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Transcending Technological Innovation: The Impact of Acquisitions on Entrepreneurial Technical Organizations

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Abstract

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MBA, Southern New Hampshire University, 2004

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Abstract

Technology firms with substantial cash reserves acquire smaller entrepreneurial firms for diversification. In 2006, 3 large firms acquired 28 organizations, with the combined deals exceeding $4.7 billion. The problem addressed in this study is that new start-up companies with innovative ideas may not mature when they are acquired by larger companies and do not fully articulate potential industry-transcending innovation. This is important because the unsuccessful integration of an acquisition can dismantle innovation and compromises economic inventiveness. Drawing from the disruptive innovation and the resource-based theories, the purpose of the quasi-experimental study was to examine the impact of acquisition by larger public technological organizations of smaller start-up innovative entrepreneurial organizations on patent generation, stock price trend, and stakeholder retention. The research questions in this study were designed to statistically test pre/post changes in these key innovation performance factors before and after an acquisition. Historical data on 71 acquisitions by 10 acquiring firms were gathered related to number of patents generated, stock price trends, and stakeholder retention. Paired *t* tests were used to confirm that there were significantly fewer patents and patents per year generated, and significantly fewer stakeholders retained after acquisition. Stock price fluctuation was examined using a cumulative abnormal return categorization approach that indicated only 31% of the acquired companies realized gains that reached the a priori threshold of significance. The results of this study could create positive social change through the development of business acquisition strategies that promote innovation, resulting in economic prosperity for the United States.

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Dedication

This doctoral study is dedicated to my family whom I love so much. To my wife MaryBeth, who has endured so much of my constant progression, and to my daughters Alyssa and Samantha, who I hold dear to my heart. Without their unconditional support, my doctoral journey would not uphold. I also would like to dedicate this study to my parents Roger and Joanne Crochetiere, although divorced, are the reason why I am on this earth, and I thank you both for the support early in my life. I would also like to thank my Uncle William Crochetiere who inspired me to pursue a doctorate, just because he has a PhD and taught me how to make wine. Lastly, I would like to dedicate this study to my deceased grandparents Pepere and Memere, who at a very young age established unconditional love in my life, which continues to drive my passion to always move forward.

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Section 1: Foundation of the Study

Innovative technology has been the cornerstone of economic sustainability in the United States since the mid-1800s; however, since the 2000s, emerging global economies and domestic acquisition strategies have jeopardized innovation. Therefore, transcending technologies that could have created new industries, making the U.S. economy stronger, have been compromised. Lynn and Salzman (2007) noted that countries such as India, China, Brazil, and Mexico have adapted to high-end technology development, and U.S.-based global organizations are now competing with new technology-based companies from emerging economies. Increased competition from emerging global economies, along with decreased innovation in the United States, jeopardizes economic standards in the United States. Therefore, transcending technological innovation from acquired smaller entrepreneurial technological organizations needs to mature to generate increased economic sustainability for the United States, resulting in positive social change.

Background of the Problem

Since its inception, the United States has been a nation of liberty, and most Americans see themselves as democratic people dedicated to free enterprise, celebrate the founding fathers' ideology, and understand that the business of America is business (Hughes, 2004). The founding fathers displayed inventiveness as conceived by the Declaration of Independence, and Americans following this tradition have built on this foundation a boldness of comparable inventiveness in technological transcendence. No other nation has displayed such innovation and developed such inventive sustainability as the United States from 1870 to 1970 (Hughes, 2004).

Large technology firms with substantial cash reserves, such as Cisco, IBM, and Hewlett-Packard, acquire smaller firms for diversification. In 2006, these three firms acquired 28 organizations, with the combined deals exceeding $4.7 billion (Adavikolanu & Korrapati, 2009). The intention of these acquisitions was to acquire complementary and fringe technologies for a diversified portfolio to achieve sustainability. The decision whether to acquire an organization or organically produce a technology is based on the entrepreneurial innovative success the acquired or target organization has developed, which, if integrated correctly, may produce favorable results. Within an acquisition framework, where successful entrepreneurial firms started by individuals with either a record of sustaining successful ventures or who have held senior positions in technology firms have been able to acquire funding through venture capitalists, monetary ambition outweighs innate principles (Umesh, Jessup, & Huynh, 2007). The dynamics of the vision and demonstrable leadership might create an innovative culture unique to a particular organization, and that frontier on the fringe technology sets innovative technology companies apart from any competition. Leaders of larger technology firms are encouraged to, and are often enticed to, target successful, smaller, innovative technology organizations and focus on pure monetary gain (K. S. Christensen, 2006).

Problem Statement

Transcending innovation, entrepreneurship, and acquisitions in information technology organizations was the focus of the current research study as a strategic corporate growth initiative for presumed sustainability. The problem was that new start-up companies with innovative ideas do not mature when they are acquired by larger

companies and do not fully articulate potential industry-transcending innovation (DiGuardo & Valentini, 2007). Adavikolanu and Korrapati (2009) completed a study on 234 acquisition deals valued at approximately $100 billion conducted by leading technology firms over an 8-year period, which resulted in several hundred million dollars of valuation loss due to inadequate integration of the acquired firm.

The quantitative quasi-experimental study involved examining control variables before and after the acquisition of entrepreneurial innovative start-up organizations with larger acquiring public organizations within the United States. Kapoor and Lim (2008) noted that high-technology acquisitions tend to stall innovative fervor, meaning the leaders of larger firms acquiring smaller firms tend not to anticipate the creative leadership and engineering synergies of the organizations they purchase. Although mergers and acquisitions have become the best-known business strategies for growth in U.S. organizations, acquiring organizations tend to underestimate the complexity of integrating all the acquired organization's resources, resulting in an unsuccessful acquisition dismantling the innovation that was once thriving (Kongpichayanond, 2009).

Purpose Statement

The purpose of the quantitative quasi-experimental study was to test the theory that transcending innovation is lost due to the acquisition strategies of larger public technological organizations acquiring smaller start-up innovative entrepreneurial organizations, controlling for patent generation, stock price trend, and stakeholder retention. DiGuardo and Valentini (2007) noted that new start-up companies with innovative ideas do not mature when they are acquired; therefore, the companies do not

fully articulate potential industry-transcending innovation. The independent variable, large publicly traded technical organizations, included organizations that had made many acquisitions and were either computer software or hardware manufacturers. The dependent variable was disruptive technology firms that possessed innovative resources typically funded by venture capital, with the controlling variables defined as the comparison of the number of patents generated, stock price fluctuation, and retention of the ownership and lead engineering talent of the acquired firm before and after the acquisition.

Additional considerations of the study were to determine why acquisitions between large technical organizations and smaller entrepreneurial innovative firms are not successful and therefore to learn the potential transcending innovations that are lost when smaller creative entities are integrated into larger, culturally different organizations. An assumption was that the acquiring organization decreased value as a result of the insufficient integration of the acquired company. The outcomes of decreased organizational value have a negative impact on new technologies that could have potentially created new industries, and therefore the United States could remain the dominant economic power in the world (Adavikolanu, 2008).

Nature of the Study

The focus of the current study was primarily on large global enterprises such as Apple, Cisco, Dell, Hewlett-Packard, EMC, Google, IBM, Intel, Microsoft, and other leading technology organizations in the United States and their strategic acquisitions. Acquisitions of smaller entrepreneurial start-up firms by these large global entities have a

negative impact on innovation and equity after an acquisition and therefore decrease economic value for the United States. A quantitative, nonequivalent (pretest and posttest), quasi-experimental research design was appropriate because the design helped to determine conclusive evidence that innovation needs to mature for technological revival to occur in the United States. Nonequivalent quasi-experimental methods are appropriate for studies in which individuals are not randomly assigned, thus acknowledging a strong base of criteria for determining technological relevance (Creswell, 2009). The nonequivalent quasi-experimental design was more suitable for this study than other research designs because of the statistical nature of the technology industry and its need for large amounts of conclusive data from many research perspectives. Clougherty and Moliterno (2010) determined that the quasi-experimental design approach crosses the boundaries of many different disciplines; the approach is appropriate for this context as organizational leaders are readily able to surmise the impact of managers and their environments for relevance to organizations.

A sequential mixed research study was considered but not selected because of the complexity of the procedure. Johnson, Onwuegbuzie, and Turner (2007) determined that the mixed method approach is appropriate when the complexities between the connected groups, in relation to a complex research question, indicate that mixed methods research is likely to provide superior outcomes. Due to the nature of the problem of lost innovation due to acquisitions, a statistical approach was necessary to ensure secured outcomes. The quasi-experimental approach was appropriate for the current study because it enables the research structure to be presented in comparative sections.

Magnusson (2009) determined that a quasi-experimental design is necessary for a comprehensive determination of correlational significance among relevant dimensions for reliability. The quasi-experimental design also made a clear and concise measure on how a quantitative research method can impact a complex, technical business problem that has implications for the economic stability of the United States.

Research Question

Large companies in the technology industry are investing billions of dollars in acquisitions every year. The effects of these acquisitions on the value of the acquired firm were not readily evident to determine if innovation continues after an acquisition. To determine if innovation continues when smaller start-up firms have been acquired, rigorous data collection and analysis on multiple scenarios was needed. Cisco Systems estimated the failure rate for technology acquisitions was 90%, Graebner, Eisenhardt, and Roundy (2010) noted that outlining the motivation for these deals and potential pitfalls could undermine the intent to acquire. Acquisition pitfalls are subject to wealth redistribution, which in its intent is strategically sound but in its execution delineates macro global implications with potential transcending innovation. The central research question for the study was as follows: How do start-up entrepreneurial technical firms lose innovation when acquired by larger global public entities?

Hypotheses

Hypotheses 1: Patent Generation

Patent generation is a key determination of the innovative significance for a start-up entrepreneurial firm, for which creating intellectual property and protecting those

rights may be the basis of an organization's existence (Raghu, Woo, Mohan, & Rao, 2008). Building on patents becomes a measurement of an organization's innovation and whether acquired patent generation may cease. Gittelman (2008) noted that patents play a central role in empirical research on innovation, the results of which provide rich details of technologies, enabling the analysis of a wealth of valuable and easily accessible information.

$H1_0$: Patent generation rate of the target firm was greater before acquisition.

$H1_a$: Patent generation rate of the surviving firm was greater after acquisition.

Hypotheses 2: Stakeholder Retention

Schlange (2009) noted that successful, sustainable, driven, entrepreneurial organization stakeholders are derived from an internal network of individuals who develop a framework considered the nature of the organization's success. After an acquisition, the ability of the acquiring firm to acquire, transfer, and integrate the acquired firm's knowledge base framework into its own enterprise creates a sustainable competitive advantage (Cloodt, Hagedoorn, & Kranenburg, 2006). The social framework that made the target organization innovative because of the nonretention of personnel after an acquisition often leaves the surviving entity in jeopardy. Desyllas and Hughes (2010) noted that if the full framework of innovators from the target firm no longer exists in the surviving organization, the innovation that existed before acquisition might no longer be applicable.

$H2_0$: Stakeholder acquisition decreased after acquisition.

$H2_a$: Stakeholder acquisition increased after acquisition.

Hypotheses 3: Stock Price Trend

Ma, Pagan, and Chu (2009) noted that when an acquisition is made and the bidder is a publicly traded organization, a 5-day window exists where stock price dictates if the transaction is a favorable or unfavorable event. A method that compares the stock price change of acquiring firms around the acquisition announcement date to a benchmark index to acquisition success is the cumulative abnormal return (CAR) value. S. Lee and Connolly (2010) concluded that the CAR value results are systematically estimated and statistically analyzed to determine the magnitude and direction of the effect of the event on the firms' valuation. S. Lee and Connolly noted that the market model assumes the linear relationship between the return of any security and the return of the market portfolio, as noted in Equation (1):

$$R_{it} = \alpha_i + \beta_i R_{mt} + e_{it} \quad (1)$$

where R_{it} is returns of security i at time t; R_{mt} is returns of the market portfolio at time t; and e_{it} is error terms on security i at time t. According to Ma et al. (2009), Equation (1) is estimated over a period of time beginning at -125 days and ending at -6 days from the event day, depicting an event window of 5 days (-2, +2). With the estimates of α_i and β_i from Equation (1), a normal return is predicted during the days covered by the event window, where the prediction error commonly known as the abnormal return (AR) is calculated from Equation (2):

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt} \quad (2)$$

where AR_{it} is the AR for i on day t and R_{it} is actual return for firm i on day t (Ma et al., 2009).

The daily ARs are summed over the event window to derive the CARs, as noted in Equation (3):

$$CAR_{i(T1-T2)} = \sum_{t=T1}^{T2} AR_{it} \quad (3)$$

$H3_0$: Stock price trend decreased after acquisition.

$H3_a$: Stock price trend increased after acquisition.

Operational Definition of Variables

Independent Variable (*X*)

The independent variable was large publicly traded technical organizations, defined as organizations that have made many acquisitions and were either computer software or hardware manufacturers. Audretsch (2009) noted that entrepreneurship has emerged as the engine of economic growth, creation, and competitiveness in global markets. Markets of entrepreneurial innovation are the essence of continued economic growth in the global continuum (Fontana & Nesta, 2009).

Dependent Variable (*Y*)

The dependent variable was disruptive technology firms that possess innovative resources typically funded by self-funding, venture capital, or equity funding. The data analysis process involved evaluating whether small, successful, innovative, technical organizations continued to be innovative after being acquired. If innovation continues, the United States will continue to be a dominant economic force in the global economy. Bordoff, Deich, Kahane, and Orszag (2005) contended major policy priorities are necessary to promote U.S. leadership in science and technology to spur economic growth through innovation, where individuals, human talent, investment, research and

development, incentives, and effective government regulations all have sustainable characteristics. The United States should renew this commitment for future generations to enjoy economic prosperity, such as has occurred from past economic growth.

Control Variables

Control variables are the comparison of the number of patents generated, stock price fluctuation, and retention of the ownership and lead engineering talent of the acquired firm before and after an acquisition. The control variables determined the statistical relevance for the study (Gittelman, 2008; Lee & Connolly, 2020; Schlange, 2009). The significance of the control variables dictated the outcome of the study.

Theoretical Framework

The theoretical framework for the study included the disruptive innovation theory and the resource-based theory. C. M. Christensen (2003a) established the idea of disruptive technologies, where organizations are subject to new innovative technologies that if not adopted pose substantial risk to the survival of the organizations. This idea over time became a theory to explain all kinds of disruptive innovation, where different kinds of innovation have different competitive effects and produce different kinds of markets (Markides, 2006). D. Yu and Hang (2009) noted that the disruptive innovation theory is a powerful means of broadening and developing new markets that may in turn disrupt existing market linkages. The resulting linkages are important to any study because the need to bridge a theoretical concept and the research question demonstrates the particulars of the study to illustrate the significance of the findings (Rocco & Plakhotnik, 2009).

