THE RELATIONSHIP BETWEEN ANSOFF'S CONTINGENT SUCCESS HYPOTHESIS, LOCATION, AND PROFITABILITY, FOR TECHNOLOGY FIRMS IN OR NEAR URBAN CENTERS COMPARED TO TECHNOLOGY FIRMS IN NON-URBAN (SUBURBAN) AREAS

A

Dissertation

Presented to the

Graduate Faculty of the

Alliant School of Management

Alliant International University

In Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

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by

Sidney E. Morse

San Diego, 2013

Abstract of Dissertation

THE RELATIONSHIP BETWEEN ANSOFF'S CONTINGENT SUCCESS HYPOTHESIS, LOCATION, AND PROFITABILITY, FOR TECHNOLOGY FIRMS IN OR NEAR URBAN CENTERS, COMPARED TO TECHNOLOGY FIRMS IN NON-URBAN (SUBURBAN) AREAS

By

Sidney E. Morse

Alliant International University

Committee Chairperson: Louise Kelly, Ph.D.

THE PROBLEM. This study examines strategic behavior of technology firms in urban centers, compared to those in suburban areas, as defined in Ansoff theory. It also evaluates innovation quality in those areas, and assesses the combined impact of both strategic behavior, and innovation quality, on enterprise performance. The underlying assumption of the research is that suburban technology firms outperform urban technology firms, thus, resulting in a suburban strategic location choice bias.

METHOD. The research sample consisted of a total of 201 public small-cap technology firms. Of that sample, 101 were located in defined suburban locations, and 98 were located in urban locations. Correlational analysis was applied to each sample sub-set, to analyze strategic behavior measures (Ansoff), and innovation quality factors for each sample location. Regression analysis was applied to the combined measures, to determine their relationship to enterprise performance. The research relied almost entirely on secondary data.

RESULTS. The first three hypotheses sought to measure gaps between environmental turbulence and strategic aggressiveness; strategic aggressiveness and capability response; and capability response and strategic investment (budget). In each, the hypothesis predicted that the gaps would be larger in urban technology firms than suburban technology firms. Two hypotheses were not supported. Those gaps were higher in suburban technology firms. The only hypothesis that was supported at the 95 percent confidence level was the strategic aggressiveness - capability response gap.

The fourth and fifth hypotheses respectively, predicted that innovation quality would be better in suburban areas, than urban areas, and that the same relationship in technology firm optimal performance level, would result from the impact of the combined strategic behavior and innovation quality measures. That hypothesis was not supported.

The overall results of the research, cast doubts on the validity of several key assumptions that support suburban technology firm location bias, and promote the need further research.

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Approved by:

Louise Kelly, Ph.D. Chairperson	Date
Dan Kipley, Ph.D.	Fred Phillips Ph.D.
Rene` Naert, Ph.D.	Lee White - Acting Dean

2013

DEDICATION

To my wife, Kristine Berg Morse,

for her unyielding support and encouragement.

In memory of Dr. Igor Ansoff,

whose intellectual imprint in strategic management

has inspired this work

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my committee members, Dr. Dan Kipley, whose Ansoff scholarship helped me navigate considerable hurdles in completing this research. I want to express the same to Dr. Fred Phillips, whose recognized scholarship in innovation and economic development played a key role in helping me combine two unique areas of research into a coherent study. I must also thank Dr. Rene` Naert, whose positive encouragement made a significant difference during some of the most challenging moments near the end of the research.

A very special thanks is extended to Dr. Louise Kelly, my Committee Chairperson, whose unique ability to carve through complex issues, and keep research projects on track, inspired me to reach for higher plateaus right at the moment when fatigue would ordinarily handicap such efforts and pushed me to strive for excellence. I can’t offer words sufficient to express my full gratitude for her leadership in this process.

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And finally, but certainly not last, let me express enormous gratitude to my wife Kristine, without whose love and unending support completion of this journey simply would not have been possible.

Dissertation Focus

The Relationship Between Ansoff's Contingent Success Hypothesis, Location, and Profitability For Technology Firms In Or Near Urban Centers Compared to Technology Firms in Non-Urban (Suburban) Areas

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THE RESEARCH PROBLEM

This is a strategic management dissertation research study that evaluates the relationship among the variables contained in the Ansoff *Strategic Success Hypothesis*, an innovation quality index model, and enterprise performance (profitability), of technology firms in urban centers compared to suburban locations. The purpose of the study is to determine what impact these relationships, if they exist, have on strategic enterprise location choice of technology firms.

The motivation for the study is founded on analysis in the literature, and direct examination, that a consistent pattern of suburban location bias has been detected, when analyzing the locations of technology firms in the U.S. nationwide.

The underlying assumption leading to the research motivation is that if differences in the strategic behavior of these firms are found to be insignificant as a determinant of enterprise success, then the suburban location bias should be challenged by the provision of researched information to technology firm executive decision makers.

If differences are detected to be significant, and found to have a negative impact on enterprise performance, this research seeks to explain the reasons such findings might emerge.

The research also examines validated factors determined to impact the propensity for the evolution of environments that promote and facilitate strategic innovation behavior, and thus attract technology firm location anchoring. Again, the purpose is to determine if there are significant differences in the presence of these factors between urban centers and suburban locations. Further, the research explores how differences in these factors might impinge upon strategic enterprise performance.

As in the examination of Ansoff variables, given an identified suburban location bias, the underlying assumption leading to the research motivation is that if differences in these so-called *innovation quality factors* between the two geographic designations, are found to be insignificant as a determinant of enterprise success, then the suburban location bias should be challenged by the provision of researched information to technology firm executive decision makers.

Conversely, if the *innovation quality factors* are found to have a significant impact on enterprise performance between the two geographic designations, this research seeks to explain the reasons such findings might emerge.

Finally, the research examines the relationship among the strategic posture variables (Ansoff), combined with the *innovation quality factors*, to determine their overall impact on enterprise performance (profitability).

Once again, the underlying assumption leading to the research motivation is that if differences in the combined variable sets between the two geographic designations, are found to be insignificant as a determinant of enterprise success, then the suburban location bias should be challenged by the provision of researched information to technology firm executive decision makers.

And as indicated in previous relationship analyses, if the combined variable sets between the two geographic designations, are found to have a significant impact on enterprise performance, this research seeks to explain the reasons such findings might emerge.

Problem Background

Over the last two decades, high technology has emerged not only as a leading industry, but it is transforming life for people all over the world. In the U.S., the high technology industry, is generally defined as firms engaged in computer and software development, electronic devices for home and mobile use, semiconductor manufacturers, information technology and other electronic business services. It also includes e-Commerce, as well as bio-technology research and product development. It has become an increasingly dominant component of the economy and is apparent in the way we work, communicate and engage in recreational activities in our spare time. The Department of Commerce's Bureau of Economic Analysis (BEA) categorizes these industries as "Information-communication-technology-producing" (ICT), and reports that ICTs (firms doing business in the technology sectors) accounted for 24% of real GDP growth in 2010, demonstrating its increasing presence as a segment of the national economy.

We saw the first signs of a transition to what has become "the digital economy" in the early nineties, when, in the U.S., society was introduced to the first models of the personal computer. Then, the Internet, previously used mostly for military use and by research institutions and universities, became the World Wide Web, and began to be embraced for mass information transmission and communication purposes.

Today, in the second decade of the 21st Century, we now have widespread use of not only personal computers that come in desktop and laptop form, but increasing use of cellphones, and personal digital assistants that have given rise to a new technology period commonly referred to as “the mobile computing era”. The stated aim of this transition by many of the ICT participants is to make communication and information seamless and accessible any time, any place.

Today, increased broadband infrastructure build-out has widened the potential for product development, and for content and other services to be delivered into both home and office. Handheld devices, i.e. music download devices (Apple-*i*Pod), cellular devices that are multi-functional, i.e. so-called “smartphones”, and a wide array of new services on the Internet, put us in the throes of a new technology revolution. Adding further complexity to this technology convergence is the emergence of bio-tech and nano-technology (molecular devices), that are predicted to integrate into existing platforms that increase product functionality in ways previously thought impossible.

However, as is reported in an early comprehensive study on technology industry dispersion, conducted nationwide by the Milken Institute, technology firms have largely chosen suburbs rather than urban centers in which to warehouse their productive capability. That study researched more than 300 metropolitan areas and found the largest concentrations of ICTs outside the boundaries of the urban centers that define them. It warned that “Metros” failing to pursue technology as a primary industry in the 21st Century, will be unable to compete economically and thus, will place themselves at significant risk (Devol, 1999). Since the first publishing of that report, we have seen increasing evidence of the slow but steady degradation of urban communities and rising unemployment.

Emergence of the "Digital Divide"

Early on when the Internet first became popular, there was concern over a potential "digital divide" between more affluent suburban dwellers and those living in largely urban, traditionally underserved communities. Surveys taken in the last part of the decade that ended in 2000, as well as those taken for the first half of the following decade, consistently showed black and Latino Internet adoption lagging behind the national average. However, an April, 2009 survey conducted by the Pew Research Center revealed that the shift occurring throughout society, namely, a migration to mobile communications devices with access to the Internet that began with cell phone use, was being embraced by blacks at a much more accelerated pace than the general society. The statement from Pew's report reads as follows: "African Americans are the most active users of the mobile internet -- and their use of it is also growing the fastest." It continues: "This means the digital divide between African Americans and white Americans diminishes when mobile use is taken into account." The report supports that statement by indicating that "48% of African Americans have at one time used their mobile device to access the internet for information, emailing, or instant messaging." The national average for such usage stood at 32% at the time of the report.

Such indicators, coupled with more recent data, suggest that urban dwellers are strong users of technology, adding further curiosity as to why technology firms have chosen not to plant industry there.

So, instead of a so-called "Digital Divide" creating disparate economic conditions in urban communities as had been feared early on, what instead has emerged is what this writer would characterize as an "Opportunity Divide," resulting from a stark gap in job creating firms locating in or near urban centers, technology enterprises being among them. If firms chose urban areas as a location, it would likely help alleviate almost two decades of double digit unemployment for some groups in those locations.

An example that vividly illustrates this point is reflected in the nationwide unemployment numbers for blacks, who occupy a significant percentage of urban populations. In November of 2011, the seasonally adjusted rate of black unemployment nationwide, according to the Bureau of Labor Statistics (Dept. of Labor), was 15.5 percent. The unemployment rate for Latinos was 11.4 percent. The national rate was 8.7 percent. Blacks saw unemployment rise as high as 16.8 in that same year, as the national rate hovered around 9 percent.

In November of 2012, the seasonally adjusted rate of black unemployment nationwide was 13.2 percent and 10 percent for Latinos. The national rate was 7.7 percent. Since the last quarter of 2008, black unemployment has been from 75 percent to double the national unemployment rate. Economists generally agree that nationally, when those who only work part-time, those considered under-employed, and those who have become so discouraged they have stopped looking for work, are added to the existing unemployment rate, that number rises by another half (around 25% for Blacks, 16% for Latinos).

In a stark example of just how bad this chronic unemployment has become in urban centers, government officials and economists studying the Detroit Metro Area, one of the most densely black populated cities in the country, estimate that contrary to published statistics, the real unemployment rate there could be as high as 50% -- an alarming situation relative to societal stability and public policy.

New Thinkers in U.S. Tech Development

This writer theorizes in this thesis that if more technology firms were encouraged to locate in urban areas, they would likely pursue hiring practices that would help mitigate the challenge of urban chronic unemployment. Devol's Milken Institute study also found that when "clustering" of technology firms occurs, it produces a range of other economic opportunities, jobs among them, in support service categories. What it also found is that the clustering of larger technology firms is often a catalyst for the emergence of considerable small business activity by entrepreneurs.

Dr. Richard Florida, formerly of Carnegie Mellon University and now Director of the Martin Prosperity Institute, an affiliate of the University of Toronto (and located there), published earlier work on this subject, but also advanced the findings of the Devol-Milken Institute study. Dr. Florida's research into urban regeneration echoed the Devol-Milken Institute findings regarding the benefits that accrue to metropolitan areas as a result of technology firm "clustering." However, his research went on to theorize that such clustering can have a profound impact on urban economic development because the clustering triggers the attraction of highly intelligent, creative and skillful people that elevate the geographic area's overall economic capabilities and prospects. His work culminated in several bestselling books including *The Rise of the Creative Class*, *Cities and the Creative Class* (Florida, 2005).

Edward L. Glaeser, renowned Harvard economist, states in an article, *The New Economics of Urban and Regional Growth* (Clark, Feldman, and Gertler, 2001), “The new economic growth theory suggests that cities should be understood as centers of idea creation and transmission.” He goes on to suggest that “If this is so, then cities will grow when they are producing new ideas or when their role as intellectual centers is increasing in importance.”

