr>
<td>Lag Projects Ongoing (Mean)</td>
<td>80.656</td>
<td>30.500</td>
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### Appendix 11: Correlations of Variables Included in Project-Level Regressions

<table>
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<th>Variable</th>
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<th>Mean 3</th>
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<th>Mean 11</th>
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Notes: *p<.05
### Appendix 12: Correlations of Variables Included in Product-Level Regression

<table>
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<th>Mean 1</th>
<th>Median 2</th>
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<td>Reorientation²</td>
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<td>-0.05</td>
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</tr>
<tr>
<td>Lag LN Revenue⁴</td>
<td>11.427</td>
<td>11.304</td>
<td>-0.11*</td>
<td>0.02</td>
<td></td>
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<tr>
<td>Radical %⁵</td>
<td>0.173</td>
<td>-0.355</td>
<td>-0.08*</td>
<td>0.01</td>
<td>-0.01</td>
<td>-0.09*</td>
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</tr>
<tr>
<td>Reorientation*Radical %⁶</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.00</td>
<td>0.42*</td>
<td>-0.04</td>
<td>-0.04</td>
<td>-0.27*</td>
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<tr>
<td>Convergent*Radical %⁷</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.04</td>
<td>-0.04</td>
<td>0.46*</td>
<td>-0.01</td>
<td>-0.29*</td>
<td>-0.02</td>
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</tr>
<tr>
<td>2005⁸</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.06*</td>
<td>0.46*</td>
<td>-0.21*</td>
<td>0.04</td>
<td>0.00</td>
<td>0.20*</td>
<td>-0.09*</td>
</tr>
<tr>
<td>2006⁹</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.05</td>
<td>-0.14*</td>
<td>-0.05</td>
<td>0.09*</td>
<td>-0.01</td>
<td>-0.06*</td>
<td>-0.01</td>
</tr>
<tr>
<td>2007¹⁰</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.09*</td>
<td>-0.23*</td>
<td>-0.28*</td>
<td>-0.09*</td>
<td>-0.01</td>
<td>-0.10*</td>
<td>-0.12*</td>
</tr>
<tr>
<td>2008¹¹</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.00</td>
<td>-0.07*</td>
<td>-0.11*</td>
<td>-0.05</td>
<td>0.00</td>
<td>-0.03</td>
<td>-0.05</td>
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Notes: *p<.05
Appendix 13: Project-Level Analyses: Project Withdrawal

<table>
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<tr>
<th>Variable</th>
<th>Std. Deviation</th>
<th>Without Interactions</th>
<th>Coefficient</th>
<th>With Interactions</th>
<th>Coefficient</th>
</tr>
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<tbody>
<tr>
<td>Reorientation Downsizing</td>
<td>.249</td>
<td>1.610***</td>
<td>1.738**</td>
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<tr>
<td>Convergent Downsizing</td>
<td>.305</td>
<td>1.000***</td>
<td>1.122**</td>
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<tr>
<td>Age of Project</td>
<td>5.100</td>
<td>.186***</td>
<td>.186***</td>
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<td></td>
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<tr>
<td>Radical</td>
<td>.321</td>
<td>-.289</td>
<td>17.554***</td>
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</tr>
<tr>
<td>Lag LN Revenue</td>
<td>.548</td>
<td>-.103</td>
<td>.068</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radical*Revenue</td>
<td>Ũ</td>
<td>Ũ</td>
<td>-1.551***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radical*Convergent</td>
<td>Ũ</td>
<td>Ũ</td>
<td>-2.529*</td>
<td></td>
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</tr>
<tr>
<td>Radical*Reorientation</td>
<td>Ũ</td>
<td>Ũ</td>
<td>-.911</td>
<td></td>
<td></td>
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<tr>
<td>Lag Projects Ongoing</td>
<td>74.090</td>
<td>.002**</td>
<td>.001*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>Ũ</td>
<td>.093</td>
<td>.094</td>
<td></td>
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<tr>
<td>2006</td>
<td>Ũ</td>
<td>.779***</td>
<td>.816***</td>
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<tr>
<td>2007</td>
<td>Ũ</td>
<td>-.408**</td>
<td>-.390*</td>
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<tr>
<td>Constant</td>
<td>Ũ</td>
<td>-4.655***</td>
<td>-5.071***</td>
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Notes: *p<.05, **p<.01, ***p<.001; No Interactions: N=19285; Wald \( \chi^2 = 865.68, df=12, p<.001; Pseudo R^2=.130; With Interactions: N=19285; Wald \( \chi^2 = 802.83, df=9, p<.001; Pseudo R^2=.126 \)
### Appendix 14: Project-Level Analyses: Project Completion