A secondary theoretical framework in the study was the resource-based theory. The resource-based theory supports the disruptive innovation theory by identifying that firms must develop distinct capabilities to enhance their ability to adapt to the changing environments that disruptive innovation will challenge in order to compete in the changing environments and improve their survival instincts (Esteve-Perez & Manez-Castillejo, 2008). The resource-based theory enables corporate leaders to understand the capabilities of the organization in an innovative competitive marketplace. Drawing from the resource-based theory is the resource-based view, in which choices of a firm are based on the relation between the resource base of a firm and the resource requirements of the market that is new to the firm (G. K. Lee & Lieberman, 2010). Both the disruptive innovation theory and the resource-based theory supported the current study and the ability to understand why large public organizations decide to acquire smaller innovative start-up firms for competitive advantage and also helped to establish why those acquisitions most likely will fail. Further discussion of these two theories occurs in the literature review section.

Definition of Terms

The following terms and phrases are defined as used in this study.

Disruptive technology is an innovation that improves a product or service in ways that the market does not expect and in turn accomplishes potential trendsetting innovation (C. M. Christensen, 2003a).

Diversification means expanding a business or line of products by increasing the variety of things produced or the number of operations undertaken in a given construct (Harvard Business Essentials, 2003).

Emerging global economies are countries with relatively stable governments, developing economies, and an increasing ability to spend money on consumer goods (Tassey, 2008).

Entrepreneurial innovation is the use of tools to effect change and create better products from a start-up organization (Sarkar, Echambadi, Agarwal, & Sen, 2006).

Inadequate integration is the inability to manage fully a newly acquired product or service (Graebner et al., 2010).

Industry-transcending innovations are new products or services that disrupt existing industries (C. M. Christensen, 2003a).

Innovative culture is a culture in which everyone in the business has a deep understanding of the business in technically fierce market competition (C. M. Christensen, 2003b).

Innovative fervor means continuing to provide new products or services in fierce market competition that is characteristic of entrepreneurial start-ups (C. M. Christensen, 2003b).

Innovative technology is a new product or service that challenges existing industries (C. M. Christensen, 2003a).

Organic research and development occurs when corporations invest in internal research and development strategies rather than through acquiring the technology through acquisitions (C. M. Christensen, 2003b).

Start-up is a business or an undertaking that has recently begun operation and grew from a tiny organization to a multimillion-dollar corporation (Barringer & Ireland, 2010).

Technical organizations are companies that produce products or services that focus on engineering or scientific solutions (Khallaf & Skantz, 2007).

Assumptions, Limitations, and Delimitations

Assumptions

Ownership and key technical officers are the reason for the success of smaller innovative start-up technical organizations (Sarkar et al., 2006). The amount of energy extended to start a technology firm requires an enormous amount of rigorous effort from the ownership and the technologists who devise the technology and can be defined as the stakeholders. These individuals' knowledge and passion are the essence of a particular organization and are noted as the reason for their success or failure.

Tassey (2008) noted the rise of competition with innovative technology from emerging economies is compromising the U.S. economy and suggested domestic innovation is crucial. Foreign students educated in the United States who once stayed in the United States for opportunity now move back to their homeland after receiving their education because these emerging global economies provide greater prosperity. Less

technical ingenuity from foreign students, along with greater competition from emerging economies, weakens the innovative spirit and threatens the U.S. economy.

Craig, Jackson, and Thomson (2007) noted that current economic conditions in the United States require government policy for incentive programs for innovation. The essence of the U.S. economic system has competed in free market entrepreneurial competition for economic sustainability; however, to persevere in competitive markets dominated by larger institutions, small businesses need assistance. Government programs that enable small institutions to grow their business are very effective for innovation and sustainability.

Limitations

The study had two limitations. First, the valuation of the acquirer's stock price after an acquisition may have had external implications that may have indicated an unfavorable result when in fact the acquisition was successful. *External implications* may be defined as adverse market conditions, political unrest, or unforeseeable disasters within the time frame of the acquisition. The introduction of supplementary asset acquisitions may lessen potential volatility and therefore extend the scope of the variations beyond short-term value creation (Adavikolanu, 2008). Additionally, the global technology acquirers selected in this study may have had foreign revenue investments that may have distorted the domestic stock valuation during the CAR value analysis.

A second limitation was the data collected were limited to large public technical organizations comprised of data-center technologies, described as organizations that

manufacture software and computing solutions and do not comprise innovation in all businesses. The rationale for the hypotheses was that technological innovation, disruptive technologies, and emerging markets were all compliant to the data set but did not include all technological organizations in the United States that generate innovation. The high-technology industry data set collected in the current study had a sufficient representation of entrepreneurial start-up firms to determine if innovation is lost due to acquisitions.

Delimitations

The scope of the research was to identify areas within the technology industry in the United States that will be able to mature and innovate, transcending completely new industries, which will generate sustainable employment and wealth for Americans. The selected data set narrowed the population to a few highly publicized global technology firms from the United States with robust acquisition strategies and determined if the acquired firms would have generated transcending innovation if they had not been acquired. The study did not include acquisitions held by private entities or investment data held by private equity firms into technology start-up organizations, which would have presented innovative tendencies for institutions that do not affect global trends. Representation of the data included the innovation level of a particular targeted acquisition before and after an acquisition.

Significance of the Study

The significance of the study is prevalent where unsuccessful integration after an acquisition because of organizational, cultural, and policy differences will dismantle the

creative think tank of the stakeholders that enabled the acquired firm to succeed (Sarkar et al., 2006). Innovation requires an entrepreneurial mind-set, and after that strategic initiative changes through an acquisition, the stakeholders from the acquired firm will not be as creative because of the integration into a more formal culture. This lost opportunity is significant because the potential creation of the now-stalled ideas may have produced a new transcending industry, as Apple Computer did with the creation of the Apple Macintosh and the first graphical user interface (C. M. Christensen, 2003a). The innovative creation has the ability to change the way business and daily lives are conducted.

Tassey (2008) wrote that the economic dominance of the United States peaked in the 1960s, and in the 2000s, in addition to weak recoveries, sluggish growth, and competition from increasing global emerging economies, being competitive requires the adoption of growth policies that are implemented with additional resources. To achieve growth, innovative entrepreneurial organizations must be able to mature, thereby generating greater opportunity for sustainable new technologies. The consequence of the lack of successful integration therefore devalued stock, where an acquiring technology organization would have retained its potential value loss by not acquiring; the shareholder wealth would have increased due to positive cash flows through no cash layout during the unsuccessful acquisition transaction. Innovative technology will enable future generations to enjoy a better life, and letting entrepreneurial organizations grow will help (Estrin, 2009).

Review of the Professional and Academic Literature

Decreasing innovation from U.S. corporations, along with increasing competition from foreign emerging economies, has jeopardized the U.S. economy. Innovation in the United States has been the cornerstone of its success based on free enterprise and ingenuity that can transcend new technologies for competitive advantage (Hughes, 2004). An example of transcendence through innovation is Apple, Inc., which in 2011 was the second largest market capitalization company in the world behind Exxon Mobile Corporation, and in 2010 became the largest technology company in the world, passing Microsoft (Svensson, 2011). Technological innovation in corporations such as Apple, Inc., takes many disciplines to be successful. In an interview with Neil Armstrong and Steve Jobs, founder and former chief executive officer (CEO) of Apple, Inc., Jobs was enamored with the enormous amounts of small and large innovations needed to put a man on the moon and determined that innovation had become his blueprint to develop a plan to put a computer in every person's hands for social change (Gallo, 2010). Innovation ingenuity will drive technology transcendence.

The challenges society faces with decreased innovation in the U.S. economic system can be attributed to flat investment in research and development by the U.S. government and corporations over the past few decades. Altman, Greenstone, Rubin, and Cannon (2010) noted that the future growth of the United States relies on appropriating expenditures on innovation by investing in research investment, but over the past two decades since the early 1990s research investment has comprised only 2.5% of gross domestic product. Ultimately, leaders in the United States should begin to look at long-

term economic strategies for sustainability. Aghion, David, and Foray (2009) studied the relevance of the systems theoretic approach for sustainability to progress in the United States, where advances in research for innovation must be in U.S. political, scientific, and corporate business policy. Long-term innovative policy to drive economic conditions in the United States will have sustaining implications (Tassey, 2008).

The knowledge gap that U.S. corporate organizations' sustainable policy is to acquire new start-up organizations instead of investing in organic research and technology themes was addressed in the current study. The policy of acquisition within the start-up entrepreneurial sector does not have transcending implications because innovation will be lost due to acquisition payouts that are too high. An example is the acquisition by Dell, Inc. of EqualLogic in 2007. Dell, a manufacturer of personal computer and server products and a reseller of storage technology products, had an acquisition ambition to enter the enterprise storage market. EqualLogic, a storage technology start-up founded in 1999 with revenues of $100 million in 2007 and a negative net income, was acquired by Dell for $1.4 billion (Kovar, 2007). In 2009, Dell announced that the total revenue of EqualLogic accounted for only $400 million on an acquisition of $1.4 billion just 2 years earlier (Mellor, 2009). Overpayment for technology acquisitions does not uphold the acquirer's stakeholder and market capitalization value; overpayment decreases the financial opportunity for corporations to invest in organic research and development initiatives, which lends to decreasing competitive advantage.

Another gap in the literature is the decrease of technological innovation due to inadequate postmerger integration. Efforts to leverage the technology of the acquired firm become mismanaged because of the disruption to the organizational process. Puranam and Srikanth (2007) studied 99 acquisitions by 43 acquirers and determined that 44% of the acquisitions produced no patenting activity, whereas 40% were considered integrated. Furthermore, inadequate integration can be linked to the nonretention of the acquired stakeholders. The leaders of entrepreneurial start-up organizations tend to be multi-task oriented, that is, involved in many layers of their business. Once acquired, their duties change or, if payout is acceptable, they exit the firm and compromise innovation (Graebner et al., 2010). The critical personnel elements that drive an entrepreneurial organization to innovation may leave the organization when acquired therefore are jeopardizing the continuation of innovation.

This literature review includes the most relevant contemporary and historical information concerning innovative technology start-up firms acquired by larger, publicly traded, global corporations. The intent of the literature review was to analyze the methodologies used in research on the issues of mergers and acquisitions, corporate business strategy, sustainability, entrepreneurship, innovation, technology disruption, financial implications, patent generation, stock price fluctuation, and stakeholder retention aspects of both start-up target firms and their acquiring public firms before and after acquisition. Zhao (2009) revealed that large global strategies will continue to overpay for start-up technology firms and will not receive the return on investment they

have calculated, resulting in diminished innovative and creative fervor in the acquired company compared to before acquisition.

Literature Review Development Strategy

Information for the literature review was obtained by searching and examining research works, dissertations, and peer-reviewed literature in journals. The information was gathered through a range of portals that included electronic resources (ABI/INFORM Complete, Business Source Complete, ScienceDirect, Emerald Management Journals, Management & Organization Studies: A Sage Full-Text Collection, Google Scholar, ProQuest, the Walden University library, and practitioner knowledge within the technology innovation construct. The following keywords and phrases were used: *acquisitions, business strategy, entrepreneurship, financial, innovation, mergers, research methodology, sustainability,* and *technology*. Full-text scholarly articles found in the Walden University database and other electronic resources, along with novels yielded more than 175 relevant sources, with 125 used in the study. Most resources not used in the study were not chosen because they were published before 2006, which is outside the 5-year cutoff of resources allowed in the study. Some resources older than 2006 were relevant to the study and were used. The search was limited to articles and resources specific to the high-technology industry, where the information used related to technology organizations relevant to the computing and software industries. The articles used from outside the high-technology industry pertained to the research methodology in the study.

Methodological Review

The foundation of the technology industry was shaped through disruptive technology that created innovation and new industries (C. M. Christensen, 2003b). The disruptive innovation theory and resource-based theory are organizational theories that focus on understanding how innovation is generated and how to manage the innovative process through acquisitions. The following is a description on how both theories supported the study.

Disruptive innovation theory. Disruptive innovation substantiated the study because disruptive innovation alters industry boundaries by displacing established technologies with newer aggressive innovation that could compromise an organization (Adner & Zemsky, 2005). Due to disruptive technology, corporate business strategies are acquiring innovative firms for competitive advantage, making it difficult for emerging technologies to sustain their creative aspects (Dewald & Bowen, 2009). Because of an era of diversification that led to the consolidation of the technology industry, large established corporate firms try to acquire smaller innovative firms, exploiting the target firms' qualities to foster their ingenuity for sustainability (Puranam, Singh, & Zollo, 2006). The side effect of consolidation is substantial—how an organization integrates an acquired entity will dictate the survival of that acquired organization. Ribeiro (2010) found that the survival of an acquired organization in mergers and acquisitions depends on the value of that firm, but certain general factors apply. The technological frontier, innovative capital, previous experience, age, and size are all important determinants for the survival of an organization (Fontana & Nesta, 2009). Such disruptive qualities have

an effect on the outcome of the acquisition event because organizations located by the technical frontier are more likely to be acquired.

The relationship dynamics on understanding different cultural attributes between executives of both the acquired and the acquiring firms' stakeholder retention, and the inability to bridge different organizational characteristics, will have an effect on how or why acquisitions fail (Zhao, 2009). The competitive advantage in successful start-up technology firms lies within the strategy process of managers that allows them to perfect themselves in real time for future events. Dewald and Bowen (2009) wrote that a cognitive perspective of a manager's responses to disruptive business models provides an important understanding to how entrepreneurial innovative organizations pose a threat to the management of the acquiring entity. The disruptive innovation theory exists if managers in a larger organization do not research a potentially new transcending technology and they risk a rapidly changing business environment or failure. C. M. Christensen (2003a) described the disruptive innovation model as a paralyzing effect on industry leaders. With resource allocation processes designed to support sustaining innovations, the quicker entrepreneurial technological start-up firms can go to market, the harder it is for established larger corporations to respond toward new technology advancements (C. M. Christensen, 2003a). Based on the disruptive innovation theory, the motivation of managers is the underlying reason why smaller innovative technology organizations are acquired, but innovative fervor will ultimately be lost with the unsuccessful integration of the acquired management.