Dr. Michael Porter of Harvard University, and founder and leader of the Initiative for a Competitive Inner City, has suggested from his research that the land/asset mix of urban areas, along with a well educated workforce, present unique economic opportunities for firms that select them as the location of choice. He argues that these opportunities are not easily duplicated in other geographic areas (Porter, 2009).

U.S. Tech Development Challenges

So the purpose of this research, in part, is to examine some key elements of the strategic paradigm to determine what prevents more technology firms from selecting the urban area geographic location choice.

Some of the obstacles that lie in the path of increased urban concentration of technology firms might be paralleled with those suggested as emerging competitive threats to American technology firms in general. A shortage of qualified workers to occupy high-skilled jobs in the technology sector makes competition increasingly fierce. Building the workforce to support technology growth in the U.S. shows unfavorable trends. The National Science Foundation reports that in 2007, the U.S. produced 485,800 science and engineering graduates amongst the college age population. In that same year, China produced 715,720. And while the number reported by China might be inflated, there is little doubt the country is outpacing the U.S. in producing science and engineering graduates. Securing data on India's number of graduates is difficult because there is no central ministry in the government that tracks such data, however, various figures and other anecdotal evidence suggests, and with widespread agreement amongst scholars, that India's number of science and engineering graduates is probably higher than the U.S. by some 50,000 or so. There is little doubt that the U.S. education system is falling behind countries such as India, China and other Asian nations in some key indicators that are crucial to technology skill development.

Retiring semiconductor giant Intel's CEO, Paul Otellini, at a 2010 conference at the Brookings and Aspen Institutes (Wash. D.C.), as reported in the New York Times stated: "While America still has the quality work force, political stability, and natural resources a company like Intel needs, the U.S. is badly lagging in developing the next generation of scientific talent and incentives to induce big multinationals to create lots more jobs here."

In 2011, Thomas Friedman and Michael Mandelbaum authored *That Used To Be Us: How America Fell Behind In The World It Invented and How We Can Come Back.* The book, through a comprehensive examination of the factors that drive innovation and economic growth in a global economy, catalogs the challenges the U.S. faces in order to both regain and maintain competitive leadership in the 21st Century (Friedman and Mandelbaum, 2011).

Friedman conducted an interview with chemical behemoth DuPont's CEO, Ellen Kullman. She characterizes the nature of just what makes a quality workforce in what has become an extremely competitive global economic environment, and how it is essential to spurring enterprise innovation. Kullman says, "Today, you have to have employees that are *present,* so that they are additive and not just taking up space". She explains that employees that are present "must be able to think, interact, and collaborate". She goes on to explain that the firm "does not operate with cheap labor. One of the big factors we look at when deciding where a plant should be located is the availability of an educated workforce" (Kullman, 2011).

Kullman defines the requisite qualifications a prospective employee must have: "you need to have more than a high school degree, either a community college degree, or a vocational-college degree, or you have to have had experience at another company, or you have to be a military veteran. You must have two out of those three qualifiers."

Urban Economics and Environmental Characteristics

In addition to U.S. domestic competitive intensity, the significant difference in wages between American workers that do have the requisite skills, and qualified workers in foreign countries like India and China, where U.S. firms can spend about half as much on salaries for similar services, a is a threat to this country's middle class standard of living, and workforce stability, an essential element of any innovation or technology environment. That difference, starting in 1999, has spurred a tidal wave of outsourcing by American firms for such technology tasks as product development, software development, and product assembly. Now, there is even a rush to resettle call-centers that execute customer care services in foreign countries rather than in the U.S. In Mumbai, India, and areas throughout the Philippines, customer care (call centers) has become a major source of high growth economic activity in those countries. These factors would appear to put added pressure on firms looking to expand and making the choice between an urban center and what might appear to be a more favorable environment in a U.S. suburb, or perhaps more probable today, a foreign country.

Other cost elements, such as the cost of real estate for operations, insurance, and municipal business taxes, are key factors to be considered when deciding on business location. Joel Kotkin's 2005 study of *The Best Places to Do Business* indicates that some urban centers like New York, Boston, Chicago, and San Francisco, rank among the highest cost locations in the country to do business. Other urban centers like Atlanta, San Antonio, Las Vegas and San Diego rank very favorably in terms of cost (Kotkin, 2005).

Empowerment Zones established by the federal government and run by the Department of Housing and Urban Development (HUD), and Enterprise Zones established by some states such as California, were designed to create tax incentives to attract high wage employers to urban centers with the goal of job creation. However, after nearly two decades of existence (they were enacted into law in 1993), by and large, the Zones have showed mixed results and had budgeted grant funding eliminated for the last two years of the Bush Administration.

On a broader scale, John H. Dunning advanced thinking about competitiveness and location in his Eclectic Paradigm, also known as the OLI-Model (Dunning, 2001). The intent of this model is to explain why investment will be directed into local markets or international locations. He posits that there are three distinct factors that help determine the outcomes: 1) Ownership advantages (trademark, production technique, entrepreneurial skills, return to scale); 2) Location advantages (existence of raw materials, low wages, special taxes or tariffs); and 3) Internationalization advantages (advantages by producing through a partnership arrangement such as licensing or a joint venture). Dunning's model amplifies the challenges urban centers face in attempting to attract technology firm investment, because operating costs can be difficult for the firm to absorb when a foreign location may look much more attractive. Empowerment Zones were originally designed to overcome some of these challenges with special tax incentives for firms locating in urban centers. However, as previously referenced, that initiative did not work.

Broadband and high speed Internet access penetration is essential to not only the direct work of technology firms, but also to the surrounding firms. They are often largely small businesses that support the firm through the provision of a variety of services. According to Nielson/Netratings, nearly 60 percent of the entire country had broadband and/or high speed access at the end of 2005, leveling the playing field of Internet capability and nearly eliminating the gap previously thought to separate more affluent areas from those less served. The latest data taken from the Federal Communication Commission's (FCC) 2009 *Broadband Adoption and Use in America* report reveals that 75 percent of the U.S. is wired for broadband access and 67 percent of all households have broadband access. To illustrate urban penetration of broadband access, 59 percent of African Americans and 49 percent of Hispanics have access at home, making telecommuting between office and home a reality in this new period.

Quality of Life and Well Being

Finally, quality of life issues raise the specter of competitiveness when trying to recruit talent to fill key positions in technology firms. A good deal of attention has been given to the subject of quality of life (QOL) as it relates to work life in recent years. It is believed to have been first introduced, or "popularized" in modern management thinking in the 1970s, when UAW and General Motors created quality of life programs to improve employee life linkages to their communities. The underlying assumption of the initiative was that it would have a direct bearing on productivity inside the firm.

Geert Hofstede conducted early research on this subject that culminated in an article published in the Academy of Management Review titled: *The Cultural Relativity of the Quality of Life Concept*. What he found in researching value patterns in 53 countries, is that life quality is a concept of perception based on one's values, and that those values are a function of the culture in which one has been brought up. What he also found that is particularly relevant to this research, is that work and life quality are not separate and distinct concepts, but directly linked to each other in part because they are value driven and that values are a matter of personal choice that affect just about everyone (Hofstede, 1984).

Leo Jeffries and Cheryl Bracken have conducted very recent research in a nationwide survey asking direct questions about the factors that impact qualify of life perceptions. Their hypothesis for the research was that QOL perceptions correlate with the number of so-called “Third Places” individuals could identify in their respective communities. These would include quality schools, proximity to shopping and entertainment locations, and a host of other destinations (Jeffries, Horowitz, and Bracken, 2011).

The Economic Intelligence Unit of The Economist Magazine publishes a periodic Global Livability Report (GLR) that quantifies the challenges that might be presented to an individual’s lifestyle in 140 different cities in the world. This index is directly related to a firm’s decision to locate in a specific location, based on its attractiveness across a range of issues. The GLR assigns a score for over thirty qualitative and quantitative factors across five broad categories that include: Stability, Healthcare, Culture and Environment, Education, and Infrastructure. In the January, 2010 published report, Vancouver, Canada was ranked as the number one city in the world for quality of living.

The Gallup-Healthways Well-Being Index, which surveyed more than 350,000 people across the U.S., measured several factors that relate to this research: Life Evaluation -- how one perceives the current state of their life and their expectations for the next five years; Emotional Health -- which also includes how one’s environment makes them feel; Work Environment -- job satisfaction and future prospects; Physical Health; and access to basic needs-healthcare facilities, food, other shopping needs, etc.

One finding in the report directly relevant to this research, was that "Residents of large cities — those with a population of 1 million or more — generally report higher levels of well-being and more optimism about the future than those in small or medium-sized cities. In small cities, of 250,000 or less, people are more likely to feel safe walking alone at night and have enough money for housing" (Gallup-Healthways Well-Being Index, 2009).

In July 2009, Kiplinger released its Best Cities Report, which is an analysis of the best places to work and live in the U.S. The research was conducted by Kevin Stolarick of the Martin Prosperity Institute, a think tank that focuses on economic prosperity. The methodology used to compile the report included stability of employment and prospects for income growth, cost of living data, and quality of workforce, among other data. Stolarick also anecdotally tried to assess the density of creative talent in each location, relying on Dr. Richard Florida's theory of the *Creative Class*, previously referenced herein.

Forbes Magazine's annual *Best Places for Business and Careers,* is an amalgamation of various index data from multiple sources. It is a compilation of secondary data, assembled to construct a primary ranking tool. The rankings covered the 200 largest metro areas (populations over 240,000), as defined by the U.S. Office of Management and Budget. The Index is based on nine factors. West Chester, Pa.-based economic research company Economy.com, owned by Moody's, supplied data on five-year historical job and income growth, as well as migration trends. Economy.com's business cost index was included, which looks at labor, tax, energy and office space costs, as well as its living cost index, which factors in housing, transportation, food and other household expenditures.

The cost of residential real estate, K-12 and higher education school quality, crime rates, community culture, and other factors play key roles in firm location decisions. Both primary and satellite operation location decisions must be made, while being cognizant of the profile needed to attract the talent that will impact strategic aggressiveness, capability response, and profitability.

Tax structures in some of the nation's largest urban centers provide one more potential obstacle to business location. A CNN/Money Survey released in 2004, showed that some thirty of the largest metropolitan areas, taken out of a total sample of fifty-one, had state and local taxes exceeding 9% of family income (CNN, 2004).

Research Preview

Using a methodology very similar to the Quality of Life indexes just described, this research utilizes a custom-crafted index, built on validated variable component measures, and specifically designed to focus on uniquely identified factors that are included in the research model. And while it is more narrowly focused, it also includes some of the factors referenced in other similar indexes, and adds other pertinent considerations. The "Innovation Quality Index" (IQI) combines segmented factors in a tabulation of Workforce Availability (WA), and Quality of Life Index (QLI) that have a bearing on enterprise location choice. Put differently, the research seeks to identify the relationships between WA and QOL factors that either attract or deter technology firms (ICTs) from choosing urban locations.

Are the reasons why technology firms choose to locate in American suburbs and foreign countries versus urban centers real or imagined? What are the differences in the strategic profiles: Strategic Aggressiveness (SA), Capability Response (CR) and Strategic Investment (SI), between tech firms (ICTs) located in suburbs compared to those located in urban centers? What impact does the Innovation Quality Index (IQI) have on the level of SA, CR and SI, selected by the firm? What impact do the strategic profile (SA, CR and SI) and the Innovation Quality Index (IQI) have on profitability? Attempting to answer these and other relevant questions is the focus of this research. It examines the relationship among strategic behavior variables (SA, CR and SI), Innovation Quality (IQI), and profitability, for technology firms (ICTs) in or near urban centers. It compares those three factor group indicators to firms located in American suburbs, and comments on the relationship, and the differences identified to exist in the two environments.

Ansoff's Theory

Dr. Igor Ansoff's *strategic success hypothesis* (Ansoff, 1990) states the following: First component: *For optimum potential performance, three conditions must be met:*

Does the aggressiveness of the firm's strategic behavior match the turbulence of its environment?

Does the responsiveness of the firm's capability match the aggressiveness of its strategy?

Are the components of the firm's capability supportive of one another?

Strategic aggressiveness is described by two characteristics: 1) *the degree of discontinuity from the past of the firm's new products/services, competitive environments,* *and marketing strategies, and 2) the timeliness of introduction of the firm's new products/services relative to new products/services which have appeared on the market.*

Environmental turbulence level ranges in severity from repetitive to discontinuous.