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standard Deviation</th>
<th>Coefficient Without Interactions</th>
<th>Coefficient With Interactions</th>
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</thead>
<tbody>
<tr>
<td>Reorientation Downsizing</td>
<td>0.249</td>
<td>0.568***</td>
<td>0.643***</td>
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<tr>
<td>Convergent Downsizing</td>
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<td>0.714***</td>
<td>0.736***</td>
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<td>0.149***</td>
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<td>Radical</td>
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<td>Lag LN Revenue</td>
<td>0.548</td>
<td>0.199**</td>
<td>0.201**</td>
</tr>
<tr>
<td>Radical*Revenue</td>
<td>(\bar{\bar{\alpha}})</td>
<td>(\bar{\bar{\beta}})</td>
<td>0.156</td>
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<tr>
<td>Radical*Convergent</td>
<td>(\bar{\bar{\alpha}})</td>
<td>(\bar{\bar{\beta}})</td>
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<tr>
<td>Radical*Reorientation</td>
<td>(\bar{\bar{\alpha}})</td>
<td>(\bar{\bar{\beta}})</td>
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<td>Lag Projects Ongoing</td>
<td>74.090</td>
<td>0.002***</td>
<td>0.002**</td>
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<td>2005</td>
<td>-</td>
<td>2.730***</td>
<td>2.733**</td>
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<td>2006</td>
<td>-</td>
<td>2.022***</td>
<td>2.043**</td>
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<td>200</td>
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<td>Constant</td>
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<td>-8.317***</td>
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Notes: *\(p<.05\), **\(p<.01\), ***\(p<.001\); No Interactions: \(N=19285\); Wald \(G^2=2032.88\), \(df=9\), \(p<.001\); Pseudo \(R^2=.118\); With Interactions: Notes: \(N=19285\); Wald \(G^2=2144.92\), \(df=12\), \(p<.001\); Pseudo \(R^2=.117\)
### Appendix 15: Product-Level Analyses: Projects Initiated

<table>
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<th>Variable</th>
<th>Standard Deviation</th>
<th>Without Interactions</th>
<th>Coefficient</th>
<th>With Interactions</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reorientation Downsizing</td>
<td>.240</td>
<td>.266**</td>
<td>.222*</td>
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<tr>
<td>Convergent Downsizing</td>
<td>.332</td>
<td>-.155</td>
<td>-.132</td>
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</tr>
<tr>
<td>Lag LN Revenue</td>
<td>.520</td>
<td>-.229(^a)</td>
<td>-.240*</td>
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</tr>
<tr>
<td>Radical %</td>
<td>.335</td>
<td>.103</td>
<td>.126</td>
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<tr>
<td>Reorientation*Radical %</td>
<td>~i</td>
<td>~i</td>
<td>.479(^b)</td>
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<tr>
<td>Convergent*Radical %</td>
<td>~i</td>
<td>~i</td>
<td>-.308</td>
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<tr>
<td>2005</td>
<td>~i</td>
<td>1.538***</td>
<td>1.533***</td>
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<td>2006</td>
<td>~i</td>
<td>1.559***</td>
<td>1.556***</td>
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<td>2007</td>
<td>~i</td>
<td>-.346***</td>
<td>-.349***</td>
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<td>3.068*</td>
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Notes: *\(p<.05\), **\(p<.01\), ***\(p<.001\); No Interactions: \(N_{obs}=1192\), \(N_{groups}=59\); Wald \(\chi^2=423.88\), \(df=7\), \(p<.001\); \(^a\)\(p=.055\); With Interactions: \(N_{obs}=1192\), \(N_{groups}=59\); Wald \(\chi^2=428.18\), \(df=9\), \(p<.001\); \(^b\)\(p=.051\)
Appendix 16: Radical Project Status and Withdrawal, Project-Level Data Set
Appendix 17: Radical Project Status and Completion, Project-Level Data Set

Radical Project Status

<table>
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<tr>
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<tbody>
<tr>
<td>No</td>
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<tr>
<td>Yes</td>
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<tr>
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</tr>
</tbody>
</table>

Completed

Not Completed       Completed

Not Completed       Completed

0 10,000 20,000
Appendix 18: Radical Project Status and Projects Ongoing, Project-Level Data Set

![Bar Chart]

The bar chart illustrates the mean lag projects ongoing for different project statuses. The x-axis represents the radical project status, with categories for 'Not Radical' and 'Radical'. The y-axis represents the mean lag projects ongoing, ranging from 0 to 100. The chart shows a significant difference in the mean lag projects ongoing between the two categories, with a much higher mean for 'Not Radical' compared to 'Radical'.
Appendix 19: Proportion of Radical Projects and Projects within Product Categories, Product-Level Data Set
Appendix 20: Reorientation and Proportion of Radical Projects, Product-Level Data Set
Appendix 21: Convergence and Proportion of Radical Projects, Product-Level Data Set
Appendix 22: Proportion of Radical Projects and Revenue, Product-Level Data Set
Tashonna Lorraine Smith

1993  B.S.E.E., Trinity College.
1995-2009 Employed by Verizon Communications Inc., New York City, as manager.
1997  "RU/486 Mifepristone Abortion Pill."
2000  Microsoft Office User Specialist Certification.
2002-11 Attended Rutgers University, Newark, New Jersey.
2008  Part-Time Lecturer in Business, Rutgers University.