Resource-based theory. The resource-based theory substantiates the current study because the focus of the resource-based view is how firms acquire, adapt, and integrate internal and external resource skills to capitalize on the changing environment when acquisitions are consummated (Uhlenbruck, Hitt, & Semadeni, 2006). Understanding that technology-innovative organizations are acquired by larger public corporations for diversification in the larger corporations' strategic portfolios, the resource-based theory provides a conceptual vantage point to explain the diversification methodology in a manner that management can grasp and implement (Wan, Hoskisson, Short, & Yiu, 2010). The resource-based theory is an important determinant of how an organization can adapt and excel in an acquisition environment.

The resource-based theory supports disruptive innovation by defining the internal resource capabilities toward the external competitive environment that exists in a firm. As disruptive innovation will challenge a firm's ability to compete, the resource-based theory provides an organization the ability to adapt to the changing competitive environment (Esteve-Perez & Manez-Castillejo, 2008). A firm's internal resource view will determine if the firm is capable of formulating the successful integration of an acquired organization. The resource-based view is the outlook of an organization on its ability to interpret its resource base and the resource requirements of the market of the acquired firm (G. K. Lee & Lieberman, 2010). To achieve sustainable competitive advantage through acquisition, the leaders of a firm need to exploit the full competitive potential of the firm's resources, but too often, the resources are compromised by diverse management practices. Yang and Konrad (2011) noted that after acquisition, diversity

management practices are compromised when corporate strategy and resource availability are not aligned, signifying that integration of an acquired firm requires extreme due diligence. The recourse-based theory may support a firm's ability to enhance its competitive intent, but if not aligned with an innovative corporate strategy may derail a company's initiative.

Acquiring Firms

During the late 19th and early 20th centuries, independent inventor entrepreneurs, fueled by university and private funding, created one of the most innovative times in the history of humankind (Hughes, 2004). Inventors such as Edison and Bell developed transcending technological advancements that catapulted the United States to the distinctive power that remains the largest national economic engine in the world (Hughes, 2004). Senge and Carstedt (2001) noted waves of technological advancement sparked innovation during the 19th century, such as the steam engine, railroads, steel, electrification, and telecommunications, as well as automotive and air transport, synthetic fibers, and television in the first half of the 20th century. These technological advances triggered "disruptive innovation" (C. M. Christensen, 2003b, p. 43), where old industries subsided and new ones were born.

The creation of the Apollo space program in 1961 triggered an innovative renaissance that paved the way for technological innovation to transgress in the United States. From 1961 to 1975, the ambitious Apollo program, although costly at $25 billion, provided a technological economic boost that propelled American ingenuity during the Vietnam War period toward technology transcendence (Gisler & Sornette, 2009). The

sprawling technological innovation from the Apollo program provided new ideas for technology-based start-ups. Entrepreneurial start-up companies such as Apple, EMC, Intel, Microsoft, and Oracle were born during this period as transcending innovative thinking organizations, but in the 2000s these companies, along with Cisco, Dell, Hewlett-Packard, and IBM, became global conglomerates due to aggressive acquisition strategies.

The matured technology industry has consolidated into diversified global enterprise organizations with large cash reserves that are able to purchase small start-up technology firms and fold them into their offering. Since 1995, IBM has purchased more than 100 companies to increase its portfolio with higher value offerings while reducing lower margin commodity divisions (Bramante, Frank, & Dolin, 2010). From 1993 to 2005, Cisco Systems acquired 120 organizations and developed a scalable business model to incorporate merger and acquisition formations (Li, 2009). The technology industry is a challenging environment where change is the only constant, and organizational leaders must constantly look at new and emerging technologies to survive. Kongpichayanond (2009) acknowledged that mergers and acquisitions are the key management business strategies to sustain growth. In 2006, U.S. firms conducted more than 8,000 acquisitions with a total value of $1,371 billion, which was a value 30% higher than the previous year (Adavikolanu & Korrapati, 2009). Acquisitions may be the business strategy target for global technology corporations' sustainability measure, but if this strategy transcends both the acquirer and the United States remains unknown.

Corporate business strategy. Time to market pressures in the technology industry often compromise a corporation's internal research and development strategy as too slow to compete against disruptive technologies. Organizations such as Cisco and Microsoft augment their internal research and development with robust acquisition strategies to fill gaps in product portfolios (Ransbotham & Mitra, 2010). When organizations are purchased, generally they are evaluated by their balance sheet and cash flows. This evaluation occurs in the technology industry with the inclusion of innovative intangibles, which can derail an acquisition. The underlying value of complementary technologies is how the acquisition of that technology can take place through the retention of stakeholders (Desyllas & Hughes, 2008). Acquisition integration through stakeholder retention due to the inevitable disruption of the acquired technology is most important. The acquiring firm must retain the stakeholders of the sought-after technology, whether they are the ownership, key engineer, or project management team, and the acquisition strategy must incorporate these individuals for the surviving entity to succeed (Paruchuri, Nerkar, & Hambrick, 2006). The shareholder framework in entrepreneurial firms is to be the key element for sustainability in an acquisition where an acquirer must identify the economically, socially, and ecologically driven stakeholders for a sustainable result (see Figure 1; Schlange, 2009).

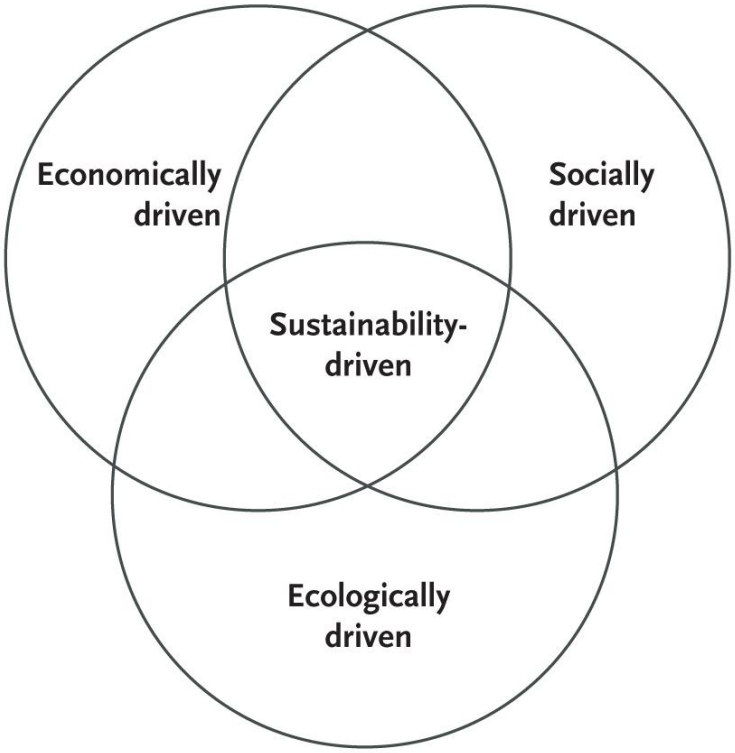

Figure 1. Sustainability-driven entrepreneurship as a concept of intersection. From "Stakeholder Identification in Sustainability Entrepreneurship," by L. E. Schlange, 2009, *Greener Management International*, *55*, p. 19. Copyright 2009 by L. E. Schlange. Reprinted with permission (see Appendix A).

The technology industry moves at a very fast pace and the key to corporate sustainability is innovation through competitive advantage, yet many companies lack a well-communicated technology implementation strategy. Strategic roadmaps are an effective way to initiate a technology strategy, yet only 27.6% of businesses develop a technology roadmap (Cooper & Edgett, 2010). Integration of an acquired firm's technology is paramount for sustainability, but this management discipline is not widely used. Approximately 50% of technology implementation failures are due to internal

issues, and 27% are due to customer dissatisfaction (Chow, Goodman, Rooney, & Wyble, 2007). It is most important for organizations, especially because of the fast pace that is the nature of the technology industry, to develop a technology innovation plan or face unsustainability. Nortel Networks, once a thriving networking company, was never able to recover from the dot-com crash of 2000 because the company lacked a clear corporate direction and strategy; in 2010, Nortel filed for Chapter 11 bankruptcy and will be broken up (Cooper & Edgett, 2010). The ability of corporate business structure to comprehend a technology strategy that is true to its market is an important element when organizations acquire other firms.

Sustainability. Global technology organizations must adopt sustainable measures through acquisitions for competitive advantage. Sustainable development in an organization has three goals most notable for sustainability in a business strategy in order to be innovative: environmental, social, and economic (Placet, Anderson, & Fowler, 2005). The idea of sustainable development through innovation has transcending implications. The economies of sustainability warrant a way to raise the standard of living of a large number of individuals while reducing the negative impacts on environmental economic activity (M. C. King, 2008). The implication of innovation in technology organizations lends itself to positive sustainable measures and social change in corporations.

Economic sustainability through acquisitions resulting in innovation and positive social change must have successful integration. For the successful integration of a transaction to occur between a buyer and a seller, a level of trust must be established due

to the asymmetric views of each party (Graebner, 2009). Graebner et al. (2010) established that buyers and sellers have different viewpoints, by conducting a survey of firms with less than 1,000 employees it was found that the sellers' top priority is to relieve personal pressures to eliminate stress resulting in sellers exit postacquisition. A top priority for successful integration is for the major stakeholders of the acquired organization to stay intact to create innovative sustainability. Generally, smaller entrepreneurial firms' stakeholders, based on aggressive fast-track energy with potential life-altering monetary gain, decide not to stay on as an employee when acquired. Schwienbacher (2008) noted that the entrepreneur's role, after venture capital invest in their organizations, will change to decreased involvement and cash out or to recapitalizing for increased venture capital ownership. In smaller firms, leadership is likely to be involved in day-to-day operations, whereas larger firms have many resources to provide resource advantage and the change can be difficult for an entrepreneur to bear (Graebner, 2009). The disadvantage for sellers in a capacity where they do not control their destiny after an acquisition dilutes the continuation and potential innovation loss.

Social and environmental sustainability in corporations are part of the overall sustainability pie that has been emerging as an important consideration for global public technology organizations. The United Nations Global Compact-Accenture CEO study in 2010 surveyed 788 CEOs from all over the globe and showed 93% of CEOs indicated that sustainability is critical to the future success of their business (Leavoy & Phyper, 2010). The corporate sustainability model of an organization supports its sustainable performance and financial performance. The corporate sustainability model claims that

the inputs, outputs, processes, and outcomes of a business need to be productive enough to support a sustainable model (O'Dwyer, 2009). Social, environmental, and economic sustainability are all important strategies that are linked directly to financial performance to which business leaders are directing their efforts, and if corporations do not consider the parameters, they risk failure.

Mergers and acquisitions. Global technology organizations have been acquiring private start-up entrepreneurial firms in the United States. Compared with 2009, the number of technology merger and acquisition deals increased 41% in 2010 to 2,685 or $119 billion, of which private equity deals accounted for $19.7 billion (Preston, 2011). The history of acquisitions involving privately held entrepreneurial organizations surpasses the history of publicly traded firms; in fact, between 60% and 75% of the firms acquired in the United States between 2000 and 2004 were privately held, indicating a business strategy of corporations acquiring start-up innovative firms (Capron & Shen, 2007). Ma et al. (2009) noted that mergers and acquisitions have expanded over the past quarter century and are commonly used by corporations to achieve strategies and growth initiatives, which indicates that public companies are acquiring smaller technology-innovative organizations to enhance or diversify their current solution offering.

The technology industry has become one of the most cash-rich industries in the United States because of consolidation and maturity. Cisco, Microsoft, and Google have $105 billion at their disposal while Apple has amassed close to $50 billion in cash, which suggests that Apple, a company that normally does not acquire for growth, will begin to do so (Marino, 2011). The fact that Apple, an innovative transcendence organization,

will revert to acquisitions due to excessive cash flows, as did their competition, is unsettling. An example of acquisition intoxication can be seen with the high-technology storage industry's current acquisition strategy. Hewlett-Packard is careful about acquisitions because of its size, which is a $120 billion market capitalization (Austin, 2010), but in 2010 acquired 3Par after outbidding Dell for $1.6 billion on 3Par revenues of only $54 million (3Par, 2011). EMC followed suit with a $2.2 billion acquisition of Isolon, which completed the jockeying of overpriced acquisition due to excessive cash reserves (Marino, 2011). High-technology corporations are acquiring technology in a reactionary mode to outpace their competition, but who wins remains unknown.

Investment in new technologies that enable high-technology companies to gain competitive advantage over their competitors is not sustainable when the acquisition is made outside the acquirer's competency. Using the evaluation methodology to differentiate mergers and acquisitions with strategic fits from those without strategic fits, the results indicated that mergers and acquisitions were more successful with firms that had similar finances, management, and technology than with firms that did not (Hsieh & Tsai, 2005). Furthermore, Flowers (2007) noted that mergers and acquisitions for closely related organizations are easier to implement than for firms in unrelated industries, but remain difficult to integrate. Technology acquisitions that have unrelated technologies will tend to fail while similar technologies, if integrated properly, will tend to succeed.

Postmerger and acquisitions have an impact on technical performance. Through a regression analysis study of a subset of 35 companies, Hagedoorn and Duysters (2002) concluded that organizations must have a strategic technological similarity fit to succeed,

which underscores the importance of investors considering differences before acquisition due to the potential failure in integrating the targeted technology. The consideration that integration after an acquisition must drive the technical performance of both the acquired and the acquirer for sustainability becomes a paramount conversation. The acquisition effect on an acquirer's research and development intensity and productivity had a significant decrease of 8% in productivity and a decrease of 12.9% in intensity generated in a study of 2,624 acquisitions in high-technology U.S. corporations over a 3-year period (Desyllas & Hughes, 2010).

Mergers and acquisitions have some impact on innovation. Positive mergers and acquisitions have been associated with a firm's ability to integrate the acquired knowledge and alter the existing routines of its research (Altman et al., 2010). Acquiring organizations are motivated by the notion that the combination of two companies provides sustainable measures, but organizational leaders should consider implementation strategies. K. S. Christensen (2006) interviewed 120 employees after acquisitions and noted that innovation perception among employees on how to integrate an acquisition was mixed regarding the ability of the boards of directors or sponsors. The main stakeholders in the acquiring organizations must identify the right acquisition, and their integration strategy must be well thought out and executed properly.

Although technology-based organizations in the United States have adopted a business strategy to acquire entrepreneurial start-up organizations with excessive cash incentives, the dynamics of the innovative process within the fabric of the entrepreneurial process is compromised. Value leakages from acquisition premiums in technology

mergers and acquisitions tend to reduce gains and increase costs, resulting in decreasing shareholder value. Acquisition premiums are the price paid for an acquired firm that exceeds its preacquisition market value, and over the past 20 years, the average premium has been 40%–50% (Hitt et al., 2009). Technology acquisitions continue to overpay for technology, resulting in shareholder devaluation.