Capability response matches aggressiveness in its alignment with the environmental turbulence level in categories ranging from custodial to flexible.

Capability response supportiveness is a measure of the strength of competitive position and characterized by the ratio of the firm's investment into an SBA to the level of investment required for optimal profitability (the benchmark of sufficiency is critical mass – the strategic break-even point below which profitability is unattainable.)

Profitability can be operationally equated to *optimum performance* and this research will examine it in the context of strategic aggressiveness, capability response, strategic investment, and environmental turbulence, as is postulated in the hypothesis.

By researching this specific segment of the *Contingent Success Paradigm,* and the impact of innovation quality on profitability in urban technology firms (ICTs), the critical success factors can be further illuminated. The obstacles to success that help shape these firms can also be potentially identified. Discovery of those factors and their relevant presence or absence in tech firms (ICTs) located in urban centers, can be instructive and prescriptive to business leaders, educators, and policy makers. The information can shed light on what might be done to improve the competitive environment that makes these firms successful. However, in this examination, we are mindful that the changing complexity of the environment and the high level of turbulence make it difficult at best to predict future performance based on prescriptions anchored to historical challenges.

The Research Question

To better understand the relationships and differences between technology firms (ICTs) in or near urban centers and those that are located in suburban locations, this research examines the relationships among levels of environmental turbulence (ETL), strategic aggressiveness (SA), capability response (CR), and strategic investment (SI), of ICTs in both urban and suburban locations. It also examines a targeted set of variables that influence ICT location choice, to create an Innovation Quality Index (IQI). The ultimate goal of the research is to assess how these factors impinge upon ICT profitability. It does so by examining the questions posited below:

RQ.1 What is the relationship among environmental turbulence (ETL) and strategic aggressiveness (SA) for ICTs located in or near urban centers (U) and suburban locations (SU)?

RQ.2 What is the relationship among strategic aggressiveness (SA) and capability response (CR) for ICTs located in or near urban centers (U) and suburban locations (SU)?

RQ.3 What is the relationship among capability response (CR) and strategic investment (Budget) (SI) for ICTs located in urban areas (U) and suburban locations (SU)?

RQ.4 What is the relationship among the Innovation Quality Index (IQI) and location for urban (U) and suburban areas (SU)?

RQ.5 What are the relationships among strategic posture (ETL–SA G, SA-CR G, CR-SI G), Innovation Quality Index (IQI), and Profitability (P), for ICTs located in urban areas (U) and suburban areas (SU)?

The Global And Research Models

The last half of the twentieth century saw increased interest in the study of technology development, its impact on the global economy, and society at large. Research strongly indicates a relationship between technology development and the external environment, including the socio-political impact on market behavior, and the ability to correlate technology development with strategic decision-making.

Dr. Peter Drucker attempted to explain the integration of dynamics that emerge within entrepreneurial cultures that give way to increased innovation connected to technology environments (Drucker, 1985). Karimi and Gupta suggested that firms must take stock of the environment in which they are operating, and understand how to leverage business strategy that propels them to a leadership role (Karimi, Gupta; 1996).

In his *strategic success hypothesis,* Dr. Ansoff prescribes that *strategic aggressiveness*, and *environmental turbulence*, must match in order to achieve optimal performance for the firm (Ansoff, 1990). Michael Martin's research focused on this same issue of connection between environment, strategy and firm success (Martin, 1994).

The global model presented in this research, describes the relationship between the environment, technology development, surrounding change and societal institutions in that external environment. The specific focus of the research, is to better understand the relationship between factors in the environment that impact levels of turbulence, how firms adopt strategic aggressiveness models to meet that turbulence, and the impact that relationship has on profitability for technology firms in or near urban centers, as compared to those located in suburban areas.

Devol, in his study of more than 300 targeted metropolitan areas, evaluated the factors that most often lead to the emergence of technology clusters (Devol, 1999). The data collected in that study gives strong evidence to support the conclusion that technology transfer in the U.S. is largely following patterns of suburban dispersion.

However, one of the first of its kind, the study did not aim to provide a better understanding of the questions being proffered in this research. The focus herein, targets differences in environmental turbulence, strategic aggressiveness, and profitability, between technology firms in or near urban centers, compared to those located in suburban areas. Additionally, since the Devol study, the phenomenon of outsourcing by American firms has created yet another dimension that is likely to shed light on the factors that contribute to these differences.

This research relies on three baseline measures, to determine key differences between how technology firms operate in or near urban centers, compared to those located in suburban areas.

First, the research uses Ansoff's *Turbulence Scale to* measure and evaluate the context of the environment in which technology firms (ICTs) operate. In executing that measurement, it further focuses upon sub-industry sector data to construct a cumulative level characterization. Doing so provides a baseline or benchmark useful to evaluating other primary independent variables. Gary Hamel has cataloged the impact of the environment on firms which thrive on innovation, and offered prescriptions on how to manage turbulent environments, and still master innovation (Hamel, 2002).

Other baseline measures include the level of strategic aggressiveness, and environmental turbulence for ICTs located in urban and suburban areas. The same baseline indicator is constructed for capability response and strategic aggressiveness for ICTs separated by the targeted geographic locations. And to complete an examination of strategic posture, this research adds a baseline measure of capability response and strategic investment for ICTs located in urban and suburban areas.

In addition to examining the impact of ICT location choice on strategic posture and performance, an Innovation Quality Index (IQI), using validated factors has been created to measure two variable categories: Workforce Availability (WAI) and Quality of Life (QLI).

In an effort to uncover the clearest possible understanding of the strategic posture and location choice relationships of ICTs located in urban areas compared to suburban, the dependent variable of profitability is measured for each group.

This research model is aimed at revealing the most accurate information available relative to the chosen variable components, to determine whether or not technology firms (ICTs) in or near urban centers face challenges that are different. And if they are different, which geography is favorably impacted? Or, if negative, are the differences correctable, using known strategic remedies? Are there inherent factors present that make the cultivation of technology firms in these areas a challenge yielding only sub-optimal performance potential? These are the issues and questions this research seeks to answer.

The Research Hypothesis

Isolating differences and relationships among specific variables in this research model will allow for a determination as to strength of the correlations between environmental turbulence, strategic aggressiveness, capability response, strategic investment, location choice, and profitability, for technology firms (ICTs) located in or near urban centers, compared to those located in suburban areas. It should also reveal if the differences and relationships suggest favor one geographic area over another. If, as expected, results produce suburban location bias, do the differences in urban ICTs represent systemic issues? Can those systemic issues be remedied by the application of strategic diagnosis and other features inherent in the body of strategic management science? With those considerations, the relationships leading to the primary hypotheses targeted by this research are highlighted as follows:

Variable Symbol Keys

U = Urban (location)

SU = Suburban (location)

SA = Strategic Aggressiveness

CR = Capability Response

SI = Strategic Investment (Budget)

ETL = Environmental Turbulence Level

G = Gap

IQI = Innovation Quality Index

P = Enterprise Performance (Profitability)

The Research Questions

RQ.1 What is the relationship among environmental turbulence (ETL) and strategic aggressiveness (SA) for ICTs located in or near urban centers (U) and suburban locations (SU)?

H.0: U-(ETL - SA G) $\leq$ SU-(ETL - SA G)

H.1: U-(ETL - SA G) > SU-(ETL - SA G)

RQ.2 What is the relationship among strategic aggressiveness (SA) and capability response (CR) for ICTs located in or near urban centers (U) and suburban locations (SU)?

H.0: U-(SA – CR G) $\leq$ SU-(SA – CR G)

H.1: U-(SA – CR G) > SU-(SA – CR G)

RQ.3 What is the relationship among capability response (CR) and strategic investment (Budget) (SI) for ICTs located in urban areas (U) and suburban locations (SU)?

H.0: U-(CR – SI G) $\leq$ SU-(CR – SI G)

H.1: U-(CR – SI G) > SU-(CR – SI G)

RQ.4 What is the relationship among the Innovation Quality Index (IQI) and location for urban (U) and suburban areas (SU)?

H.0: U-IQI = SU-IQI

H.1: U-IQI < SU-IQI

RQ.5 What are the relationships among strategic posture (ETL–SA G, SA-CR G, CR-SI-G), Innovation Quality Index (IQI), and Profitability (P), for ICTs located in urban areas (U) and suburban areas (SU)?

H.0: U-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI = SU-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI

H.1: U-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI < SU-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI

The Research Variables

The variables used in this research are categorized and defined both conceptually and operationally below:

Moderating Variables

The moderating variable is one that, when introduced into a given environment, can have the effect of changing the condition of dependent variables and thus, is a causal agent of a result.

The first moderating variable is geographic area – urban and suburban – described below. This variable category is repeated below for other moderating variable definitions.

Geographic Area (MV). The conceptual and operational definitions of a geographic area appear below. Also, following are the characteristics and two value definitions of this variable.

Conceptual Definition. A geographic area is the location of a specific point on the earth's surface, typically appearing on a map, and the area surrounding that point.

Operational Definition. Operationally, a *geographic area,* for purposes of this research, has two possible values. They are urban (U) and suburban (SU). Each is a nominal data type.

The two definitions are further defined as follows:

Element 1: Urban (U). The operational definition of Element 1 appears below.

Operational Definition. Operationally, selected urban geographic locations (U), for purposes of this research, are defined as the city-municipal jurisdiction of Metropolitan Statistical Areas (MSAs), with populations of 1 million people or more. Further, diversity in the population will be a significant feature which will suggest high concentrations of minorities residing and working within the defined area.

Element 2: Suburban (SU). The operational definition of Element 2 appears below.

Operational Definition. Operationally, selected suburban geographic locations (SU), for purposes of this research, are defined as areas that are also part of large metropolitan areas (MSAs), outlying a large city, which does not include the city jurisdiction or urban center to which it is related, and has populations less than 1 million.

Technology Firm. Recognizing that technology firms are the focus of the research, such entity should first be defined.

Conceptual Definition. A *technology firm* is a business enterprise engaged in the creation of products and/or services that serve an environmental need. These firms are normally associated with pursuing the widely defined field of innovation in particular industries or niche markets, i.e. information technology, telecommunications, bio-technology, nano-technology, etc.

The Standard Industry Classification (SIC) code reference includes from 5-7 industries that fit the definition of technology producing or technology service. As previously referenced, The Department of Commerce's Bureau of Economic Analysis (BEA) categorizes these industries as "Information-communication-technology-producing" (ICT). However, for purposes of this research, ICTs are being identified by industry sector, as defined by their respective North American Industry Codes (NAICs). So, for purposes of this research, technology firms will be designated as ICT firms.

Operational Definition. A *technology firm* is operationally defined as being in one of several specific categories designated by The Department of Commerce's Bureau of Economic Analysis (BEA) as industry sub-sectors included in the sector category Information-communication-technology-producing (ICT).

Specifically, ICTs included in the research sample population have total revenues that range from $25 million to $500 million annually. The specific NAICs and industry sectors are listed below.

For purposes of this research, ICTs have one defining characteristic with two possible values. The defining characteristic is the moderating variable of geographic area in which the firm is located. ICT location has been identified by principal place of business (headquarters operations).

The two possible values are urban technology firm (U - ICT) and suburban technology firm (SU - ICT). Operational definitions of these two values appear below. Each is a nominal data type.

Element 1: Urban Technology Firm (U - ICT). The operational definition of Element 1 appears below.

Operational Definition. Operationally, a selected urban technology firm (U - ICT), for purposes of this research, is one located in an urban geographic area, as defined above (city-municipality-MSA-population 1 million or more).

Element 2: Suburban Technology Firm (SU – ICT). The operational definition of Element 2 appears below.

Operational Definition. Operationally, a selected suburban technology firm (SU - ICT) for purposes of this research, is one located in a suburban geographic area, as defined above (city-external-MSA-population less than 1 million).

Independent Variables

Dr. Ansoff's *strategic success hypothesis* (Ansoff, 1990) has shown empirical evidence that there is a relationship between environmental turbulence, strategic aggressiveness, and optimal performance of the firm. However, this relationship has not been considered in the context of technology firms (ICTs) that are located in U.S. urban centers, compared to those that reside in suburban areas. This research examines if there are differences in the strength of these variables, given those two environments, and will identify the strength of the relationships to optimal performance of the firm. It uses profitability as the indicator of enterprise performance. The independent variables are strategic aggressiveness (SA), capability response (CR), and strategic investment (budget) (SI).

Strategic Aggressiveness. The conceptual and operational definitions of strategic aggressiveness appear below.

Conceptual Definition. *Strategic Aggressiveness* is a description of firm behavior that, according to Ansoff's *strategic success hypothesis*, is necessary at each level of turbulence for the firm to succeed.