Target Firms

The drive of technology invention has been the strategic cornerstone for innovation in the United States. During the hundred years following 1870, Americans created the modern technological nation with inventions such as incandescent light, the radio, the airplane, gasoline-driven automobiles, and the computer (Hughes, 2004, p. 3). These inventions were made by creative individuals through self-funding, government, or institutional funding; thus, the entrepreneur was born and paved the way for the modern technology entrepreneur. The modern technology entrepreneur was conceived through the explosion of technological innovative transcendence during the Apollo space program from 1963 to 1972, which enabled clusters of high-technology areas to flourish (Gisler & Sornette, 2009). Clusters of high-technology industry incubators accounted for the majority of technology start-up firms by fostering innovation through multiple layers of entrepreneurialism, disruptive technology, and financial implications noted as the entrepreneurial society. The entrepreneurial society refers to technological knowledge-based start-up firms that are the driving force for economic growth, employment creation, and competitiveness in the United States (Audretsch, 2009). Entrepreneurial

technological innovation continues to be the primary criterion for U.S. economic transcendence.

Creative individuals continue to drive innovation in the United Sates by means of personal ambition through technological talent and institutional funding. The United States is the world leader in scientific education and venture investment, where entrepreneurial start-ups are more likely to access knowledge through the combination of existing business, academic, and capital resources to generate science-based entrepreneurial firms (Colombo, Mustar, & Wright, 2010). Although the current economic technological nurturing environment may have transcending implications, too often the entrepreneurial stakeholders decide to be acquired before their technology can mature and transcend**.**

Entrepreneurship. Entrepreneurial firms represent a large percentage of job growth and innovation in the United States. In 2007, approximately 5.5 million firms existed in the United States, of which about half a million were created by new start-up innovation and generated approximately 40% of the new jobs in that year (Strangler, 2010). The dependence of the entrepreneur on economic growth is imperative for the U.S. economy to transcend and to further the development of technological innovation for American prosperity.

The dynamics of the lead entrepreneur nurtures the innovative capability of start-up entrepreneurial ventures. This capability was demonstrated in a study focusing on 112 entrepreneurs in the high-technology industry that showed a positive relationship toward entrepreneurial leadership and new patent generation as the level of creativity of

entrepreneurial teams increased (M. H. Chen, 2007). Successful technology start-ups are commanded by innovative thinkers who are surrounded by a strong technical staff that works in unison. To be successful, the significant relationship between the competitive position of a company and the cooperative behavior of its people must include a clear strategy all participants understand (Shan, 1990). When a new start-up is acquired, the unique dynamic of the management structure must be analyzed and integrated efficiently for innovation to continue. In a study of 207 acquisitions of small technology firms by larger corporations, only 27 maintained the acquired management structure to be successful (Puranan et al., 2006). The philosophy of entrepreneurial leadership, which has a practical hands-on approach and motivates the firm's strategy process, is elaborate in the measure of the complexities that exist in innovativeness in new start-up technology organizations. Campos, Aguirre, Parellada, and Nuno (2009) created a model that shows that through the technology strategy process, new technology-based firms reaffirm the importance of the entrepreneurial philosophy to be the foundation of the firms' innovative essence (see Figure 2).

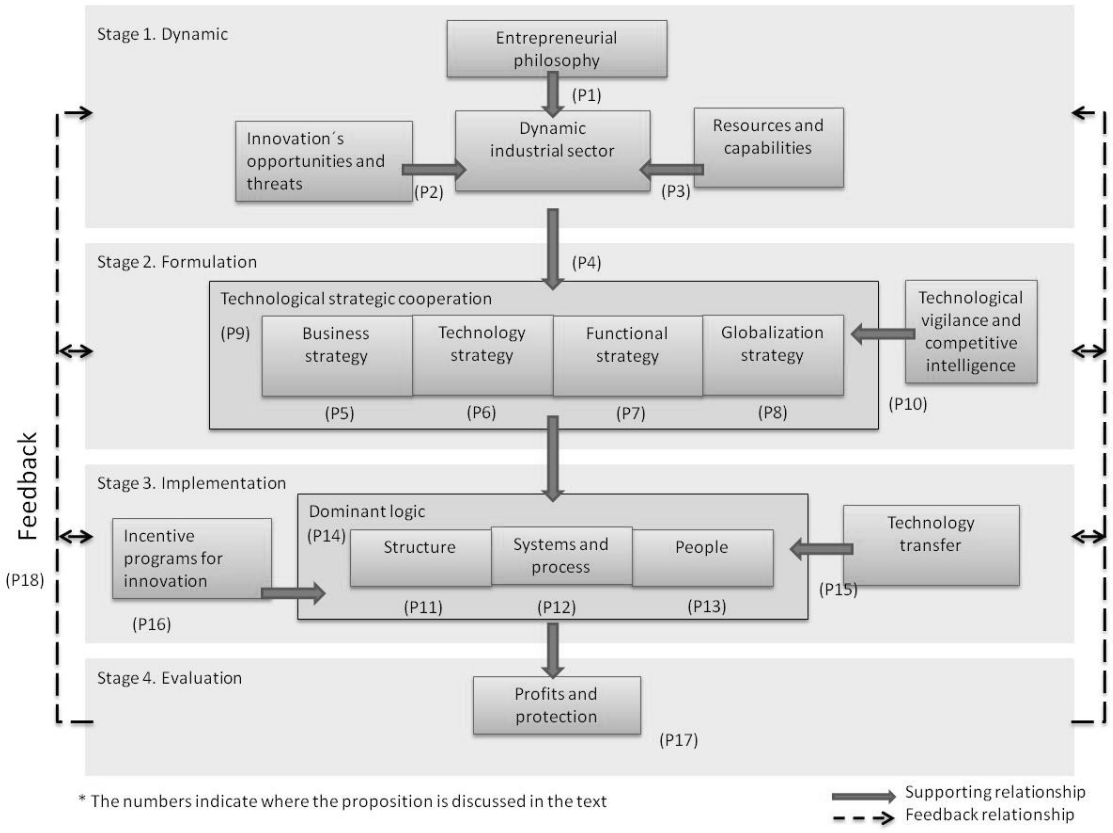

Figure 2. The technology strategy process. From "Technology Strategy and New Technology Based Firms," by H. M. Campos, I. P. Aguirre, F. S. Parellada, and J. P. Nuno, 2009, *Journal of Technology Management & Innovation, 4*(4), p. 47. Copyright 2009 by H. M. Campos. Reprinted with permission (see Appendix A).

Technology entrepreneurs must overcome many obstacles to achieve transcending technology. Having an exaggerated focus on core competencies at the early stages when solutions have not been crafted hinders a company's market potential (Boccardelli & Magnusson, 2006). Entrepreneurial managers must pay attention to the uncertainties that exist in both resource and market dimensions to avoid missing the timing of market potential. Timing an innovative market within the technology industry has many

restraints, but with a little luck, appropriate funding, and hard work the best ideas can lead to transcending new industries (Umesh et al., 2007). Furthermore, timing technological market potential may be limited to adoption by consumers, whereas the technology may be infant but transcending. When visiting a Xerox think-tank campus under nondisclosure with the permission of Xerox management, Steve Jobs stumbled on a technology within the business model of Xerox that did not provide innovation, but under Apple's later direction transcended the technology industry with the graphical user interface (Gallo, 2010). The suggestion that under the right leadership direction and economic conditions a creative technological idea can potentially generate transcending innovative implications motivates the American dream.

The motivation of technology entrepreneurs is to develop disruptive technology, but most importantly define the exit strategy. The majority of entrepreneurs initiate a business without an exit strategy. Only 45% of the 2004 *Inc. Magazine*'s 500 CEOs, which were the 500 fastest growing privately held companies in the United States at that time, reported that they started their companies with an exit strategy (DeTienne, 2010). Believing that a technology start-up does not have a defined end game plan leads to problematic dismantling circumstances, especially in the fast-paced technology industry.

Innovation. Technological innovation has been the driving determinant of economic growth in the United States. Technology innovation is an important sector for the United States, as more than 50% of the economic growth between 1945 and 2002 can be attributed to innovations in the high-technology industry (Makri & Scandura, 2010). Continued technological innovation to drive economic conditions is a necessity, but new

start-up businesses have many challenges. Eighty percent of new businesses fail; therefore, to combat business failure, leaders of new start-ups must build better theories (Tan, Fischer, Mitchell, & Phan, 2009). Building better theories for small business will create better business models for sustainable innovation. Business models are performances and encounters in which a presentation is to be displayed to an audience and contributes to a better understanding of an entrepreneur's understanding of their processes and functions (Doganova & Eyquem-Renault, 2009).

Innovation excels when different individuals group together for idea generation and to enhance a common business issue, where cluster management involves having multiple resources available due to the advantages of geography. An example is the Boston Route 128 belt, where 1,065 of the 4,000 companies related to the Massachusetts Institute of Technology with revenues of $230 billion or more are headquartered (Wonglimpiyarat, 2006). In technology cluster advantage areas, venture capital investment, integration of industries, university location, and government leading programs are prevalent and yield innovative organizations (Wonglimpiyarat, 2006).

The climate for innovation in organizations before and after acquisition lies in research and development, but when organizations are acquired with similar research and development in related industries, innovation tends to decrease, while partners in unrelated research lines increase after acquisition. In a data set comprised of 72 technology acquisitions with and categories, 84% of the research and development in related organizations decreased while 22% of the research and development in unrelated organizations increased (Ruckman, 2009). Although acquired organizations with the

same subset of technology as the acquirer may add to the structure, they do not have innovative transcending sustainability. According to D. R. King, Slotegraaf, and Kesner (2008), target acquisitions have a negative impact on a firm's research and development, resulting in decreased innovation.

New firms must survive the first few turbulent years to generate creative disruption for innovation. A 32% decrease in start-up company failure occurs when organizations are aligned for innovation (Sarkar et al., 2006). Innovation is the function of a set of elements: entrepreneurship through courage and vision; institutions in a social, economic, and cultural frame; capabilities within a developed group of resources and competences; and capital of financial resources (Zawislak, Borges, Wegner, Santos, & Castro-Lucas, 2008). The set of elements must work together for a sustainable result; hence, effort must be produced for the appropriate outcome.

Disruptive technology. Disruptive technological innovation is a technology that supports start-up technology firms and if successful can transcend an industry. Some examples of innovation that transcended the technology industry are the personal computer, the router, Kodak's original camera, and Xerox's original photocopier (Eucher, 2011). Technology disruption is a major concern for established public companies, and the level of not understanding the new technology effect on their business can potentially be devastating. A classic example of disruption is Cisco's creation of the router, which became disruptive to Lucent, but when a little-known company named Linksys created the wireless router, the technology became disruptive to Cisco; Linksys was later purchased by Cisco to mitigate the disruption (Eucher, 2011). Acquisition behavior is

generated when technology start-ups create a window of opportunity to dismantle an established public firm's business strategy by producing disruptive technologies.

The leaders of new start-up firms must adopt and understand the complexities of the disruptive technologies before embarking on such a difficult task. Klimis and Wallis (2009) noted the disruptive role of new technologies could hinder or facilitate entrepreneurship and innovation. Cloud computing is an example of a disruptive technology on a potential innovation that has been adopted by U.S. corporations and emerging economies. Katzan (2010) defined *cloud computing* as, "an architecture for providing computing service via the Internet" (p. 1). At the chief technology officer roundtable at a cloud computing seminar with participation of the top chief technology officers from companies such as Amazon, Google, and Sun Microsystems, Creeger (2009) acknowledged that because of the disruptive cloud computing technologies, their corporate activity is to acquire new start-up cloud organizations before they become established and transcend. Although cloud technology can be considered an innovative transcending technology identified by large global corporations, the technology may not be mature enough to be sustainable to an acquiring organization. Hayes (2010) acknowledged that the cloud is both "a fuzzy marketing term" (p. 46) and a tangible technology, where investment from corporations to acquire cloud organizations may distract true investment. Global technology companies must take notice of new technology, but disruption timing and the understanding of consumer appetite for the potential disruptive technology are important considerations.

The timing of disruptive technologies is based on many elements such as funding, market potential, and stakeholder endurance with many obstacles to fail, but if orchestrated correctly disruption can develop incredible results. Founded in 1998, Google was the idea of information utility, a Web-based concept developed in the 1970s; in 2009, just 11 years later, the stock price was $600 per share and the company had a market capitalization of around $200 billion (R. Chen, Kraemer, & Sharma, 2009). The ability to develop such a large market capitalization in such a short time, creating transcendence, dominates the American innovative process and creates a need to understand a common theme for such an impact of the economic implications. The disruptive innovation theory has had a significant impact on management practices, where new entrants have an advantage compared to larger public technology organizations because of their smaller size, shorter histories, and more limited commitments to current structures (D. Yu & Hang, 2009). A timetable appears in Figure 3. New start-up firms must overcome a multitude of challenges to succeed in understanding the complexities of developing a disruptive technology. Financial implications, timing of the market, and stakeholder endurance all contribute to a shorter go-to-market strategy.

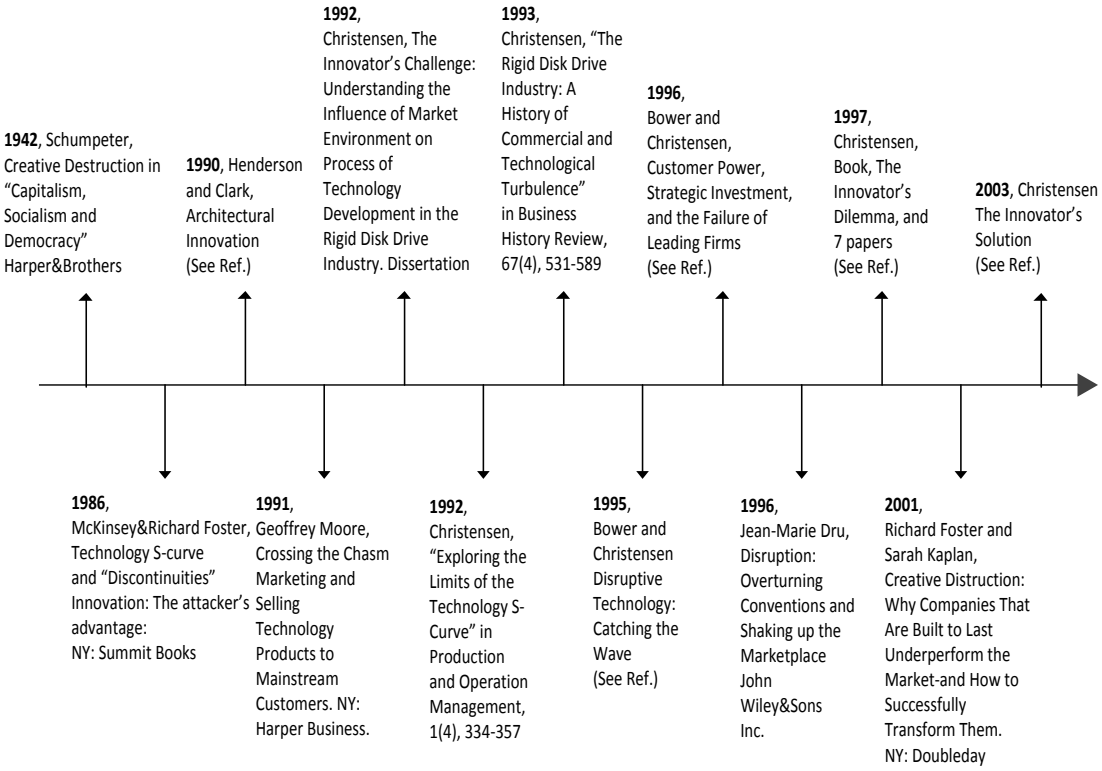

Figure 3. Timeline of the evolution of disruptive innovation theory. From "A Reflective Review of Disruptive Innovation Theory," by D. Yu and C. C. Hang, 2009, *International Journal of Management Reviews, 12,* p. 2. Copyright 2009 by D. Yu. Reprinted with permission (see Appendix A).

The disruptive technological implications can be structured in two ways for entrepreneurial start-ups to succeed: by developing a disruptive technology that can transcend an industry and by understanding the incredible dynamics an entrepreneur must orchestrate with the multitude of challenging factors to achieve success. Out of a selection of 710 relevant entrepreneurial technology companies, only 121 of the analyzed organizations used strategic modeling for innovation, and 79% of these were deemed innovative with an effective innovative technology model suggesting that disruptive

technology and entrepreneurship overcame potential failure when organizations focused on strategic modeling (Carlo, Lyytinen, & Rose, 2011). Disruptive technology is the cornerstone of the transcendence of technological entrepreneurial start-ups in the technology industry, and established public firms are targeting disruptive technology organizations for acquisition on an excessive financial level, making the acquired stakeholders financially sound. By making these stakeholders financially sound, their early exits are compelling.

Financial implications. The financial implications for entrepreneurial start-ups hinge on the ability of the entrepreneur to raise funding that enables an organization to continue to operate for a time before revenues are compromised. The three areas to consider in raising funds are self-funding (or *bootstrapping*), bank lending, and venture capital (D. Smith, 2009). These three areas have varying levels of commitment that entrepreneurs will have to consider regarding how much ownership and control on management decisions they will give up, which can determine if an acquisition is inevitable.

Self-funding, also termed *bootstrapping*, enables entrepreneurs to start up their organization by not giving control to any outside resource. Bootstrapping involves launching a new venture with limited personal funds without relying on long-term external financing or using highly creative ways of acquiring resources without borrowing from traditional resources (D. Smith, 2009). Bootstrapping has lower liquidity, higher leverage, and lower profitability than other methods. Young bootstrapping firms, firms between 5 and 15 years old, have significantly lower liquidity

and profitability than firms that are 15 years and older (Ebben, 2009). Young self-funding entrepreneurs are most likely not positioned to be acquired.

Bank financing requires an organization to secure funding on the assets of the organization and generally requires the entity to have a record of accomplishment of revenues before the bank will lend finances, indicating the organization must be mature enough for a substantial investment. Winton and Yerramilli (2008) surmised that bank financing is a viable option if an organization is not a risky proposition and the lending is proportionate to the organization's asset value, where bank monitoring on financial activity is lessened. Bank or debt financing is not considered the most frequently chosen method of innovative organizations. Only 12% of innovative entrepreneurial start-ups in the planning stage have debt financing, whereas 19% have debt financing in the early stage; innovative new ventures that cannot attract financial resources for new inventions will fail (Audretsch, Bonte, & Mahagaonkar, 2009). Although bank financing has transcending potential due to the ability to fund with less monitoring from external resources, market timing for innovation due to the length of the venture may lend to stagnation.

Venture capital is the most popular form of funding for innovative entrepreneurial start-ups, but ownership control is then given up. Venture capital, the pure financial advisor, in addition to providing monetary capital, human capital, and advice, in return for their investment and guidance venture capital firms gain an ownership percentage of the start-up (Fulghieri & Sevilir, 2009). From 1978 to 2004, venture funding increased from $424 million to $21 billion (De Clercq, Fried, Lehtonen, & Sapienza, 2006).

Increased investments in venture capital firms are also the result of creative cluster technology locations throughout the United States that provide a high level of technological competence for universities. Venture-backed firms in Silicon Valley absorb 20%–26% of the total venture capital investment in the United States and by 2000 housed more than 25,000 technology firms and provided 670,000 well-paying jobs (Zhang, 2007). Venture capital investment in the high-technology cluster areas such as Silicon Valley and the Route 128 belt in Massachusetts are the most influential areas for public companies to be acquired. Ten universities, 180 venture capital companies, 392 recruitment companies, and 700 merchant banks devoted to the high-technology industry exist in Silicon Valley, and in 2000, acquisitions by large public companies in this area represented 25% of Silicon Valley technology start-ups (Ferrary & Granovetter, 2009). Venture-capital-funded technological start-up firms are being acquired.

Of the three financial elements for entrepreneurship, venture-capital-backed financing organizations have the most potential for being acquired and have the ability to transcend due to the fast-track innovative process. In the first quarter of 2010, 81 innovative entrepreneurial start-ups with a total value of $2.3 billion and backed by venture capital were acquired by cash-rich public organizations (Quinn, 2010). Venture-capital-backed technological entrepreneur firms are on a fast track toward innovation and acquisition. According to a VentureXpert data set conducted between 1980 and 2004, a sample of 3,756 entrepreneurial portfolio companies from an information database of 67,505 concluded that 38% of the start-ups were acquired (Fitza, Matusik, & Mosakowski, 2008). Venture-capital-backed technological start-ups are being positioned

for acquisition by venture capitalists, and innovation becomes the conversation for continuation.

Control Variables

The determination of whether innovation is lost due to acquisitions is comprised of the measurement of patent generation, stock price fluctuation, and stakeholder retention analysis before and after an acquisition of a smaller entrepreneurial start-up is made by a public technology organization. Raghu et al. (2008) determined that patents are important determinants of a firm's intellectual property, and Khallaf and Skantz (2007) noted that stakeholder expertise in acquisition has an effect on the market value of a firm. The control variables determined the essence of the current study by supporting the endurance of the study's significance. By subjecting the data to rigorous analysis, the control variable provided a subjective picture that innovation is lost when technology organizations are acquired.

Patent generation. Patent generation in an entrepreneurial organization is the means through which a firm can measure if innovation exists. In a sample of 1,194 international high-technology sector organizations, 85% were considered innovative due to increased research and development expenditures resulting in increased patent counts (Hagedoorn & Cloodt, 2003). A major indication if innovation continues postacquisition is through continued patent generation. Patents within the technology industry increased from 66,170 in 1980 to 157,717 in 2005 (Desyllas & Hughes, 2010). The increase indicates that intellectual property and patent generation are important for an organization to possess a competitive advantage, and infringement of a company's proprietary

information jeopardizes that institution (Raghu et al., 2008). Innovation can be defined through patent generation.

Patent generations decrease after an acquisition and jeopardize the initial innovation the acquired firm possessed before being acquired. In a dataset of 3,858 individual patents extracted from the U.S. Patent and Trademark Office, using the recent patent indicator variable that was set to 1 if the target firm held one or more patents during the 3 years prior to the acquisition and 0 otherwise, only 25% of targets had patents 3 years after the acquisition (Ransbotham & Mitra, 2010). Patents can be measured to find out if innovation decreases by the number of new patents produced after an acquisition.

Stock price fluctuation. Conducting CARs by using stock price is a method of measuring if an acquisition is successful or not. This widely used research technique measures the abnormal effect of a firm's stock market value during a short period of time, usually 2 days before and 2 days after an acquisition, which creates a 5-day window of activity to understand the response of the stock market and the investment community to the acquisition (S. Lee & Connolly, 2010). An example of a stock valuation trending downward by using the CAR model is when acquisitions that decide not to reinvest in research and development after the acquisition of a target firm will most likely decrease the acquirer's stock market value. Although in many cases innovation may be lost due to inadequate integration, in a study conducted using a sample of 129 mergers and acquisitions in the United States, Hsu, Kin, and Song (2009) found that firms that write-off in-process research and development 2 days after a merger and acquisition have a

2.73% decrease in stock valuation. The notion that the investment community gathered knowledge of low investment in research and development created a downward trend, indicating that reduced investments in this area decrease innovation. Kallunki, Pyykko, and Laamanen (2009) noted in a study of 1,879 high-technology industry mergers and acquisitions in the United States from 1993 to 2006, 75% of the firms that did not invest in the research and development integration process had a decrease in stock price. Negative stock price fluctuation is due to a low investment in research and development after acquisition and can impede innovation.

Negative stock price fluctuation indicates that innovation and market capitalization of the acquiring firm have decreased postacquisition, but additional factors may also lead to a decrease in shareholder value. Leakage of shareholder value or market capitalization can occur from the inadequate integration of the acquired entity due to a preoccupation in empire building. Meyer (2008) noted that preacquisition acquirers spend 80% of their organization's time on customer activity, whereas postacquisition they spend the same amount of time on internal affairs. Management's commitment to continue innovation after an acquisition is necessary, yet the cultural differences may lead to inadequate integration. Integrating the acquired organizational resources and knowledge base is a complicated process; because of inadequate integration in a recent study, patent generation was reduced to less than 50% of what was attained before acquisition, which decreased the market value of the surviving corporation (Graebner et al., 2010). Inadequate integration of the acquired management resources has an adverse effect on the stock price of the acquiring corporation.

Stakeholder retention. The retention of the stakeholders of the acquired organization has significant value to the surviving innovative process after an acquisition, but if not intact can have derailing tendencies. Executive vice president Paula Long, the driving force behind the early success in research and development for EqualLogic, resigned from Dell just 2 years after being acquired (Mellor, 2010), but revenues in 2007 were only $400 million on an acquisition of $1.4 billion (Mellor, 2009). Schlange (2009) determined that stakeholder-driven entrepreneurs are the reason for organizations' success, and removing that recipe of teamwork and inventiveness can be catastrophic to a firm's survival. For a technological entrepreneurial firm to continue innovation after being acquired, the stakeholders must remain intact, meaning all individuals who contributed to and continue to sustain the innovative process must remain for innovative sustainability to continue (Graebner et al., 2010). The innovative management makeup of the entrepreneurial technology start-up must remain intact after an acquisition for innovation to continue, but stakeholders for many reasons do not remain in the surviving acquirer's organization.

The motivation of entrepreneurial stakeholder exit strategies is an important element to understand how to address an acquisition, but many entrepreneurs lack a proper exit strategy when a firm was first incorporated. Only 45% of *Inc. Magazine*'s 500 privately held, fastest growing companies' CEOs of 2004 reported they had an exit plan, and although 65% of CEOs plan to leave their organization in 10 years, 43% have done little or no planning (DeTienne, 2010). Little or no exit planning in a fast-paced innovative environment may set the stage for venture capital investment.

Entrepreneurial start-up organizations that use venture capital do so as a means for raising capital and using an experienced management team, yet some venture-capital-backed transactions have multiple owners. Venture-backed transactions contain venture capitalists, angel investors, and individuals including the founders and key employees, all investing for their share of the investment (Fitza et al., 2009). The complexity of multiple owners with differencing agendas, where the stakeholders in the current study were defined as the founders and key employees of the target firm who were responsible for the innovative technology and knowledge transfer, may be compromising when the start-up is acquired. Mergers and acquisitions that focused less on the transfer of knowledge from the stakeholders and more on the financial implications of the venture investment experienced a negative effect on innovative performance (Cloodt et al., 2006), whereas acquiring firms that focused on organizations with greater innovative potential paid premium prices (Schwienbacher, 2008). Organizations that pay premium prices must focus on retaining the stakeholders for innovation to continue.

Empirical Research Related to This Study

Empirical studies that focus on the merger and acquisition of technology organizations and their apparent postacquisition results existed in the literature. The examination of these empirical studies provided a better understanding of the relationship that existed in previous research that supported the findings in the current research study. The following analysis of the empirical research supports this study.

In an empirical study, Ransbotham (2008) examined abnormal stock value returns during acquisition in the high-technology industry. Ransbotham searched the *Wall Street*

Journal, Business Wire, PR Newswire, and Dow Jones News Service, identified 238 acquisitions of technology firms in the telecommunications industry such as Cisco, Nortel, and Lucent, and then used an event study methodology or CAR to estimate the stock price using the market model and the market AR model. "The Market Model posits a linear relationship between the return on the stock and the return on the portfolio over a given time period" (Ransbotham, 2008, p. 18). Using the ordinary least square regression analysis on the data set over a period of 200 days ending 10 days prior to the acquisition announcement, the acquisitions of younger companies had a positive effect with stock price, whereas acquisitions of older public firms yielded a negative effect on their stock price (Ransbotham, 2008). CAR values may be considered a viable measurement tool for understanding stock market acceptance toward acquisitions.

In a second empirical study, Hagedoorn and Cloodt (2003) measured innovation by using multiple indicators to determine the relationship between inventive, technological, and innovative performance for indicator viability. In a study of 1,200 companies in four high-technology industries using the indicators of research and development, patents, patent citation, and new product development, it was determined that while the measurement of all the indicators combined was ambiguous, patent counts and citations in computer and office machinery scored above a 95% variance for reliable measurement (Hagedoorn & Cloodt, 2003). Patent counts and patent citations can be a viable measurement tool in determining if innovation continues postacquisition.

In a third empirical study, Desyllas and Hughes (2010) determined whether acquisitions become more innovative if the acquired knowledge base or stakeholders

remained in the surviving organization. In a study of 2,624 high-technology acquisitions from 1984 to 1998, Desyllas and Hughes (2010) determined that during the 3 years after an acquisition, a negative 8% effect occurs on research and development when stakeholder retention does not exist. Not retaining stakeholders may cause a decrease in research and development and innovation.