It is described by two characteristics: The first dimension is the *degree of discontinuity* from the past of the firm's new products/services; competitive environments; and marketing strategies. The scale of discontinuity ranges from no change to incremental change, to change which is discontinuous for the firm but observable in the environment, to creative change which has not been observed previously.

The second dimension is *timeliness of introduction of the firm's new products/services relative to new products/services which have appeared on the market*. Timeliness ranges from reactive to anticipatory, to innovative, to creative.

Ansoff describes the characteristics of strategic aggressiveness on a scale that distinguishes characteristics by level of turbulence (e.g. Level 1, 2, 3, 4, and 5) as shown below:

Table 1

Matching Aggressiveness to Turbulence

Turbulence Level	1	2	3	4	5
Strategy Aggressiveness	Stable Stable Based on Predictions	Reactive Incremental Change Based on Experience	Anticipatory Incremental Change Based on Extrapolation	Entrepreneurial Discontinuous New Strategies Based on Observable Opportunities	Creative Discontinuous Novel Strategies Based on Creativity

Ansoff, 1990, pg.33

<u>Operational Definition</u>. Strategic aggressiveness (SA) will be measured by an assessment of multiple sub-elements. Each is measured on a five-point scale, consistent with the Ansoff definition of SA components. They are:

Innovation Aggressiveness (IA):

New Product Dev. Strategic Focus

New Product Introduction Frequency

M&A Activity

R&D Intensity

Future Industry Critical Innovation Trend

Marketing Aggressiveness (MA)

Market Development Intensity

Industry Market Structure

Industry Growth Rate

ICT Strategic Aggressiveness (SA) score is calculated as follows: (IAI + MA)/2 = SA score.

Table 2

Ansoff Strategic Aggressiveness Scale

Strategic Aggressiveness	Stable Based on precedents	Reactive Incremental Based on experience	Anticipatory Incremental Based on extrapolation	Entrepreneurial Discontinuous Based on expected futures	Creative Discontinuous Based on creativity

Compared with Ansoff Turbulence Scale (see description below)

Capability Response. The conceptual and operational definitions of capability response appear below.

Conceptual Definition. *Capability Response* is a description of the firm's ability to support the execution of its strategy. Because aggressiveness, according to Ansoff's *strategic success hypothesis*, must match the level of turbulence for the firm to succeed, and response capability must match aggressiveness, capability must also be aligned with the turbulence level. The nature of capability is characterized at each level of turbulence below:

Table 3

Matching Capability to Turbulence

Turbulence Level	1	2	3	4	5
	Custodial	**Production**	**Marketing**	**Strategic**	**Flexible**
	Precedent-driven	Efficiency-driven	Market-driven	Environment-driven	Seeks to create the environment
Responsiveness of Capability	Suppresses change	Adapts to change	Seeks familiar change	Seeks new change	Seeks novel change
	Seeks Stability	←	Seeks operating efficiency	← →	Seeks creativity
			← Seeks strategic effectiveness →		
	Closed system ←			→	Open system

Ansoff, 1990, pg. 34

A firm’s capability is characterized by its alignment to the turbulence level with five categories:

Level 1-Custodial: the environment is repetitive and the optimal strategic behavior is change-rejecting. Strategic change is suppressed. The enterprise is hierarchical, with centralized authority.

Level 2-Production: focus is on efficiency. Enterprise is introverted (looks inward). It allows change only after failure to meet objectives. It is not environmentally sensitive. It assumes efficiency delivers market success.

Level 3-Marketing: enterprise is extroverted and future oriented. Emphasis is placed on serving future needs of historical customers, using historical strengths. Marketing function drives enterprise dynamic and relies on historical success strategies.

Level 4-Strategic: Enterprise is not attached to history. It is environment-driven, and future validity of historical success strategies is subject to constant challenge. Emphasis is placed on understanding future state in present context.

Level 5-Flexible: Enterprise is environment creating. It has no attachment to history. It is constantly seeking novel change.

Additionally, the firm's capability profile must match the strategy (*strategic aggressiveness*). That profile is constructed using five capability factors (one general management and four functional factors). The nature of each factor and its alignment with strategy is described below:

Table 4

Capability Factors

		Growth	*Innovation*	*Maturity*	*Creativity*
General Management	* *Efficiency* * Diversification * Multinational		*Large risks * Societal	*Technology	*Project management
Finance	* *Controllership* * *Cash management*		* Financing * Capital investment	* Credit	* Currency/tax *Inflation Management
Marketing	* *Sales* * Advertising/ promotion	* Pioneering market research	* *Sales analysis*	*Product market introduction	* Cross-culture marketing
Production	* *Mass production* * *Inventory* * *Automation*	* Distribution * Product changeover	* Tailored production	* Purchasing	**Industrial relations* * *Technology adaptation*
R&D	* Research * *Incremental evolution* * Styling	* Creativity * Industrial engineering	* Innovation * Imitation	* Adaptation * *Production technology*	

Ansoff, 1990, pg.34

Further delineated, general management capability (also functional capability) is the propensity and ability to engage in behaviors that optimize attainment of both short-term and long-term enterprise objectives and goals. That capability is "assessed in two complimentary ways" – behavioral observation and the development of capability profiles (Ansoff, 1990). Observation seeks to identify responsiveness traits ranging from reactionary to anticipatory, relative to environmental discontinuities. Developing capability profiles relies on assessment of three capability attributes: *climate* (will to respond), *competence* (ability to respond), and *capability* (capacity to respond). Both methods are considered relative to factor alignment with turbulence and aggressiveness that determine assessment outcome appropriateness.

Operational Definition. Thus, CR will be measured by an assessment of multiple sub-elements. Each is measured on a five-point scale consistent with the Ansoff definition of CR components. They are:

Competence Responsiveness:

> Half executive team

Managerial Skill set Alignment Quality

New Product Dev. Strategic Focus

Executive Team Tenure

Time Orientation

Climate Responsiveness

Enterprise Values and Attitudes (corporate statement analysis: as expressed in mission and value statements/Annual Report comments, media releases, etc.)

Enterprise Change Catalysts

Employee Growth - 1 yr.

Capacity Responsiveness

Functional Distribution Quality (FDQ)

Staffing Sufficiency (Manager and Staff Headcount)

ICT Capability Responsiveness (CR) score is calculated as follows: (CO + CL + CA)/3 = CR score.

Table 5

Ansoff Capability Response Scale

Responsiveness of Capability	Custodial Precedent-driven	Production Efficiency-driven	Marketing Market-driven	Strategic Environment-driven	Flexible Seeks to create environment

Compared with Ansoff Strategic Aggressiveness Scale (see description below)

Strategic Investment (Strategic Budget). The conceptual and operational definitions of strategic investment appear below.

Conceptual Definition. Ansoff's *strategic success hypothesis* states *that the components of the firm's capability must be supportive of one another.* This provision of the hypothesis essentially means that in order for the firm to achieve optimal performance (profitability), it must have sufficient resources to support the execution of its strategy and its capability. In each Strategic Business Area (SBA), and, for purposes of this research, the SBA is comprised of technology firms (ICTs), there is a *critical mass* which is the *strategic break-even point* below which profitability is not attainable (Ansoff, 1990 pg. 73).

There is also an *optimum mass*, below which profitability begins to decline largely due to decreased response capability which can manifest in several of the response factor categories (i.e. capability factor-general or functional management attribute degradation-climate, competence, capacity, etc.). So, the area of profit potential lies between the points of critical mass and optimum mass.

The science attached to determining both critical mass and optimum mass is not fully developed and thus relies largely on estimates grounded in both industry and enterprise capability understanding.

The *strategic investment ratio* (SIR) is a measure of the estimate of future investment necessary to achieve anticipated profitability minus current investment; compared to an estimate of optimum investment minus current investment; given optimal strategy and capability. The formula that best describes this relationship appears as follow:

$$\frac{I_f - I_{cr}}{I_{opt} - I_{cr}} \times a \times \mathcal{B}$$

Figure 1

Strategic Investment Ratio Equation
(Ansoff, pg. 73)

Even though strategic investment levels can only be estimated, focus on three investment categories aid the process of calculating a meaningful ratio. The categories examined in this research are capacity, strategy (strategic behavior), and capability (Ansoff, pg. 74).

Operational Definition. Strategic Investment (Budget) (SI) is the firm's commitment of resources to support execution of the strategy. For purposes of this research, Strategic Investment is represented by the last year of research and development expense as a percent of total revenue. Then an ordinal Likert Scale rating is applied based on the R&D percent in a range from 0 to more than 20%. The calculation is represented as: R&D Exp./total revenue: Likert rating 1-5.

Moderating Variables

As previously indicated, the moderating variable is one that, when introduced into a given environment, can have the effect of changing the condition of dependent variables and thus, is a causal agent of a result.

The first moderating variable is geographic area – urban and suburban – described above.

The second moderating variable is environmental turbulence (ETL), because it is the factor that influences both strategic aggressiveness and capability response. Those two variables are also calibrated against ETL. Both must be aligned with the environmental turbulence level in order to influence optimal performance (profitability (P)).

The third moderating variable is the *Innovation Quality Index* (IQI), because it also is an element that influences optimal performance (profitability (P)).

The *Innovation Quality Index* has two primary elements: Workforce Availability Index (WAI), and Quality of Life Index (QOLI), each with sub-elements that are defined as measurable units used to characterize the innovation quality of a given geographic area.

It is anticipated that during the course of this research, both of these moderating variables will be shown to demonstrate either strong or weak relationships to the independent variables. They are also expected to be a determinant on the nature of relationships to the dependent variable, which is optimal performance as represented by profitability (P) for technology firms (ICTs) located in or near urban centers compared to those located in suburban areas.

Environmental Turbulence. The conceptual and operational definitions of strategic investment appear below.

Conceptual Definition. *Environmental turbulence* is a combined measure of the changeability and predictability of a firm's environment. According to Ansoff, it is described by four characteristics:

Changeability: the degree to which the environment is changing, measured along two dimensions:

1) Complexity of the firm's environment is a dual measure of the pervasiveness of the impact of a challenge on various parts of the firm, as well as the frequency of occurrence of challenges.

2) Relative *novelty* of the successive challenges which the firm encounters in the environment. Novelty is further defined as the measure of the extent to which knowledge gained from the experience can be extrapolated to responses to new challenges.

3) Predictability: the degree to which future events can be forecasted, measured along two dimensions:

1) *Rapidity of change*: the speed in which change is occurring in the environment.

2) *Visibility of the future*: assesses adequacy and timeliness of information about the future (Ansoff, 1990). It is further defined as the degree to which signals of events in the environment can be seen with clarity, signifying weak, moderate, or high.

Ansoff describes the characteristics of turbulence on a scale as shown below:

Table 6

Turbulence Levels

Level	1	2	3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

<u>Operational Definition</u>. *Environmental turbulence level (ETL)*, is the single primary data factor contained in the research methodology. It is captured by utilizing a panel of experts, assembled to provide ETL assessment analysis data. The background of each expert on the panel is provided in Chapter 4 on research findings. Each member of the panel completed a custom-crafted Environmental Turbulence Assessment tool

(Kipley, 2012), which analyzed ETL along two dimensions: 1) Future Industry Innovation Turbulence; and 2) Future Market Turbulence. The specific elements of each dimension are listed in Chapter 3 on Research Methodology.

Innovation Quality Index (IQI). The conceptual and operational definitions of strategic investment appear below.

Conceptual Definition. The *Innovation Quality Index* (IQI), for purposes of this research, is a measure of two key indicators, considered important when technology firms (ICTs) are making decisions regarding location choice and in their daily operations. These indicators, the availability of workforce populations to support technology firms (technical knowledge required for both strategic portfolio), and quality of life (essential to talent attraction), impact the firm's performance and bottom-line profitability.

Operational Definition. The *Innovation Quality Index* (IQI) is a measure of two key indicators: Workforce Availability (WAI), and Quality of Life Index (QLI). Each indicator is a separate element. The ICT *Innovation Quality Index* (IQI) score is calculated as follows: WAI + QLI/2 = IQI score.

Element 1: Workforce Availability Index (WAI). The conceptual and operational definitions of Element 1 appear below.

Conceptual Definition. *Workforce Availability Index (WAI)* can be measured by examining several factors. This research focuses on the availability of workers with the requisite skills necessary to sufficiently and effectively to work in technology related occupations. It will also focus on education. The literature provides ample evidence geographic area proximity to colleges, universities, and technical schools, providing technology-related education, is essential to technology workforce development. It also is a central ingredient in all of the technology "clusters", not just in the U.S., but around the globe. These institutions are now commonly referred to as S.T.E.M. – science, technology, engineering, and math education institutions.