A review of these empirical studies revealed discussions that if a high-technology acquisition is not integrated properly and if the stakeholders of an acquired organization are not retained postacquisition, a reduction in research and development and a decline in innovation are likely. The social implications have economically driven consequences; for example, if research and development declines and competitive advantage decreases, jobs will be lost due to corporate downsizing. With nearly 75% of all households in the United States having a family member, friend, or neighbor being laid off or touched in one form or another because of merger and acquisition failure (DiGeorgio, 2003), the current research study provides information for research practitioners and business leaders who are contemplating merger and acquisition activity regarding the problems they face.

Transition and Summary

The basis of the current study was transcending innovation and how technology can generate sustaining economic value for the United States. With increased competition from emerging economies and larger firms acquiring smaller innovative organizations, the combination is having a compromising effect on the competitive advantage of U.S. corporations. Statistical data have shown that corporate value

decreases when start-up entrepreneurial firms are acquired by public corporations before they mature. Furthermore, without stakeholder retention and a compromising decrease in patent generation after an acquisition, a once-promising transcending technology dissipates. The disruptive innovation theory supported by the recourse-based theory identifies a rational motive that if entrepreneurial organizations are left alone, they can transcend into new technologies. The transcendence into new technologies by encouraging entrepreneurial firms to mature will enable the United States to compete in a competitive global economy, resulting in increased revenues and positive social change for Americans.

Section 2 contains a detailed account of the methodology chosen for the study. The section also contains an examination of the role of the researcher, of the study participants, and the sampling technique. Finally, section 2 contains a discussion of the data collection technique, data analysis process, instruments chosen to collect and analyze the data, and the reliability and validity of those instruments. Section 3 contains the results obtained from the data analysis.

Section 2: The Project

The project topic was to determine whether small start-up entrepreneurial innovative firms, when acquired by larger technology organizations, lose innovation and, in doing so, negatively affect the U.S. economy. Bordoff et al. (2006) contended that innovation has long fueled economic growth, giving rise to new jobs and new industries, and the economic growth throughout the world has been driven by science, engineering, and technological innovation. Leaders of large global enterprise organizations with excessive cash flows have embarked on a business strategy that involves acquiring start-up innovative firms that lose their innovation when acquired (K. S. Christensen, 2006).

The research study involved investigating acquisitions from the top technical global organizations in the United States using quantitative analysis. Creswell (2009) noted that within a quantitative study, researchers should specify the reasons for the method approach and identify key elements of the design early. The current project includes a discussion of the quantitative quasi-experimental research methodology, population and sampling, data collection and analysis, reliability, and validity of whether smaller start-up innovative organizations lose innovation when acquired. Section 2 includes (a) a restatement of the purpose statement; (b) a description of the role of the researcher; (c) a description of the participants; (d) a description of the research and design; (e) a description of the population and sampling; (f) a description of the data collection instruments, data collection techniques, and data collection organization techniques; (g) data analysis techniques; and (h) a discussion of the reliability of the instruments to be used and their validity for the study.

Purpose Statement

The purpose of the quantitative quasi-experimental study was to determine whether small start-up innovative firms lose innovation when they are acquired by larger public technology firms. Technology innovation that is lost due to acquisitions may result in a decrease of the economic environment by reducing job creation in the United States. K. S. Christensen (2006) noted that an acquisition in the technology industry destroys value; the price paid for an acquisition does not justify the subsequent performance of the acquired company and subjects the organization to unfavorable future economic conditions. The independent variable was large public technology organizations, and the dependent variable in the study was small innovative technology start-ups, and. The control variables used to measure if innovation lessons exist before and after the acquisitions are patent generation, stock price trends, and stakeholder retention. The quantitative research questions and hypotheses were determined through experiments utilizing data from historical documents and from data mining for statistical analysis. Through the data analysis, the researcher was able to determine if innovation was lost in acquired organizations by measuring the control variables. The results of losing innovation were then studied and analyzed by organizational leaders to implement the methodologies needed to drive successful acquisition strategies for economic and social sustainability.

Role of the Researcher

The role of the researcher throughout the data collection process was to collect, organize, analyze, and interpret the data. The researcher had extensive knowledge, over

20 years, in the high-tech industry as a business owner and partner with the public organizations that were researched. The researcher was also proficient with the data collection process by having the knowledge on where to locate information with the subject public organizations and their acquisitions. The data sets were also standardized to determine the significance of the data to make conclusions about the entire population. In the analysis of data, the statistical program SPSS Statistics 17 was used to perform the complex computations needed to test the data statistically. The researcher's significant knowledge and experience in the technology industry was able to interpret the results for clarity if innovative continued after an acquisition occurred of entrepreneurial start-up firm by public technology organizations.

Participants

The participants were purposefully selected from the U.S. stock market within the technology industry and were limited to companies that made many acquisitions between 2006 and 2010. Nonrandom assignment in quasi-experiments is important because the groups may be intact and available to the researcher (Creswell, 2009). The organizations were manufacturers of computer hardware and software that have global tendencies. The participants were the top 10 U.S. public technology companies in the standardized industrial code (SIC) of 357, which is the U.S. system for classifying industries, and their acquisitions over a 5-year period. A total of 213 data points were analyzed during the period chosen.

Research Method and Design

The objective of the study was to determine if innovation decreases after larger public technology organizations acquire smaller entrepreneurial innovative firms. The best way to measure if innovation fails after an acquisition is through quantitative analysis of the variables. In quantitative research, researchers rely on objective theories that can measure variables so that numbered data can be analyzed (Creswell, 2009). This approach uses a postpositivist worldview that includes a focus on determination, reductionism, empirical observation and measurement, and theory verification (Creswell, 2009). In quantitative research methods, the researcher isolates variables and applies analytics to associate conditions to generate trends.

The quantitative nonequivalent quasi-experimental (pretest and posttest) design was most appropriate for the study because measuring variables to decide if innovation decreases after the acquisition of a start-up entrepreneurial firm by a larger public technology organization required an analysis of historical data. Historical data are required for manipulating one or more independent variables against a dependent variable, with the control variables tested for clear continuity (Simon, 2010). The three major categories of quasi-experimental designs are the nonequivalent-groups, cohort, and time-series methods, but the most frequently used and subjected to pretest and posttest conditions toward control variables is the nonequivalent design (Simon, 2010). The control variables in the study were the core measurements for data analysis and produced the valid and reliable results for the study.

Method

The quantitative methodology in the study was based on the following research questions, and the null hypotheses were tested using a *p* value less than .05 to reject the null hypotheses.

1. For the entire sample, what is the patent generation rate before and after an acquisition?

   $H1_0$: Patent generation rate of the target firm was greater before acquisition.

   $H1_a$: Patent generation rate of the surviving firm was greater after acquisition.

2. For the entire sample, what is the stakeholder retention after an acquisition?

   $H2_0$: Stakeholder acquisition decreased after acquisition.

   $H2_a$: Stakeholder acquisition increased after acquisition.

3. For the entire sample, what is the stock price or CAR value fluctuation during the 5-day period 2 days before and 2 days after the acquisition?

   $H3_0$: Stock price trend decreased after acquisition.

   $H3_a$: Stock price trend increased after acquisition.

The quantitative methodology was appropriate based on the measurements of the independent, dependent, and control variables that predicted the outcome of innovation loss in technology acquisitions. A qualitative methodology was not appropriate in the study because whereas quantitative methodologies rely on statistical procedures toward the relationships to the variables, qualitative methodologies rely on the analysis of individuals or groups in the participants' setting (Creswell, 2009). The mixed methods methodology was considered for the study but presented challenges based on the

magnitude of interviewing the CEOs or the top stakeholders of the 10 technology corporations selected. The mixed methods methodology is becoming increasingly proficient, but is the third approach behind quantitative and qualitative analysis (Johnson et al., 2007).

Research Design

The study included a quasi-experimental nonequivalent (pretest and posttest) control-group research design to address the innovation trends between target start-up entrepreneurial firms and acquiring public technology corporations. According to Simon (2010), the quasi-experimental method includes a sample of convenience and is treated before and after to determine if any significant difference exists. The quasi-experimental nonequivalent (pretest and posttest) control-group research design is a popular quasi-experimental design where Experimental Group A and Control Group B are selected without random assignment, and both groups take a pretest and a posttest, but only the experimental group receives treatment (Creswell, 2009). With regard to measuring performance of the control variables against Firms A and B, quasi-experiments capture empirically the performance of the research questions by measuring the resources transferred in the strategic factor market resource acquisition (Clougherty & Moliterno, 2010). The quasi-experimental design was more appropriate than other experimental methods because quasi-experimental designs are not randomly assigned, which was a requirement for the analysis portion of the study.

Population and Sampling

The population consisted of public technology organizations and their acquisitions located in the United States. The organizations were chosen through the researcher's investigative efforts and solicitations of various trade magazines, industry and business knowledge, and professional communities. Random assignment was not appropriate in the selection process because of the need of similar organizations in the high-technology industry for consistency in innovation measurement. The intent of the study was to analyze the acquisitions made by these organizations between 2006 and 2010 to determine whether the organizations were successful and to determine if innovation was lost.

The sampling was based on the 10 largest technology companies within the data center technology industry in 2010. The sample was from SIC 357 (Computer and Office Equipment) within the U.S. Census Bureau and was based on market capitalization. Defining a firm's valuation on market capitalization is important because the valuation is proportional to stock price and encompasses the true value of a firm (Ko, 2009). Determining a firm's true value aided in the analysis of the results.

The focus of the study was to determine if innovation was lost due to inadequate integration of an acquired firm by the acquirer. The measurements to support if innovation was lost were from a statistical analysis in three areas: (a) stock price fluctuation during a window of time, (b) patent trend before and after acquisition, and (c) stakeholder retention of the acquired firm. The organizations analyzed were all public

entities; therefore, the data extracted were public information. Gathering the data from public documents ensured the validity and the reliability of the information analyzed.

Data Collection

The data for the study consisted of archival data collected from public information. The data collection process set parameters for the study by establishing a methodology for extracting data. This section includes a description of the instruments, the data collection techniques, and the data organization techniques for the study. Because this study is quantitative collecting public data, does not require a consenting process, describe how participants may withdraw, provide any incentives, data maintained in a safe place to protect the rights of the participants, no names of individuals, and finally a narrative of using an organization to collect data.

Instruments

The study included a quantitative quasi-experimental design. The quantitative quasi-experimental research design was more appropriate than other designs because the design provides a baseline of statistical historical data for sufficient power or structure to generate rigorous statistical data in a pretest and posttest format (Creswell & Plano Clark, 2007). The instrument used in the study was data mining historical documents from various websites for continuity of the population. The population or organizations selected were designated through organizations such as Yahoo! Finance and comprised the top 10 technology organizations based on market capitalization in 2010.

The 10 technology organizations chosen for analysis were subjected to an intense data mining process from Web-based software resources such as Capital IQ and other

Web-based financial software packages. The description of each organization was based on high-technology firms that focus on acquiring smaller technology start-ups. The data acquired were then subjected to the variables in the study, which were (a) disruptive technology start-up firms that provide innovation, (b) acquiring larger public organizations, (c) patent generation before and after an acquisition methodology (Appendix B), (d) stock price fluctuation during an acquisition, and (e) stakeholder retention after an acquisition. This information was public knowledge and could only be compromised if the researcher transposed the information incorrectly.

Data Collection Techniques

The technique chosen for collecting data in the study was sampling existing data that encompassed the statistical analysis of public merger and acquisition data between 2006 and 2010. Due to rapid technological change and in order to obtain an unbiased representation of the true current technology industry landscape, Tassey (2008) recommended that data should not be collected beyond 5 years prior to a study. Generating data over a 5-year period provided conclusive evidence for optimal results.

Data Organization Techniques

Data organization in the study was analytic in nature and a cataloging system was used to keep track of the data and emerging understanding. The cataloging system used for the study involved a spreadsheet and filed documents, with all documents being scanned into a database. The data were secured at the home of the researcher, at the researcher's office that has redundant backup, and to compact disk. The term for storing the data will be indefinite.

Data Analysis Techniques

Quantitative statistical analysis lies in the process of presenting and interpreting numerical data pertaining to the questions and hypotheses in a study. Techniques behind quantitative data analysis during an experiment require intensive statistical computation to provide optimal results. Due to the complexities of quantitative analysis in an experiment, rigorous data points, statistical expertise, and data fluency are needed and can be formalized in the following steps (Creswell, 2009):

1. Report the descriptive statistics.
2. Indicate the inferential statistical tests.
3. Use line graphics for baseline and treatment observations.
4. Report both statistical results of hypotheses testing, confidence intervals, and effect size.

The data collected from Capital IQ, Yahoo Finance, and other Web-based resources were imported from an Excel spreadsheet into PASW GradPack Version 18, previously known as SPSS, for statistical analysis. Analysis performed logically and sequentially addressed all research questions and hypotheses. The study included a Pearson correlation to examine the relationship of the variables between innovative target firms and larger acquiring public technology corporations. The Pearson correlation assesses the linear relationship between quantitative variables in a sample (Green & Salkind, 2008). The choice of the Pearson correlation was primarily based on the purpose of the study and the nature of the variables.

The data analysis was consistent with the research questions, hypotheses, and underlying theoretical framework of the study. Consistency throughout the sectors increased the validity and reliability of the study. The researcher answered the research questions and hypotheses following the data analysis, which indicated whether larger public technology corporations lose innovation due to acquisitions of entrepreneurial start-ups.

Reliability

The measurement of the continuation of innovation after the acquisition of an entrepreneurial technology firm by a publicly traded organization was the main theme of the study. The control variables were the patent generation, stock price fluctuation, and stockholder retention statistics before and after an acquisition. Patent generation can be a viable measurement tool because the number of patents generated by an entrepreneurial start-up before it was acquired may decrease after an acquisition and will determine if innovation has stalled (Zhao, 2009). Stock price fluctuation was measured by an event study using CARs, a widely used and accepted technique in which the results are estimated and statistically analyzed to determine the magnitude of an acquisition (Lee & Connolly, 2010). Stakeholder retention was measured by analyzing the length of time the founders and critical management were retained after 2 years of the acquisition. Schlange (2009) noted losing any support from the stakeholders or a critical group in an acquisition over the first 2 years compromise the venture. The combined measurement of the control variables brought a strong level of reliability to the study.

To uphold the integrity of the study, an additional reliability measure was conducted through examining intercoder reliability. Intercoder reliability is a procedure in which a researcher utilizes a second person to cross-check codes for agreement or reliability regarding the concepts of the codes (Creswell, 2009). The procedure increased the reliability of the study by creating an additional layer of testing that held the variables as credible sources for analysis.

Validity

Statistical methods using *t* tests and correlation analysis helped to verify the speculative relationships between the independent, dependent, and control variables in the study. Many studies in technology acquisitions employ rigorous statistical computation. Adavikolanu (2008) conducted a study using aggressive regression and correlation analyses on multiple hypotheses to determine the value creation in serial acquisitions of technology firms. External validity was based on the credible sources of the data, and internal validity depended on statistical analysis of the variables under analysis.

Transition and Summary

The study involved investigating the impact of acquisitions on entrepreneurial technical organizations. The quantitative method of research using structured record reviews was the best method to approach the study. Section 2 contained the purpose statement, the role of the researcher, the research method and design, the population and sampling method, the data collection process and implementation, and a discussion on the reliability and validity of the study. The study involved statistical analysis using the

Pearson correlation method in the PASW GradPack Version 18 software to validate the study. Section 3 contains the results obtained from the data analysis.

Section 3: Application to Professional Practice and Implications for Change

The purpose of the quantitative quasi-experimental study was to test the theory that transcending innovation is lost due to the acquisition strategies of larger public technological organizations acquiring smaller start-up innovative entrepreneurial organizations, controlling for patent generation, stock price trend, and stakeholder retention. The problem addressed was that new start-up companies with innovative ideas do not mature when they are acquired by larger companies and do not fully articulate potential industry-transcending innovation. The impediment of innovation may eventually jeopardize the U.S. economic condition, resulting in decreasing technological advantage against emerging global economies.

Section 3 includes a detailed account of how the study was conducted, the presentation of the findings, discussions of the ability of those findings with respect to the professional practice of business, and the implications for social change. The recommendations for action by stating who needs to pay attention to the results are addressed in this section. Finally, the researcher provides recommendations for further study and a summary and conclusions for the study.

Overview of the Study

The current quantitative study involved examining the innovation that was lost when start-up entrepreneurial firms were acquired by public technology organizations. The study included two statistical approaches, a paired *t* test and subscripted statistics, to understand the patent generation, stakeholder retention, and stock price fluctuation of 71 acquisitions by 10 public corporations.

The three research questions addressed in the study were as follows:

1. For the entire sample, what is the patent generation rate before and after an acquisition?
2. For the entire sample, what is the stakeholder retention after an acquisition?
3. For the entire sample, what is the stock price or CAR value fluctuation during the 5-day period 2 days before and 2 days after the acquisition?

The following null hypotheses and alternative hypotheses were tested using a *p* value less than .05 to reject the null hypotheses.

$H1_0$: Patent generation rate of the target firm was greater before acquisition.

$H1_0$: Patent generation rate of the surviving firm was greater after acquisition.

$H2_0$: Stakeholder acquisition decreased after acquisition.

$H2_a$: Stakeholder acquisition increased after acquisition.

$H3_0$: Stock price trend decreased after acquisition.

$H3_a$: Stock price trend increased after acquisition.

$H1_0$ and $H2_0$ were both rejected, which holds favorable to the study. In addition, $H3_0$ held true, which also holds favorable to the study. The next section provides a detailed presentation of the findings of the study.

Presentation and Findings

The purpose of the quantitative quasi-experimental study was to test the theory that transcending innovations are lost due to the acquisition strategies of larger public technological organizations acquiring smaller start-up innovative entrepreneurial

organizations, controlling for patent generation, stock price trend, and stakeholder retention. Public data sources for 71 acquired technology companies were examined.

Table 1 contains the frequency counts for the 10 parent companies that acquired those 71 companies. Parent companies that acquired the most companies were Cisco (28.2%), Microsoft (21.1%), and EMC (11.3%). A complete list of all the names of the 71 acquired companies appears in Appendix C.

Table 1

Frequency Distribution for Number of Companies Acquired (N = 71)

Parent company	*n*	%
Apple	6	8.5
Brocade	1	1.4
Cisco	20	28.2
Citrix	5	7.0
Dell	2	2.8
EMC	8	11.3
HP	7	9.9
Microsoft	15	21.1
Net App	3	4.2
VMWare	4	5.6

Table 2 displays the descriptive statistics for selected variables. The length of time these acquired companies were incorporated ranged between 0.5 years and 10 years

(M = 4.89, SD = 2.06). In addition, Table 2 provides summary statistics for patents, stakeholders, and the company's CAR value (M = -0.33).

Table 2

Descriptive Statistics for Selected Variables (N = 71)

Variable	*M*	*SD*	Low	High
Incorporation year	2002.55	2.31	1997.00	2007.00
Years incorporated before acquisition	4.89	2.06	0.50	10.00
Number of patents before	9.38	18.85	0.00	122.00
Number of patents after	1.03	3.04	0.00	18.00
CAR value (expressed as percentage)	-0.33	3.66	-13.61	9.25
Stakeholders before	3.97	1.13	1.00	6.00
Number of stakeholders after	1.63	1.28	0.00	5.00
Percentage of stakeholder retained	41.47	31.27	0.00	100.00
Patents per year before [a]	2.07	3.52	0.00	18.77
Patents per year after [b]	0.51	1.52	0.00	9.00

Note. [a] Calculated based on the number of patents divided by number of years incorporated.[b] Calculated based on the mean number of patents in the 2 years after acquisition.

Research Question and Hypotheses

The primary research question for this study was as follows: How do start-up entrepreneurial technical firms lose innovation when acquired by larger global public entities? The three related null hypotheses were as follows:

$H1_0$: Patent generation rate of the target firm was greater before acquisition.

$H2_0$: Stakeholder acquisition decreased after acquisition.

$H3_0$: Stock price trend decreased after acquisition.

To address Hypothesis 1, paired *t* tests were used to compare the number of patents generated before and after acquisition. The dependent variable was calculated two ways: unadjusted patents were calculated using the number of patents for the years incorporated before being acquired ($M = 4.89$) and for the 2 years after being acquired. For patents per year, the before acquisition number was calculated by dividing the number of patents generated by the number of years incorporated. Patents per year after acquisition was calculated by dividing the number of patents generated in the 2 years after acquisition by two. Inspection of Table 3 for both metrics indicated that significant declines occurred ($p = .001$) from before to after acquisition. This combination of findings provided support to reject Null Hypothesis 1.

To address Hypothesis 2, a paired *t* test was used to compare the number of stakeholders in the acquired company before and after the acquisition (see Table 3). A significant decline ($p = .001$) was noted ($M = 3.97$ vs. $M = 1.63$) where only 41% of the original stakeholders were still with the company 2 years after acquisition. This finding provided support to reject Null Hypothesis 2.

Table 3

Paired t Tests Comparing Number of Patents and Stakeholders Before and After the Acquisition (N = 71)

Variable and time period	*M*	*SD*	*t*	*p*
Unadjusted patents [a]			4.05	.001
Before	9.38	18.85		
After	1.03	3.04		
Patents per year			4.11	.001
Before	2.07	3.52		
After	0.51	1.52		
Stakeholders			14.03	.001
Before	3.97	1.13		
After	1.63	1.28		

Note. [a] Unadjusted patents were the number of patents for the years incorporated before being acquired ($M = 4.89$) and for the 2 years after being acquired. [b] Patents per year before acquisition was calculated by dividing the number of patents by the number of years incorporated. Patents per year after acquisition was calculated by dividing the number of patents generated in the 2 years after acquisition by two.

For CAR values, a significant change was considered any gain greater than 1% or any decline greater than -1% (Ma et al., 2009). Inspection of Table 4 revealed 25 companies (35.2%) had CAR values considered to be random fluctuations (between -0.99% and +0.99%). Also, 31% had significant or important gains in their CAR values

while another 33.8% had significant or important declines. Given that 69.0% of the acquired companies had CAR values considered to have only random fluctuation or a significant or important decline, the findings provided support to retain Null Hypothesis 3 (see Table 4).

Table 4

Distribution of Cumulative Abnormal Return (CAR) Categories (N = 71)

CAR category (% included)	*n*	%
Important decline (-13.61 to -3.00)	9	12.7
Significant decline (-1.00 to -2.99)	15	21.1
Random fluctuation (-0.99 to +0.99)	25	35.2
Significant gain (+1.00 to +2.99)	12	16.9
Important gain (+3.00 to +9.25)	10	14.1

Note. CAR values expressed as percentages.

In summary, public data sources for 71 acquired technology companies were examined to test the theory that transcending innovations are lost due to the acquisition strategies of larger public technological organizations acquiring smaller start-up innovative entrepreneurial organizations. For these acquired companies, the number of patents generated and stakeholders retained significantly declined in the 2 years after acquisition (see Table 3). In addition, CAR values either remained essentially the same (random fluctuation) or had significant declines for 69% of the acquisitions (see Table 4).

Applications to Professional Practice

The current quantitative study involved examining if innovation was lost due to acquisitions by examining the patent generation, stakeholder retention, and CAR values before and after the acquisition of 71 entrepreneurial innovative firms by 10 large public technology organizations. The results were consistent with the majority of the previous studies on the topic, showing a negative effect on acquisitions. The 71 target firms analyzed were start-up entrepreneurial firms incorporated in the United States, 10 years old or less, and purchased between 2006 and 2010. The 10 acquiring public firms were from the information technology sector and were computing, networking, storage, and software enterprises all incorporated in the United States.

The patent generation results statistically in the sample indicated a significant decrease in patents generated 2 years after the acquisition from 2 years before. The findings are important because patent generation is a strong indicator of whether innovation is prevalent in an organization. The innovative nature of a technology organization is to create transecting implications that enable economies to expand, and patent generation is a key determinant for this argument.

Stakeholder retention of the key employees of the target firm after 2 years indicated a significant decline. The stakeholders researched were the founders, CEOs, chief operating officers, chief technology officers, presidents, and vice presidents of engineering or other equivalent titles organizations may use. The majority of the target firms' founders and cofounders are considered the technical lead and operational stability of the innovative nature of the organization. Whether the technical founders maintain

employment after acquisition is a key determinant of whether innovation fails. Because the findings support a significant loss of stakeholders, the founders' employment retention can only be determined equivalent and innovation will not continue.

The impact on the stock value fluctuation after acquisition had a substantial decrease according to the results. The acquiring firms' stock price percentage fluctuation CAR value was compared to the Vanguard Information Technology Index CAR value. The acquiring technology firms were compared to the index to get a stronger perspective because all the public firms selected are included in the index portfolio. Having a substantial drop in the CAR values of these acquisitions over a 5-year period provides businesses the ability to compare the price paid for the target firm with the stock price lost and determine if the acquisition was favorable. The next section includes a discussion on the implications for change.

Implications for Social Change

The economic conditions in the United States, along with increased competition from foreign emerging markets, have had a profound effect on the prosperity of Americans and future generations, as discussed in section 1. The technology industry has the ability to transcend and create whole new industries, as Apple has done, which is now the second largest valued company in the world. But serial acquisition strategies by large public technology firms involve continually acquiring innovative organizations before they mature. If entrepreneurial firms are able to transcend and create new industries, many new opportunities would be available for individuals in the United States.

Many of the founders from the target companies were of foreign descent, and although these entities were incorporated in the United States, the organizations used technical resources from their home countries to outsource jobs not found in the United States. Furthermore, many of the foreign entrepreneurs become serial entrepreneurs because they understand the current technology venture capital investment system in the United States. Therefore, a need exists for sovereign U.S. individuals to follow these steps but continue to innovate without being acquired. The implication for social change is to provide Americans with the ability to innovate through technology education and let those entities transcend to create greater economic prosperity for Americans in the United States.

Recommendations for Action

The research findings provided significant recommendations for action by looking at how the U.S. economy can succeed for generations to come. For this to happen, the U.S. government must partner with private and nonprofit organizations and create an infrastructure for innovation, creativity, and ideas, which can involve supporting K-12 education and inspiring kids and teachers; providing incentives to universities that encourage practical innovation and entrepreneurship both inside and outside the classroom; creating inspired leadership; and supporting small business and microenterprise. The space race and the Apollo program happened because the project had a clear objective, inspired leadership, and significant investment in technology and the sciences that created the technology revolution from the 1960s. The U.S. government departments that would best serve in creating innovation are the Office of Innovation and

Improvement, the U.S. Department of Education, the U.S. Economic Development Administration, and the U.S. Department of Commerce.

Acquisitions of entrepreneurial innovative firms will continue, but corporate business strategies must consider the findings in the current study. The audience for the study will be corporate heads, business strategists, and entrepreneurs. To reach the appropriate audience, the results of the study will be disseminated through publications, with the entire study being published in the ProQuest/UMI dissertation database. The researcher also plans to publish parts of the study in several scholarly articles and publish a book on the subject studied.

Recommendations for Further Study

Based on the literature and current findings, in the high-technology industry acquisitions of start-up entrepreneurial innovative firms by larger public corporations measured for patent generation, stakeholder retention, and stock price fluctuation innovation is lost. However, the sample selected only included an acquisition window of 5 years, which may not define the complete story of the selected acquiring firms' history toward acquisition behavior or the integration success of the target firm. Because the selected corporations had long life cycles, meaning they had been incorporated for more than 10 years with an average of 29 years in business, encompasses many years and multiple business strategies that corporate heads had to execute acquisitions. Therefore, a recommendation for future study should include a longer acquisition window of at least 10 years to achieve a stronger indication of whether innovation is lost over multiple business strategies and leadership. Additionally, interviews of corporate heads will lend

greater credibility to the study and add insight to the habits of the business strategies, as well as valuable consideration on why acquiring target firms is more beneficial to that organization than internal research and development initiatives.

Reflections

As a founder and CEO of an information solutions partner of all the acquiring organizations in this study, the researcher began the study with the preconceived notion that innovation would be lost following the acquisitions by large public high-technology corporations of innovative entrepreneurial start-up companies. The expectation was to find scholarly literature closely related to the high-technology industry, although informative journal articles was analyzed, what was found did not provide much specific information on the acquiring firms and their target acquisitions. The researcher used his extensive experience with high technology to facilitate the data collection techniques utilizing online web resources to bridge this gap. Experience is important because on a business level as a practitioner, the researcher will be able to provide scholarly-based solutions to the business community in the high-technology industry. Furthermore, the knowledge gained from writing and collecting data during this doctoral study will be valuable and will aid in his company's growth and provide leadership toward technological innovative economic growth for U.S. society in the years to come.