Operational Definition. There are two sub-elements in this examination. Workforce Availability Index (WAI) is a measure of two sub-elements: Workers with Requisite Skills (WRS), and Tech. Education Accessibility Index (TEAI), and is calculated as: WRS + TEAI/2 = WAI Score

Sub-Element i: Workers with Requisite Skills (WRS). The conceptual and operational definitions of Sub-Element i appear below.

Conceptual Definition. Determining the number of workers in the geographic area that have the requisite skills to work in technology related occupations. This is an essential element of ICT effectiveness.

Operational Definition. The availability of Workers with Requisite Skills (WRS) is measured by recording the ratio of the total number of people employed in technology occupations in a specific geographic location, as a percent of the total workforce (see data sourcing below) That ratio is then calculated as the difference from the mean variance from all geographic locations. The calculation is represented as Tot. Tech. Empl./Tot. Empl. - mean var.

Sub-Element ii Tech. Education Accessibility Index (TEAI). The conceptual and operational definitions of Sub-Element i appear below.

Conceptual Definition. Accessibility to higher education is a key indicator to the conditions favorable to the presence of technology firms. The Tech. Education Accessibility Index (TEAI) is a measure of the proximity of colleges, universities and technical schools, in the local geographic area. As previously indicated, ample evidence shows that geographic area proximity to colleges, universities, and technical schools, providing technology-related education, is essential to technology workforce development. It also is a central ingredient in all of the technology "clusters", not just in the U.S., but around the globe. These institutions are now commonly referred to as S.T.E.M. – science, technology, engineering, and math education institutions.

Operational Definition. The Tech. Education Accessibility Index (TEAI) is a measure the number of colleges, universities, and technical schools, in each targeted geographic area. (see data sourcing in Section 3 below). Specifically, it is a measure of S.T.E.M. – science, technology, engineering, and math education institutions. It is calculated by recording the total number of S.T.E.M. institutions in the area, and then calculating the distance from the mean variance from all geographic locations. The calculation is represented as: S.T.E.M. Inst. - mean var.

Workforce Availability Index (WAI) and its sub-elements are both ratio and interval data types.

Element 2: Quality of Life Index (QLI). The conceptual and operational definitions of Element 2 appear below.

Conceptual Definition. *Quality of Life* is an important determinant in the firm's ability to attract the talent it needs to meet its strategic objectives. There are numerous variables that can be considered in evaluating quality of life. This research focuses on 1) home ownership in a geographic area, 2) the number of art, entertainment, and recreation establishments in a geographic area, representing what the literature refers to as "third places" that influence quality of life and "well-being" perceptions, and 3) primary/secondary education quality (K-12). This measure directly relates to workforce availability.

Operational Definition. Operationally, quality of life is a measure of three sub-elements: i) Home Ownership Index (HOI), ii) Arts, Entertainment, and Recreation Index (AERI), and iii) Primary/Secondary Education Quality (K-12) (PEQI),. It is calculated as: HOI + AERI + PEQI/3 = QLI Score

Sub-Element iii Home Ownership Index (HOI). The conceptual and operational definitions of Sub-Element iii appear below.

Conceptual Definition. According to the quality of life literature, the level of home ownership in a given neighborhood is one indicator widely accepted as a reflection of its overall quality. The literature, supported by research data strongly suggest a correlation between the level of home ownership and the level of care owners invest in the neighborhood's appearance, safety concerns, social interactions, etc. Thus, a high level of ownership in a given geographic area is theoretically able to more easily attract high caliber talent than an area with low ownership levels.

Operational Definition. Operationally, the Home Ownership Index (HOI) is measured by the percent of the population in each geographic area that own their own homes, and then calculating the difference from the mean variance for all geographic locations. The calculation is represented as: % Owner Occupied - mean var.

Sub-Element iv: Arts, Entertainment, and Recreation Index (AERI). The conceptual and operational definitions of Sub-Element iv appear below.

Conceptual Definition. The quality of life literature provides research that suggests when human beings perceive there is a sufficient number of what is being referred to as "third places" in a community, such that it makes that locality vibrant and interesting, their sense of well-being increases. These third places are represented by such venues as theaters, sports stadiums, museums, parks, other arts, entertainment, and recreation establishments. Thus, the AERI is a measure of the number of these establishments in a given location examined in the research, compared to the sample city average.

Operational Definition. Operationally, the Arts, Entertainment, and Recreation Index (AERI), is a measure of the number of establishments in each geographic area contained in the sample, and then calculating the mean variance from the sample city average (all sample geographic locations). The calculation is represented as. # establ. per geographic area: mean var.

Sub-Element v: Primary/Secondary Education Quality (K-12) (PEQI). The conceptual and operational definitions of Sub-Element ii appear below.

Conceptual Definition**.** Measuring primary/secondary education performance as a quality of life element is also important to the ability of an ICT to attract the talent it needs to meet its strategic objectives. When the talent pool is comprised of people that have families, research shows that a key concern they have when considering occupational geographic moves are whether or not there are sufficient educational facilities that allow their children to get a good education. Geographic areas with known reputations for having high performing schools are more easily able to attract talent than areas with reputations for having poor performing schools. Thus, measuring primary/secondary education, K-12, is considered a key quality of life indicator.

Operational Definition. Operationally, Primary/Secondary Education Quality (K-12) (PEQI) is a measure of two sub-ratings: Reading At Grade Level Index (RGLI), and Math Comprehension Index (MCI) (see data sourcing below). The Primary/Secondary Education Quality (K-12) Score is calculated as: RGLI Var. + MCI Var./2 = PEQI Score.

Sub-rating a: Reading At Grade Level (RGLI). The conceptual and operational definitions of Sub-rating a appear below.

Conceptual Definition. The measure of Reading at Grade Level (RGLI) is a measure of the number of students K-12 reading at grade level in a given geographic area compared to the national average. This is a key measure in determining the quality of individual schools, and school districts, and whether or not they are delivering a competitive education to their students in the all important area of reading comprehension. Research shows that reading comprehension is a primary root factor in just about all learning comprehension, and so it is vitally important to educational proficiency.

Operational Definition. Reading at Grade Level Index (RGLI) is the percent of students (K-12), demonstrating a proficiency in reading comprehension in each geographic area, compared to the national average, and then calculating the variance. The calculation is represented as RGLI – natl. avg.: mean var.

Sub-rating b: Math Comprehension (MCI). The conceptual and operational definitions of Sub-rating b appear below.

Conceptual Definition. Math Comprehension (MCI) is a measure of the percent of students (K-12) demonstrating a proficiency in math in a given geographic area compared to the national average. Like Reading at Grade Level (RGLI), MCI is a key measure in determining the quality of individual schools, and school districts, and whether or not they are delivering a competitive education to their students in the all important area of math comprehension. Research shows that math comprehension, also like reading comprehension, is a primary root factor in just about all learning comprehension, and so it is vitally important to educational proficiency.

Operational Definition**.** Operationally, the measure of Math Comprehension (MCI) is the percent of students (K-12) demonstrating a proficiency in math in each geographic area, compared to the national average, and then calculating the variance. The calculation is represented as MCI – natl. avg: mean var.

Intervening Variables (Int. V)

As previously indicated, the Ansoff model, built upon the *strategic success hypothesis* (Ansoff, 1990), states that for optimum potential performance, three conditions must be met: 1) *aggressiveness of the firm's strategy must match the turbulence of the environment.* 2) the *responsiveness of the firm's capability matches the* *aggressiveness of its Strategy and 3) the components of the firm's capability must be supportive of one another (strategic investment (budget)).* Therefore, measurements of variable gaps are calculated as follows:

Environmental Turbulence/Strategic Aggressiveness Gap. The operational definition of environmental turbulence/ strategic aggressiveness gap appears below.

Operational Definition. Environmental turbulence/Strategic aggressiveness gap (ETL - SA G) is operationally defined as the absolute difference between the level of environmental turbulence for the specific technology sector (NAIC) and the strategic aggressiveness of the ICT. It is represented as ETL - SA G.

Capability Response/Strategic Aggressiveness Gap. The operational definition of capability response/strategic aggressiveness gap appears below.

Operational Definition. Capability Response/Strategic Aggressiveness Gap (SA – CR = G) is operationally defined as the absolute difference between the strategic aggressiveness and capability response measures of the ICT. It is represented as SA – CR = G.

Capability Response /Strategic Investment (Budget) Gap. The operational definition of Capability Response/Strategic Investment (Budget) Gap appears below.

Operational Definition. Capability Response/Strategic Investment (Budget) Gap (CR – SI G) is operationally defined as the absolute difference between the capability response and the Strategic Investment (Budget) ratio measures of the ICT. It is represented as CR – SI G.

Dependent Variable

The dependent variable Enterprise Performance (a.k.a. Strategic Business Unit (SBU) performance (Profitability (P))) results from the execution of the firm's strategy and its operations to achieve a targeted outcome.

Enterprise Performance (Profitability). The conceptual and operational definitions of strategic investment appear below.

Conceptual Definition. *Profitability* is the measure of net income: the difference between revenue and costs for the firm over a specific accounting period, typically one year.

Operational Definition. Operationally, enterprise performance (profitability (P)) will be measured by calculating the average net operating income of each ICT as a percent of total revenue taken from the firm's financial statements for the last three years, using the sources previously designated. It is represented as P = (yr.1 np/tr + yr.2 np/tr + yr. 3 np/tr)/3. Profitability is a measure of both ratio and interval data types.

The Research Strategy

The method of research in this model is focused on quantitative study. Further, it aims to gather reliable qualitative data that can be converted into quantitative metrics. Determining correlative relationships among independent, moderating, and intervening, variables, and the dependent variable is a priority of the research.

The research model is designed to examine the relationship among the variables contained in the Strategic Success Hypothesis (Ansoff, 1990), geographic location of ICTs, and area specific innovation quality. It then examines the impact of those variables on enterprise performance ((profitability) (P)) in urban technology firms ((ICTs), and suburban technology firms (ICTs). Unlike the abundance of primary research noted in the literature, this effort examines secondary data available for the public companies that are the focus target. While not prolific, some validated studies reveal measurements that unveil anecdotal inferences that can be used to support this research. That data is integrated into required constructs to add value to the findings. More on this process is explained in the Data Sources and Research Methodology section in Chapter 3.

An extensive review of the available literature has been done (see Chapter 2) and has been extended during the course of the research process to ensure sound methodology.

Data Sources

As indicated above, the focus of this research is built almost entirely on use secondary data sources. All data sources are catalogued in detail in Chapter 3 Research Methodology.

Data Collection and Analysis Methodology

This research targets the largest geographic locations, commonly known as metropolitan areas (metros) in various regions of the U.S., to identify technology clusters where there are sufficient numbers of technology firms (ICTs) that support the focus of the research. A technology cluster is an area that contains a high number of technology firms (ICTs) either in a specified technological path, or is integrated in a variety of industries that rely on technology as a primary means of doing business. These ICTs that produce products and/or services considered technology driven. Selection of the metros leans toward those that have well defined urban centers as defined above and suburban locations as well (as defined above). All research methods are catalogued in Chapter 3 Research Methodology.

Anticipated Results of Research

This research is designed and anticipated to reveal important information regarding the differences in how two distinct sets of technology firms (ICTs) -- urban technology firms, and suburban technology firms -- select their strategic posture and the impact it has on profitability of the firm. Further, it is designed to measure and identify some of the key gaps in strategic behavior between these two types of technology firms, to better understand them, and the implications assigned.

The descriptive and correlational relationships revealed in this research seeks to catalog how the environments in which urban technology firms (ICTs) and suburban technology firms (ICTs) must operate, lend themselves to natural differences that potentially create challenges for urban ICTs.

By cataloging differences in strategy and response capability, decision-making regarding choice of strategic posture, and the impact on profitability of the firm, the results can potentially lead to prescriptive research for improving the conditions that support optimal performance by ICTs for business leaders, policy makers, educators and communities at both regional and national levels.

This result can contribute to turning traditionally underserved communities, i.e., urban centers, into greater participants in a global economy driven by emerging technologies, and create brighter socio-economic prospects going forward in the 21st Century.

Contributions to the Academic Field of Strategic Management

The expected contributions of this research to academic knowledge are to provide empirical evidence about the relationships among specific strategic behavior variables, environmental turbulence, and innovation quality relative to enterprise performance as represented by profit (P). It also seeks to determine the relationship among those outcomes and location choice of high-technology firms discriminating based on geography.

Contributions to the Practice of Management

The expected contributions and applications to the practice of management focus on providing additional clarity, relative to strategic enterprise location choice and the factors that lead to optimal performance and competitive advantage.

Chapter 1 Summary

Chapter 1 began with a brief statement of the research problem, which focuses on evaluating the relationship among the variables contained in the Ansoff *Strategic Success Hypothesis*, a custom-crafted innovation quality index model based on validated elements, and enterprise performance (profitability), of technology firms in urban centers compared to suburban locations. The purpose of the study is to determine what impact these relationships, if they exist, have on strategic enterprise location choice of technology firms.

A background of the problem was then provided. The key strategic thrust of the research is to examine the underlying reasons why research shows a proclivity by technology firms (ICTs) to reflect a suburban bias when selecting location choices.

Included in the background reflection, was a discussion of early concerns about a so-called “Digital Divide”. It goes on to explain how that divide was only short-lived, defying the expectations and concerns of many economists, and public policy experts. However, it was also discussed that what had been a concern that didn’t materialize, has emerged into what some describe as an “opportunity divide” instead, with consequences just as severe.

The problem background highlighted some of the new thinkers today in the area of technology development, like Dr. Richard Florida, and his “creative class” theory. It included the contributions of Harvard’s Dr. Richard Glaeser, and his highly recognized research focus on cities, and particularly urban development. The section included the thinking of Dr. Michael Porter, also of Harvard, and his Initiative for a Competitive Inner City.

Chapter 1 then discussed some of the challenges facing American technology development efforts in general, chief among them, a severe shortage of workers with the unique skill sets required to sustain technological innovation and development.

The characteristics of urban economic dynamics were discussed within the context of ICT attraction. Related to that subject, what has emerged as an important consideration relative to talent attraction within the tech sector, quality of life, was discussed within the framework of contemporary theory.

Then, a preview of the research was introduced to provide a perspective about purpose, method, and direction. Integral to that introduction was a discussion of Ansoff's *Strategic Success Hypothesis*, which serves as a key foundation for the research.

Entering the primary elements of the research study, the research questions were introduced. And to provide additional clarity as to the context and need for the research, both the global and research models were discussed.

The hypotheses the research seeks to explore were cataloged, along with the strategy for conducting the study and gathering the required data.

Finally, the anticipated results of the research were introduced, along with the expected contributions to strategic management and to management practice at-large.

Chapter 2

LITERATURE REVIEW

The literature review contained in this chapter will examine previous research on classic strategic management theory, the problem, the research model, the variables, and the hypotheses.

Literature Relevant to The Problem, The Research Model, The Hypotheses, and The Variable Definitions

Each section of this chapter reflects the literature that exists within the field of strategic management, relative to the specific factors being considered in this research model. At the end of each section, the literature is summarized in a section labeled "Literature Observations and Conclusions". This review involves an extensive examination of classical, as well as contemporary theory. It includes, but is not limited to, Ansoff's Strategic Success Hypothesis elements, innovation quality factors, and profitability. It provides significant information gathered from the most distinguished contributors to strategic management science.

Selected Background Literature Review

of Strategic Aggressiveness

Strategy is defined as a plan, method, or series of maneuvers or stratagems for obtaining a specific goal or result (Random House, 2010). It has been used in myriad ways to describe enterprise behavior, so that such activity is better understood by academics and business practitioners alike.

The classical view of strategy, paralleling the open system perspective in organization theory, provides for its basic shape and purpose to be framed as a pattern of decisions that, when optimized, align an organization's "structure and process". This optimization leads to an expression of its capabilities with the external environment ((Katz & Kahn, 1966; Thompson, 1967) (Miles & Snow, 1978; Mintzberg, 1978) (*Venkatraman* & Camillus)).

Alfred Chandler's early work helped provide both conceptual and operational definitions of the firm, which also contributed to advancing analysis of strategy (Chandler, 1962).

Dr. Igor H. Ansoff's *Contingent Success Paradigm* described the relationship between factors present in the environment that bear upon successful performance of the firm (Ansoff, 1990). He focused particularly on the relationship between the firm's strategic choice and the environment, arguing that for optimum performance, they must be properly aligned (see variables below: SA, CR and SI).

Charles Hofer built upon that work by segmenting various combinations of variables to frame contingency strategies in order to advance the import of relying on contingency theory (Hofer, 1975). His purpose was to create a framework in which the reliability of business strategies could be tested to further validate their usefulness. The key conclusion he developed, was that if strategies are put to test under different propositions, such as organizational life-cycle, consistency under these tests is an indicator of strategic reliability.

The research of Dan Kipley and Alfred Lewis analyzed secondary information from empirically validated research and industry journals to demonstrate the reliability of Dr. Ansoff's Strategic Management Systems (Kipley & Lewis, 2009). In researching each of the system's components, they concluded from the evidence that, in both implicit and explicit ways, the application of Ansoffian principles had value relative to increased financial performance for a cross section of firms (i.e. for-profit, non-profit, small and medium sized enterprises) competing in turbulent environments.

Further, while issues relative to scalability raise some questions about levels of impact, the research also showed that there is an empirical relationship between the application of Ansoffian Strategy within small and medium sized enterprises (SMEs), and strategic success probability . These findings are particularly relevant and noteworthy as it pertains to the variable targets in this research, which has a focus on small to medium sized urban ICTs compared to non-urban.

Shona Brown and Kathleen Eisenhardt in their book, "Competing on the Edge: Strategy as Structured Chaos", introduced theory that diverts from Ansoffian principles, by suggesting that firms should not look for the optimum fit between strategy, organization and environment, arguing that pushing for such a fit makes the firm inflexible and less able to respond to changes (Brown & Eisenhardt, 1998).

Instead, Brown and Eisenhardt suggest that the firm should seek a semi-coherent strategic direction, with a focus tilted more on the present than the past in terms of the relationship between the two. They argue the firm should seek to constantly remake itself, or reinvent itself, by drawing on past strengths and attempting to leverage them to respond to current conditions. The rationale advanced for this approach is linked to the viability of the firm at various stages of the organizational life cycle. It is influenced by Hofer's work as well. The authors note Mintzberg's theory, that suggests the formulation of strategy is more emergent than intended (Mintzberg, 1978).

Brown and Eisenhardt also acknowledge that Pankaj Ghemawat's findings suggest a somewhat contradictory position. He finds that firms are compelled to make higher levels of commitment in order to develop sustainable strategies that optimize the probability of success (Ghemawat, 1991). This perspective is consistent with Ansoffian principles. However, Brown and Eisenhardt counter that argument by recognizing that even when linkage of the key elements is tight rather than loose, the fit can only be pushed so far, because the firm does not necessarily and fully control the novelty and intensity of change.

Robert Gustafson however provided further empirical support for Ansoff's Contingent Success Hypothesis, by conducting research that revealed strong correlations between environmental turbulence, strategic behavior, and firm performance (Gustafson, 2003). He advanced the research by introducing an additional feature: competitive behavior (operating), establishing a relationship between competitive behavior and environmental turbulence, similar to the relationship between environmental turbulence and strategic behavior. Gustafson's research also established a theoretical framework for the harmonious co-existence of both strategic behavior and competitive behavior. Finally, advancing understanding of the relationship between environmental turbulence and strategic behavior, the research established empirical support that environmental turbulence determines “the proper allocation of resources and priorities among strategic and operating activities.”

Adding clarity to Brown and Eisenstadt’s argument that “fit can only be pushed so far, because the firm does not necessarily and fully control the novelty and intensity of change;” Derek Abell’s research builds upon the widely recognized trend that the post-World War II period produced change that was largely moderate and incremental, compared to the present period in which the environment is highly volatile. He suggests that the current volatility results in a strategic sense that change is constant and must be considered as such. His argument posits then, that if the firm recognizes change as a constant, having only one strategy is insufficient to meet the challenges current change dynamics produce. He argues that the firm should be operating with two parallel strategies simultaneously: one for today, and one that confronts and attempts to manage the future. He goes on to suggest that by so doing, the firm is able to achieve the twin goals of “maximizing present capabilities” while developing future strategic capacity.

Jane Dutton and Robert Duncan examine how organizations respond to change environments, and how change momentum can be assessed and predicted by considering the complexity of how strategic issues are interpreted along three dimensions (Dutton & Duncan, 1998). They refer to this process as *strategic issue diagnosis* and the three dimensions are: activation (of change), assessments of urgency, and assessments of feasibility. They argue that by analyzing the relationship of these dimensions to the creation of change momentum, predictability of organizational response can be achieved.

Dutton and Duncan go further to suggest that by examining the systematic effect of an organization's belief structure and its resources, a model can be created for predictability of why organizations respond differently to change/strategic issues.

In cataloging the evolution of the creation and theory of strategy, Ghemawat argues that it can be closely tracked to the evolution and incremental complexity of competition. He argues that in essence, the strategy framework is heavily influenced by the intensity and complexity of the competitive forces present in a given firm's industry and environment (Ghemawat, 2002)

Advancing the examination further, as an influencer or determinant of strategic choice, Douglas Bowman and Hubert Gatignon, examined how key competitive forces triggered defensive strategy reaction. Specifically, they looked at the relationship between enterprise characteristics, and the speed with which it is willing and able to respond to the introduction of a new product by a competitor (Bowman & Gatignon, 1995). They concluded that such factors as market growth, market share of the reacting enterprise, typical production development time, and the frequency of product changes, all emerged as significant reaction time determinants.

As early as 1994, Gary Hamel and C. K. Prahalad, began to chronicle the emerging academic belief that traditional approaches to strategy development were starting to present themselves insufficient to tackle contemporary challenges. Several theories have been offered as causal agents of this phenomenon. However, perhaps the most consistent theme would be characterized as the increasing complexity of the environment driven by increasing turbulence.

Recognition of the increase in environmental intensity and complexity can be framed as being consistent with the elemental tools used to construct Ansoff's Contingent Success Paradigm. Ansoff's theory introduces a set of analysis tools to examine the relationship between complexity and turbulence. In their recitation, Hamel and Prahalad state that the search for new approaches to strategy development is intensifying. They point out, that while that process is occurring, a theoretical operating void is developing amongst managers who are choosing to place far less emphasis on strategy, replacing it with heavier weight on implementation.

Analyzing the strategic thrust of the literature, it could be suggested that the process Hamel and Prahalad describe, is nutritional to strategic management understanding. It suggests anticipation of a movement that promotes new approaches to strategy, one that would be a natural by-product of some rather dramatic environmental shifts. The shifts in global forces, competitive forces, and particularly economic changes, have resulted in significant increases in both complexity and turbulence.

In a later article appearing in *Sloan Management Review*, Gary Hamel noted that in a world that has clearly become more turbulent and thus, more discontinuous, it compels the emergence of strategy innovation (Hamel, 1998). He argues that in such an environment, increased value creation focus (ROI) must shift from operating margin improvement to growth. However, and more importantly, the underpinning of sustained performance will come from strategy innovation. He suggests five conditions that create the environment for strategy innovation: 1) new voices, 2) new conversations, 3) new passions, 4) new perspectives, and 5) new experiments.

Advancing Hamel's discussion for the need for new strategy innovation in the face of an environment with increasing turbulence and volatility, Hitt, Keats and Demarie, argue that at least part of the cause of this new environment has been triggered by significant technological revolution, which is also linked to increased globalization (Hitt, Keats, and Demarie, 1998). The speed of technological innovation and globalization has created an entirely new competitive landscape.

These scientists go on to suggest that, because of these forces, success in the 21st Century will require a new type of enterprise. In their view, the description of this new enterprise type, echoing others in the field, will shape a model that builds upon strategic flexibility as a key foundation. Hitt, Keats and Demarie correlate this competitive advantage, emitting flexibility with emphasis on intensified leadership development, focus on building dynamic core competencies, greater development of human capital, and leveraging new technologies, particularly those that impact building information, as a key strategic asset.

Literature Observations and Conclusions

The literature provides a catalog of the early research on strategy, that focuses significantly on examining the variables that act as influencers and/or determinants of strategic choice that lead to optimal performance. The early work of Chandler and Mintzberg respectively, examined first a conceptual definition of the firm, and then such factors as the relationship between structure and process, as it relates to strategic choice.

Ansoff's Contingent Success Paradigm gave meaningful shape to this early thinking, by arguing that optimum performance is achievable when the enterprise's strategic choice is aligned with the environment in which it must operate (Ansoff, 1990).

Much work has emerged in the subsequent debate amongst scholars, as to which determinants correlated most strongly with optimal performance. Some further argued that the relationship between strategy and the enterprise environment, were strongly correlated, and set out to provide reliability tests to validate the strength of this relationship.