Summary and Study Conclusions

Transcending technological innovation has been the cornerstone of American prosperity, but acquisitions of entrepreneurial start-up innovative firms by larger public technology organizations are jeopardizing innovation. The goal of the current research

was to determine if innovation is lost by examining 71 acquisitions of entrepreneurial start-up innovative firms by 10 larger public technology corporations, controlling for patent generation, stakeholder retention, and stock price fluctuation. The purpose of the data analysis was to determine if innovation decreased by examining if patent generation decreased, stakeholder retention decreased, and stock price fluctuation decreased after the acquisition of an innovative entrepreneurial firm. The results indicated that patents decreased after acquisitions, stockholder retention decreased, and stock price fluctuation decreased after acquisition. The outcomes indicated that the majority of acquisitions by public technology corporations' shows that innovation declines, but there may be additional research that can add to this study by increasing the number of years. Based on the results of this study addressing whether innovation decreases after acquisition, significant decline in innovation was shown. The Walden University Institutional Review Board (IRB) approval number for this doctoral study is 08-10-11-0189730.

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Appendix A: Permissions for Use of Figures

Subject : Re: Request for permission to use a figure in one of your articles

Date : Thu, Jun 23, 2011 08:37 PM CDT

From : Daniela Yu <g0500974@hotmail.com>

To : Bruce Crochetiere <bruce.crochetiere@waldenu.edu>

Please feel free to cite my paper for your study. All the best to your research!

Sent from my iPhone

On Jun 24, 2011, at 5:14 AM, Bruce Crochetiere <bruce.crochetiere@waldenu.edu> wrote:

Dear Dr. Dan Yu,

My name is Bruce Crochetiere a doctoral candidate at Walden University. I am writing you to request a written statement granting me permission to use a figure in your article "D. Yu and C. C. Hang, 2009. A Reflective Review of Disruptive Innovation Theory, *International Journal of Management Reviews, 12*" in my dissertation. My study focuses on transcending technological innovation: the impact of acquisitions on entrepreneurial technical organizations. I intend to use the figure "Timeline of the evolution of disruptive innovation theory" on page 2 in your article to describe the disruptive innovation theory timeline and its significant impact on management practices in my study. If at all possible, please reply to this email with permission or direct me to the appropriate resource.

Thank you!

Bruce Crochetiere, MBA
Doctoral Student
Walden University
School of Management and Technology
Mobile: (781) 248-9027
E-mail: bruce.crochetiere@waldenu.edu
Eastern Time Zone

Subject : Re: Request for permission to use a figure in one of your articles

Date : Thu, Jun 23, 2011 06:38 PM CDT
From : Hector Montiel Campos <hector.montiel@upaep.mx>
To : 'Bruce Crochetiere' <bruce.crochetiere@waldenu.edu>

Dear Bruce,

Of course, you can use the figure in the paper technology strategy and new technology based firms if you cite the source.

Saludos,

Héctor Montiel Campos
Centro Interdisciplinario de Posgrados, Investigación y Consultoría
UNIVERSIDAD POPULAR AUTÓNOMA DEL ESTADO DE PUEBLA
21 Sur 1103, Colonia Santiago
Puebla, Puebla. C.P. 72000
México
Tel: (52) (222) 229 9400 Ext. 7783
Lada sin costo: 01 800 224 22 00

De: Bruce Crochetiere [mailto:bruce.crochetiere@waldenu.edu]
Enviado el: Jueves, 23 de Junio de 2011 12:54 p.m.
Para: hector.montiel@upaep.mx
Asunto: Request for permission to use a figure in one of your articles

Dear Dr. Hector Montiel Campos,

My name is Bruce Crochetiere a doctoral candidate at Walden University. I am writing you to request a written statement granting me permission to use a figure in your article "H. M. Campos, I. P. Aguirre, F. S. Parellada, and J. P. Nuno, 2009, Technology strategy and new technology based firms. *Journal of Technology Management & Innovation, 4*(4)" in my dissertation. My study focuses on transcending technological innovation: the impact of acquisitions on entrepreneurial technical organizations. I intend to use the figure "The technology strategy process" on page 47 in your article to articulate a model that shows that through the technology strategy process, new technology-based firms reaffirm the importance of the entrepreneurial philosophy to be the foundation of the firms' innovative essence in my study. If at all possible, please reply to this email with permission or direct me to the appropriate resource.

Thank you!

Bruce Crochetiere, MBA
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Subject : Re: Request for permission to use a figure in one of your articles

Date : Tue, Jun 28, 2011 02:00 PM CDT
From : Dean Bargh <dean.bargh@greenleaf-publishing.com>
To : bruce.crochetiere@waldenu.edu
CC : Schlange Lutz <Lutz.Schlange@htwchur.ch>
Attachment : gmi55schl_fig1.jpg Save to My Files

Dear Bruce,

I hereby grant permission for non-commercial use in your dissertation (if it is subsequently commercially published, permission would have to be re-sought).

Please acknowledge source, i.e. taken from <author>, <article>, *Greener Management International* 55. Copyright © 2009 Greenleaf Publishing. Reproduced with permission.

Here's a JPG version if that helps.

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On 28 Jun 2011, at 19:04, Schlange Lutz wrote:

Dean,

Would you please give me your comments on the request below.

Thank you.

Regards,

LUTZ

Prof. Dr. Lutz E. Schlange
University of Applied Sciences HTW Chur
Comercialstrasse 24
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http://linkd.in/bQDpW5
www.htwchur.ch

Von: Bruce Crochetiere [mailto:bruce.crochetiere@waldenu.edu]
Gesendet: Donnerstag, 23. Juni 2011 19:37
An: Schlange Lutz
Betreff: Request for permission to use a figure in one of your articles

Dear Dr. Schlange,

My name is Bruce Crochetiere a doctoral candidate at Walden University. I am writing you to request a written statement granting me permission to use a figure in your article

"L. E. Schlange, 2009, Stakeholder identification in sustainability entrepreneurship. *Greener Management International*, *55*" in my dissertation. My study focuses on transcending technological innovation: the impact of acquisitions on entrepreneurial technical organizations. I intend to use the figure "Sustainability-driven entrepreneurship as a concept of intersection" on page 19 in your article to establish a shareholder framework in entrepreneurial firms as a key element for sustainability in my study. If at all possible, please reply to this email with permission or direct me to the appropriate resource.

Thank you!

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Appendix B: Patent Acquisition Methodology

Bruce,

I used two search engines on the USPTO website: 1) The patent assignment database (http://assignments.uspto.gov/assignments/?db=pat); and 2) the patent application search database (http://appft1.uspto.gov/netahtml/PTO/search-bool.html). Since all the searching was electronic, I don't have any paperwork to send you but I can explain how I searched.

I first went to the assignment database and searched for the target firm name, including variations of the name (LLC, Inc., LTD, etc). If more than one entity was found, I compared addresses and inventors, and researched on Google to determine if the companies were separate or associated. In the results page of the assignment database, I went through each patent and patent application to see if the filing date was before or after the date of acquisition. There were many duplicate patents and applications listed, so I counted each individual patent or application to get a more accurate number, as opposed to simply relying on the USPTO's number. I then went to the patent application search database, entered the target firm name, and selected 'assignee name' in the Field 1 box. The results listed all patent publication numbers the USPTO had on file for each target firm, but that can be deceiving, since some may have since issued to patents. I compared the results to the assignment database results, then looked at the filing date of each patent application that wasn't in the assignment database. I also compared each newly discovered patent application with each issued patent in the assignment database, to account for the any applications that had been issued and eliminate duplicates.

If you have any questions, please do not hesitate to call. I'm happy to help.

Best,

Daniel H. Landau
dlandau@hayes-soloway.com
HAYES SOLOWAY PC
175 Canal Street
Manchester, NH 03101
Tel: 603-668-1400
Fax: 603-668-8567

Appendix C: List of Acquisition and Target Firm

Acquiring firm	Target firm	Target firm incorporation year
Apple	Siri	2007
Apple	Quattro Wireless	2006
Apple	Lala.com/LALA Media Inc.	2006
Apple	P.A. Semi, Inc.	2003
Apple	Proximity	1997
Apple	Silicon Color	2006
Brocade	Silverback Systems, Inc.	2001
Cisco	LineSider Technologies, Inc.	2004
Cisco	Arch Rock Corporation	2005
Cisco	Rohati Systems, Inc.	2006
Cisco	Pure Digital Technologies, Inc.	2001
Cisco	Jabber, Inc.	2000
Cisco	PostPath, Inc.	2003
Cisco	Pure Networks, Inc.	2002
Cisco	Nuova Systems	2005
Cisco	Securent, Inc.	2004
Cisco	Navini Networks	2000
Cisco	Latigent, LLC.	2002
Cisco	Cognio, Inc.	2000
Cisco	NeoPath Networks	2002
Cisco	Reactivity, Inc.	2005
Cisco	Five Across, Inc.	2003
Cisco	Greenfield Networks, Inc.	2000
Cisco	Orative Corporation	2002
Cisco	Arroyo Video Solutions, Inc.	2002
Cisco	Metreos Corporation	2001
Cisco	SyPixx Networks, Inc.	2004

Appendix C Continued

Appendix C *Continued*

Acquiring firm	Target firm	Target firm incorporation year
Citrix	VMLogix, Inc.	2004
Citrix	Vapps	2002
Citrix	XenSource	2004
Citrix	Orbital Data	2002
Citrix	Reflectent	2000
Dell	EqualLogic	2001
Dell	Zing Systems, Inc.	2005
EMC	Kazeon Systems, Inc.	2003
EMC	FastScale Technology, Inc.	2006
EMC	PI Corporation	2003
EMC	Voyence, Inc.	2000
EMC	Mozy, Inc.	2005
EMC	Avamar Technologies, Inc.	1999
EMC	nLayers, Inc.	2003
EMC	Kashya, Inc.	2000
HP	Fortify Software	2003
HP	Melodeo	2003
HP	SPI Dynamics, Inc.	2000
HP	Tabblo. Inc.	2005
HP	Polyserve	1999
HP	Bitfone Corporation	2000
HP	Outerbay Technologies, Inc.	1997

Appendix C Continued

Appendix C *Continued*

Acquiring firm	Target firm	Target firm incorporation year
Microsoft	Interactive Supercomputing, Inc.	2004
Microsoft	DATAllegro, Inc.	2003
Microsoft	Powerset, Inc.	2005
Microsoft	Farecast, Inc.	2003
Microsoft	Komoku, Inc.	2004
Microsoft	Kidaro, Inc.	2005
Microsoft	YaData, Ltd.	2005
Microsoft	Calista Technologoes, Inc.	2006
Microsoft	Jellyfish, Inc.	2005
Microsoft	Stratature, Inc.	2001
Microsoft	Engyro Corporation	2000
Microsoft	Medstory, Inc.	2000
Microsoft	Softricity, Inc.	1999
Microsoft	Onfolio, Inc.	2002
Microsoft	SeaDragon Software, Inc.	2003
Net App	Bycast, Inc	2000
Net App	Onaro, Inc.	2002
Net App	Topio, inc.	2001
VM Ware	SpringSource, Inc.	2004
VM Ware	Tungsten Graphics, Inc.	2001
VM Ware	Blue Lane Technologies, Inc.	2002
VM Ware	B-Hive Networks, Inc.	2005

Curriculum Vitae

Bruce R. Crochetiere, MBA

EXECUTIVE SUMMARY

- Senior Executive with more than 20 years combined experience in corporate and start-up IT sales environments.
- Creative and innovative manager, administrator, public speaker, and entrepreneur, taking great pride in the ability to offer high-quality technology solutions that significantly reduce costs, increase revenues and mitigate business risks.
- Fast-track professional who thrives on challenges and takes a hands-on leadership role to position the company for growth in an ever-changing environment.
- Recognized for the ability to lead organizations through dramatic turnarounds and periods of high growth.
- Proven ability to combine high-caliber analytical and strategic planning skills with business development and marketing expertise.
- Skilled in creating highly cost-effective business management processes and infrastructures.
- Possesses exceptional written communication skills and ability to incorporate ingenuity with business savvy in successful start-up efforts, marketing strategies, and product branding.
- Recognized and sought-after public speaker, bringing a wealth of knowledge and highest levels of enthusiasm to all projects undertaken.

CORE COMPETENCIES

Business Development	Sales/ Marketing	Entrepreneurship
Information Technology	Process Improvement	Negotiation Skills
Operations Management	Strategic Planning	Cost Containment
Mergers/Acquisitions	Executive Recruiting	Integration Planning

PROFESSIONAL EXPERIENCE

Founder, CEO/President **1998-Present**
Focus Technology Solutions, Inc. Seabrook, NH

www.focustsi.com

Founder of privately held technology start-up focused on information technology and service solutions. Broad scope of responsibilities includes negotiating strategic partnerships to secure associated technology platforms, recruiting executive management team, facilitating mergers and acquisitions of service providers, sales operations and developing and leading technical and market development activities.

SELECTED RESULTS

- Developed, implemented, and monitored operating business structure for sales, with an emphasis on goal formation, establishing performance criteria and measuring the respective performance results.
- Grew company to over $22 million in Revenue and managed a $5 million plus operating budget.
- Strategically transitioned company from traditional value added reseller (VAR) to a Strategic Enterprise Solution Provider.
- Successfully maneuvered through Dot.com technology meltdown, 9/11 disaster in 2001, and through Financial Crisis of 2008-2010 by employing bootstrapping and strong value proposition strategies.
- Primary driving force behind the successful acquisition and merger with MCG, Inc., a Portsmouth, NH based solution provider in June 2001.
- Ranked number 488th in "VARBusiness 500" and 17th fastest growing technology company in North America- 2004.

RELATED PROFESSIONAL EXPEREINCE

Paramount Computer, Danvers, MA

Business Development Manager ……**1995-1998**

Data Care Corporation, Burlington, MA

Sales Executive……**1994-1995**

AmeriData, Lynnfield, MA

Account Manager……**1993-1994**

MicroAge, Lynnfield, MA (Acquired by AmeriData)

Account Manager……..…. **1991-1994**

MicroAge, Burlington, MA

Account Manager…….…….. **1990-1991**

The Atwell Company, Watertown, MA

Sales Associate……..…..**1989-1990**

EDUCATION

DOCTOR OF BUSINESS ADMISTRATION CANDIDATE- Expected graduation 2011
Technology Entrepreneurship
Dissertation: Transcending Technological Innovation: *"The Impact of Acquisitions on Entrepreneurial Technical Organizations"*
Walden University, Minneapolis, Minnesota

MASTERS OF BUSINESS ADMINISTRATION- 2004
Southern New Hampshire University, Manchester, New Hampshire

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION - 1988
Minor in Mathematics
University of Lowell, Lowell, Massachusetts

SPEAKING ENGAGEMENTS

Guest speaker at UMASS Lowell Beta Gamma Sigma graduation class dinner- May 2004

MEMBERSHIPS

SIGMA IOTA EPSILON; The National Honorary and Professional Management Fraternity