Others began to advance the notion that enterprise flexibility in strategic choice led to increased performance optimization, because of significantly higher levels of turbulence in the modern world

The latest work in the field, allows for either segments, or all of the early theories to be integrated with later research that clearly indicates an increase in environmental turbulence and volatility, particularly at the present time, the beginning of the 21st Centur. This increase in turbulence and volatility, results in intensified discontinuities, making optimal performance leading to competitive advantage all the more challenging. However, it also invites further research to determine to what degree factors that lead to strategy innovation, will be appropriate as determinants of optimal performance in this new environment.

Selected Background Literature Review

of Strategic Aggressiveness for ICT Firms

As technological innovation has become a key factor across industries over the last two decades, it has had a rather profound impact on the re-sculpting of the business and competitive landscape, both nationwide and globally.

This phenomenon has triggered a significant increase in research regarding all aspects of enterprise behavior, not only amongst firms impacted by new technology, but also about the dynamics that impact performance within technology enterprises themselves. It has also compelled the federal government's Bureau of Economic Analysis (BEA) to designate a distinctive category for firms whose primary business purpose and activity involves, or is related to information, communication, and other technology producing endeavors. Thus, the category has been duly labeled "Information-communication-technology-producing - ICT". The review of the literature that follows is aimed at highlighting what has, and is being revealed by the science in terms of how ICT firms create, develop, and advance strategy to produce and sustain competitive advantage.

The literature consistently supports the conclusion that technology, or ICTs operate in an environment that is quite different from traditional models, in that the novelty of change and turbulence is significantly intensified. John Camillue, Richard Sessions, and Ron Webb, refer to this dynamic as "fast-cycle environments" (FCEs), and argue that this new landscape renders traditional approaches to strategic planning insufficient in their usefulness (Camillue, Sessions & Webb, 1998).

They reach this conclusion because, while the science of planning has continuously evolved in recognition of increasing change novelty from the time that strategic planning was first explored, the environment today has cast a semi-permanent condition that renders change as a constant, and thus compels that new planning methods and models emerge.

William F. Hamilton, Joaquim Vila, and Mark D. Dibner, examined how strategic choice in ICTs evolves. Utilizing an executive contact survey in the bio-tech industry, with high participation and return rates, they essentially found that ICTs shift their strategic priorities over time, based on environmental conditions (Hamilton, Vila & Dibner, 1990). The range of strategic behavior associated with choice, spanned from highly scientific, research oriented, to almost solely commercial. They identified four distinct patterns of strategic choice: First, they found firms that were technology driven, externally oriented-early movers. Also identified were technology driven, internally oriented-early movers. Additionally, firms that were technology driven, externally oriented-late movers, were found, as well as market-driven firms that were internally oriented. They present these categories as four distinct patterns of strategic choice.

Using their findings as foundation, Hamilton, Vila and Dibner suggest strong support for the theoretical construct that emerging enterprises operating in novel technology environments, demonstrate rapid shifts in strategic choice. They argue that the shifts directly correspond to their priorities, which are heavily influenced by surrounding environmental conditions.

Camillue, Sessions, and Webb, cite two benchmarking studies conducted by the American Productivity & Quality Center (APQC). The first in 1995, focused on strategic planning in firms generally, and the second, completed in 1997, focused on strategic planning in so-called FCEs. The study uncovered five companies that developed, what were considered, exceptionally effective strategic planning models. The most notable at the time, National Semiconductor, was highlighted as a leading edge ICT in both technology, and management.

The study found that the firm employed three characteristics deemed instructive for other enterprises operating in environments faced with rapid and unpredictable change. They are 1) directive vision; 2) linking vision, action and outcomes; and 3) reality-driven accelerated planning. The lessons taken from the study, according to the authors, are that these three characteristics emerged as key building blocks for the development of contemporary strategic planning models that enable firms to effectively compete in FCEs.

Shona L. Brown, and Kathleen M. Eisenhardt, conducted a study that found that multiple-product innovation enterprises create a tendency of optimal performance, with a combination of strategic elements that are less structured and more incremental in nature, while also considering time-paced evolution (Brown and Eisenhardt, 1997) . They argue that first, by creating structure that is both loose, and flexible, but not so liberal that it allows for the introduction of chaos when confronted with change, the enterprise is more equipped to deal with an environment that is ever-shifting. They go on to suggest that successful firms link the present with the future, through time-spaced transition processes. Further, that in these firms, rather than aggressively pursue product innovation, “they rely on a wide variety of low-cost probes into the future, including experimental products, futurists, and strategic alliances.” Semi-structures, links in time, and sequenced steps, significantly influence the character of strategic choice in these firms.

Elements of support for this theory, are found in Alfred D. Chandler’s analysis of just how technology firms evolve in the information age. He advanced the premise that technology firm evolution occurs as a function of networks comprised of both human and material, that are supported by infrastructure that serves as a perpetual enabler for continued evolution (Chandler, 2005).

Considering the nature of strategic behavior in ICTs, Hubert Gatignon and Jean-Marc Xuereb, conducted a study designed to examine strategic orientation selection, and under what conditions choice is influenced or determined (Gatignon & Xuereb, 1997). Using a structural model of the impact of strategic orientation, to measure the performance of innovative products under certain conditions, they uncovered evidence instructive to best practices for ICTs.

First, the researchers determined that firms seeking to introduce innovation products (IPs) in competitive environments must possess strong technology orientation. Second, an orientation toward competitive intensity in high-growth markets enables firms to create IPs at lower cost, which can create competitive advantage, and is essential to success in such environments. Third, in markets where demand is relatively uncertain, firms should have a strong combination of consumer, and technology orientation. This combination leads to the creation of IPs that come closer to meeting consumer needs, perform better, and position the enterprise for competitive advantage. And fourth, and to clarify, competitive orientation is appropriate in markets where demand is relatively uncertain. However, it is deemphasized in those where demand is highly uncertain, due to corresponding change novelty that requires a higher degree of flexibility.

Simon Alder conducted a recent study that examined the correlation between competitive intensity and innovation, to see if either of the two drives enterprise behavior (Alder, 2010). What the study revealed, was that firms that possess a high degree of innovation, or technology, demonstrate tendencies to perpetuate innovation within their enterprise. Alder found that this behavior is particularly true when the enterprise has superior technology to its next closest competitor. However, what it also demonstrated, was that competitive intensity increased amongst firms with low levels of innovation or technology. In other words, the higher the trajectory an enterprise reflects, in terms of its innovation capacity, the less likely the competitive intensity it faces is high.

Alder's work, although conducted subsequently, highlights some of the findings found in Janet K. Tinoco's examination of dual focus innovation strategies, and the requisite requirements to optimize their success. Tinoco's work built upon various principles reported in the literature which set the foundation for competitive advantage in innovative environments. According to Tushman and O'Reilly, enterprise success is highly determined by the capacity to successfully develop both radical and incremental innovation, as a means to create competitive advantage (Tushman & O'Reilly, 1996). Each of these is deemed a requisite component of competitive behavior in distinctive market segments. Radical innovation is a necessary element in emerging markets, while incremental innovation is essential in mature markets (He and Wong 2004; Tushman & O'Reilly 1996).

Tinoco argues that firms often find themselves competing in both environments, in order to capture share from markets with distinctive characteristics, and as a result, a dual focus is required (Tinoco, 2007). While prior research has investigated the structural and cultural determinants involved in dual focus environments (Duncan 1976; Gibson and Birkenshaw 2004), Tinoco's work supports the hypothesis that dual focus, as a path to innovation, is significantly influenced by internal business processes.

Almost by nature, radical and incremental environments are often engaged in strategy conflict and resource competition. This is the reason why focusing on business processes that optimize customer value in each distinctive market, enables the attainment of competitive advantage. The research finds strong support for the use of mapping a business process framework (Srivastava et al., 1999), to utilize three distinct business processes It argued that each is critical to delivering high customer value and a significant determinant of strategic choice.

First, Product Development Management (PDM) process, comprised of the processes of market experimentation, technology monitoring, and technology competence, predominantly influences exploration.

Second, Supply Chain Management (SCM) process, comprised of the processes of channel bonding and quality process management, predominantly influences exploitation.

Third, the Customer Relationship Management (CRM) process, encompassing the processes of lead user collaboration, competitor benchmarking, and current customer knowledge process, enables the dual focus to be effective and heightens the capacity to optimize outcomes in each sector.

Consistent with his research and writings on the need for new strategy innovation, Gary Hamel offers that the key challenge for innovation enterprises (IEs), or ICTs, is to drive revolution within its own industry (Hamel, 1998). He argues that rather than focusing specifically and exclusively on products, as the primary catalyst for enterprise innovation, which he labels as "product-centric," real competitive advantage will be achieved by shifting to systemic innovation, by changing the business model itself. This shift would call for a strategic assessment of product alignment with target markets, the markets themselves, internal methods and business processes, and external factors.

When considering the factors and challenges that emerge when the need for new innovation strategy is examined, a wide range of research has been conducted to determine the impact of enterprise shape, size, and industry type, to name just a few.

For example, Jayachandran Variyam and David Kraybill, in their examination of a sampling of manufacturing, sales and service firms, found three important implications influencing strategic choice (Variyam & Kraybill, 1993): first, supporting research previously referenced herein, firm size is a key determinant of strategic choice; second, the nature and context of human capital present within an enterprise, will have a significant bearing on strategic choice; and third, their research found that smaller firms, i.e. sole proprietorships, and independent firms (small stand-alones), particularly those owned or managed by women, might require special attention in areas such as planning, and new technology adoption.

In the last couple decades, a good deal of attention has focused upon the short-term and long-term strategic scope of American enterprises, as compared to their foreign counterparts. In this regard, Vida Scarpello, William Bouton, and Charles Hofer, argue that continuing focus on short-term results (profits) by U.S. firms, will eventually lead to loss of competitive advantage to other countries focusing on the creation of strategic structures that serve long-term interests (Scarpello, Bouton & Hofer, 1986). Consistent with other research literature, they emphasize that keen attention must be paid to research and development (R&D), as a key component of long-term competitive advantage, and that four types of R&D are needed.

They suggest that those R&D categories include 1) idea origination (new ideas and novel solutions); 2) idea application (linking new ideas leading to innovation meeting market needs); 3) idea evaluation (systematic evaluation of innovation components and requirements, including investment); and 4) refining innovation to facilitate market introduction and acceptance. In addition to these four R&D categories, Scarpello, Bouton, and Hofer, also go on to suggest that four personality types, consistent with the categories, should correspondingly be present in the enterprise, to facilitate the kind of strategic behavior that will result in R&D evolution. Those personality types are creative, entrepreneurial, analytic, and development-oriented, respectively.

Literature Observations and Conclusions

Research of ICTs, sometimes interchangeably referred to in the literature as Innovation Enterprises (IEs), places considerable focus on the novelty of change itself, both internally and externally, as a driving factor influencing strategic choice. The work of Camillue, Sessions, and Webb, gave rise to the descriptive term “fast cycle environments” (FCEs), to capture the essence of the novelty of change, that has become almost a constant in the modern environment, and even more so amongst ICTs and IEs.

In examining how strategic choice in ICTs evolves, Hamilton, Vila, and Dibner, found that these firms demonstrated patterns that are influenced by whether or not enterprise orientation is internal or external, if inclination is tilted toward early mover, late mover, or market driven dynamics. They concluded that ICTs are more inclined to shift strategic choice as a function of change novelty, and other external conditions, rather than maintain strategic consistency.

Hubert and Jean-Marc explored how and under what conditions orientation is chosen that then influences strategic choice.

Camillue, Sessions, and Webb, also found that planning itself, had distinctive characteristics when examining ICT function. Brown and Eisenhardt, Chandler, Adler and Tinoco, on the other hand, all describe circumstances that support the need for flexibility and dual focus in strategic choice, depending on product innovation orientation, and technological novelty of change at-hand.

Finally, Hamel highlights a growing assertion that traditional strategic planning models are no longer useful, particularly for ICTs operating in fast-cycle environments (FCEs), and the intensity of the need for strategic innovation is increasing. Some examples focus on R&D, as a rudimentary building block for increased innovation. Other key enterprise factors required for success have been included to illustrate key theoretical constructs contained in the literature.

Selected Background Literature Review

of Capability Response

To understand response capability, there are key theoretical underpinnings that form the foundation for examining what role it plays in determining enterprise behavior and performance success or profitability. Building upon earlier work from Schumpeter (1939), Penrose (1959), Williamson (1975,1985), and Barney (1986), among others, Resource-Based View (RBV), also sometimes referred to as the *efficiency-based view,* has been a significant theory for about two decades. However, its roots, lodged in economic theory, go back much further.

It is built on the construct that firms possessing the best productive resources, and best able to exploit them, will achieve the highest levels of growth and profitability (Penrose, 1959). It also installs the thinking that access to those resources creates a dependent relationship between an enterprise and its environment-environment being the source of the resources and thus determines boundaries and limitations.

Since its inception, theoretical layers have been added to the construct that encompass what type of resources the firm possesses, resource quality, and how it uses them, as key determinants of firm success.

Chandler's early work in strategic management, namely, strategy, growth, and structure of the large industrial enterprise, as described by David Teece, credit his scholarly efforts as being a major contributor to the development of capabilities theory (Teece, 2010). Chandler began his examination of capabilities by researching a theory commonly referred to as *transaction cost economics* (Williamson, 1975). He did so while also developing insights relative to strategy, structure, and performance. These principles, contained in the strategic management literature, have maintained a high degree of relevance to contemporary theory.

In *Scale and Scope*, Chandler advances the view that competitive advantage (in the early 20th Century context) flowed from execution of a three-pronged strategy that included: 1) *investment in large-scale production to lower unit cost*; 2) *investment in marketing, distribution and purchasing networks*; and 3) *recruitment and organization of professional managers* (Chandler, 1990). He argued that entrepreneurs able to execute in these areas, in young or changing industries, would gain advantages from both lower unit costs, and product-specific learning across functional areas.

In 1992, his thinking had evolved and changed from considering transaction costs, as the unit of analysis, in favor of capabilities, namely, that "the nature of the firm's facilities and skills becomes the most significant factor in determining what will be done by the enterprise, and what by the market" (1992; 86).

The scientific roots of capabilities theory is evidenced in the literature early on by Selnick (1957), and further by Cyert and March (1963), who posited that *organizational learning* served as the undergirding of capability, by framing standard operating procedures as a composite of organizational memory.

In his seminal work, *Strategy and Structure* (1962), Chandler highlights the importance of skills as "trained personnel with manufacturing, marketing, engineering, scientific, and managerial skills", and suggested these as being more valuable than hard assets, i.e. plant and equipment. These skills serve as the foundation for organizational capabilities.

Chandler's discussion of learned capabilities is seen as an early building block toward the evolution of *dynamic capabilities* theory (Teece, 1990)

As indicated in Chapter 1 and to review, Ansoff's *Contingent Success Hypothesis* seeks to define response capability within the context of that paradigm. *Capability Response* is a description of the firm's ability to support the execution of its strategy. Because aggressiveness, according to Ansoff's *strategic success hypothesis*, must match the level of environmental turbulence in which the firm functions, to succeed, and response capability must match aggressiveness, capability must also be aligned with the turbulence level. The nature of capability is characterized at each level of turbulence below:

Table 7

Matching Capability to Environmental Turbulence

	Custodial	**Production**	**Marketing**	**Strategic**	**Flexible**
Responsiveness of Capability	Precedent-driven	Efficiency-driven	Market-driven	Environment-driven	Seeks to create the environment
	Suppresses change	Adapts to change	Seeks familiar change	Seeks new change	Seeks novel change
	Seeks Stability	←	Seeks operating efficiency	← →	Seeks creativity
			← Seeks strategic effectiveness →		
	Closed system	←		→	Open system

Ansoff, 1990, pg.34

A firm's capability is characterized by its alignment to the environmental turbulence level with five categories:

Level 1-Custodial: the environment is repetitive and the optimal strategic behavior is change-rejecting. Strategic change is suppressed. The enterprise is hierarchical, with centralized authority.

Level 2-Production: focus is on efficiency. Enterprise is introverted (looks inward). It allows change only after failure to meet objectives. It is not environmentally sensitive. It assumes efficiency delivers market success.

Level 3-Marketing: enterprise is extroverted and future oriented. Emphasis is placed on serving future needs of historical customers, using historical strengths. Marketing function drives enterprise dynamic and relies on historical success strategies.

Level 4-Strategic: Enterprise is not attached to history. It is environment-driven, and future validity of historical success strategies is subject to constant challenge. Emphasis is placed on understanding future state in present context.

Level 5-Flexible: Enterprise is environment creating. Enterprise is not attached to history. It is constantly seeking novel change.

Additionally, the firm's capability profile must match the strategy (Ansoff-*strategic aggressiveness*). That profile is constructed using five capability factors (one general management and four functional factors). The nature of each factor and its alignment with strategy is described below:

Table 8

Capability Factors

		**Growth*	**Innovation*	**Maturity*	**Creativity*
General Management	* *Efficiency* * Diversification * Multinational	*Large risks * Societal	*Technology		*Project management
Finance	* *Controllership* * *Cash management*	* Financing * Capital investment	* Credit		* Currency/tax *Inflation Management
Marketing	* *Sales* * Advertising/ promotion	* Pioneering market research	* *Sales analysis*	*Product market introduction	* Cross-culture marketing
Production	* *Mass production* * *Inventory* * *Automation*	* Tailored production * Distribution * Product changeover	* Purchasing	* *Technology adaptation*	**Industrial relations*
R&D	* Research * *Incremental evolution* * Styling	* Creativity * Industrial engineering	* Innovation * Imitation	* Adaptation * *Production technology*	

(Ansoff, 1990, pg 34)

Further delineated, general management capability (also functional capability), is the propensity and ability to engage in behaviors that optimize attainment of both short-term and long-term enterprise objectives and goals. That capability is “assessed in two complimentary ways” – behavioral observation, and the development of capability profiles (Ansoff, 1990, pg. 263).

Observation seeks to identify responsiveness traits, ranging from reactionary to anticipatory, relative to environmental discontinuities. Developing capability profiles relies on assessment of three capability attributes: 1) *climate* (will to respond), 2) *competence* (ability to respond), and 3) *capability* (capacity to respond). Both methods are considered relative to factor alignment with turbulence and aggressiveness that determine assessment outcome appropriateness.

Resource-Based View (RBV), on the other hand, differs significantly from the widely-used Five Forces Model (Porter, 1980), which focuses on industry analysis, rather than resources to determine firm performance success.

However, a comprehensive study by Jeremy Galbreath, and Peter Galvin, of both service and manufacturing firms, found that capability is a stronger determinant of firm performance than either structural industry characteristics (Porter), or resources (Penrose). Their study of some 285 Australian firms, found that resources were more important than industry structure (Galbreath & Galvin). And while they found that resources were much more important in service firms than manufacturing, their study also revealed that throughout their aggregate sample, capability was more important than resources in both service and manufacturing

Borrowing from the same early works noted above, Teece, Pisano, and Shuen, sought to give further illumination in the literature to the question of how firms build competitive advantage in "regimes of rapid change" (Teece, Pisano, and Shuen; 1997). They argue that the dominant strategic management paradigm during the 1980s, Porter's Competitive Forces Model (Porter, 1980), as well as the resourced-based approach, and the efficiency-based approach, were effective in explaining firm level performance. In their view, it also revealed how competitive advantage was achieved in that more restricted and localized space. However, Teece et. al, point out that during the emergence of a global environment, one with high turbulence and rapid change, the process of achieving competitive advantage is much more complex, and requires new paradigms to analyze and understand the new dynamics of enterprise behavior, competitive advantage, and the Efficiency-Based approach.

Thus, their analysis aims to point out that firms which are able to sustain competitive advantage in these change-oriented conditions are those that "can demonstrate timely responsiveness, and rapid and flexible product innovation. They argue that those enterprise behaviors must be "coupled with sufficient management capability, to effectively coordinate, and redeploy internal and external competences" (Teece, Pisano, and Shuen; 1997). They refer to this process capability as "the dynamic capabilities approach". This theory appears to align with the Ansoffian model, which positions the relationship between capability response effectiveness, and change (Environmental Turbulence), as a key factor in determining enterprise success.

Teece et al, defines dynamic capabilities as a "firm's ability to integrate, build, and reconfigure internal and external resources/competences, to address and shape rapidly changing business environments" (Teece et al. 1990, 1997; Teece, 2009). Further, it is argued, these capabilities "determine the speed and degree to which the firm's resources/competences can be aligned, and realigned to match opportunities and requirements of the environment."

Through this definition, the underlying competences take the form of three clusters: the first is sensing, which essentially is the process of identification and assessment of opportunities; the second is seizing, which involves the mobilization of resources required to address an opportunity, and to capture value while so doing; and finally, the third category is transforming, which is the process of shaping and reshaping the organization and its markets. Chandler argues that the most important capabilities are all rooted in creative managerial and entrepreneurial acts

Winter, sees the enterprise consisting of a system of behavioral routines, and experience accumulation, as the foundation for the development and evolution of dynamic capabilities. These capabilities in turn, form the basis of operational procedures. The literature offers additional works on absorptive capacity (Cohen and Levinthal, 1990), architectural knowledge (Henderson and Clark, 1990), and combinative capabilities (Kogut and Zander, 1992), that each describe a process of enterprise learning that supports the development of dynamic capabilities.

Schwandt's research around this same time period yielded considerable work in the literature. It also considered the process of enterprise learning by examining the influence of cognition and action, as key elements of the development of capability (Schwandt, 1994, 1995, 1999). Schwandt's work resulted in the development of the Dynamic Organizational Learning Model (DOLM), which defines the relationship between enterprise cognition and action. The organizational action system, as it is described, is comprised of two subsystems: organizational learning, and organizational performing.

Essentially, the theoretical construct surrounds the reasoning that learning bequeaths performing, and that these dual action streams influence the agility, flexibility, and quality of how enterprises adjust their capability response in the face of changing environmental conditions.

Maurizio Zollo and Sidney Winter, advance this theory by postulating that there are key *learning mechanisms* within the enterprise, that have the potential to strengthen capability and thus performance (Zollo and Winter, 2002). They seek to bridge some rather natural divides between the behavioral approach, and the cognitive approach, by defining the context of *organizational routines* and *experience accumulation,* which is available in the literature.

Zollo and Winter focus on what they view as an important enterprise dynamic -- collective learning, or group learning -- an organizationally oriented cognitive activity. Organizational competence improves as awareness of performance implications intensifies. This is done through a process called *knowledge articulation*-namely, the process of enterprise members being allowed and encouraged to communicate with each other, and express their views, relative to performance elements and outcomes (Argyris and Schon, 1978).

However, the enterprise cannot expect to see significant impact of this dynamic until the articulated knowledge is codified, a process referred to as *knowledge codification.* There is a significant gap between the performance outcomes, in which knowledge articulation has been combined with knowledge codification, and when only the former occurs. In other words, the circle is not closed until the latter is complete (Zollo and Winter, 2002).

Ari Jantunen, Ellonen Hanna-Kaisa, and Anette Johansson, explored the heterogeneity of dynamic capabilities, by comparing unique enterprise case studies within the same industry. They chose the magazine publishing industry as their research focus. The study revealed that in one of the three competences, sensing capability, appeared to be similar in firms in the same or similar industry (Jantunen, Ellonen, and Johansson, 2011). However, they also found that the seizing competency, which entails reconfiguring capabilities to respond to changing conditions, was different across firms within the same industry. This finding suggests that there are both idiosyncratic and common features in firms across the same industry. The implication of these findings is that firms are likely to develop similar capabilities to respond to changing environmental conditions, thus, relying on the status quo in terms of operating procedure renders no opportunity for competitive advantage to emerge. Managers must first be proactive in anticipating environmental changes. They must include in that proactivity, the ability to develop unique response capabilities that serve to differentiate their enterprise from other industry participants, if they expect to create competitive advantage.

Heiko Gebauer found similar results in her analysis of multiple case studies in the capital good manufacturing sector. Research findings confirmed that sensing, seizing, and reconfiguring, were key elements driving the development of dynamic capabilities (Gebauer, 2011). What this research also confirmed was that competitive advantage was not limited or restricted to the infusion of innovation into products and services, but that it should aptly be applied to management as well. Management innovation such as key change agents, and utilization, i.e. motivation, invention, and implementation, for example, facilitate sensing, seizing, and reconfiguring, and thus strengthens dynamic capability and capacity.

Roy and Pradyumana, sought to explore the impact of RBV definition on decision-making, a key component of capability development, by asserting that RBV does not consider the presence of multiple goals within the enterprise. To account for this element in the process, they developed the *rational-contingency view*, which accounts for multiple goals, and acknowledges that the goals may be in conflict, creating a cultural dynamic that accretes to the decision making process on capability (Roy and Pradyumana, 2011).

They suggest, using previous research by Langston and Schoonhoven, that what emerges is an understanding that there is no one best way of doing things, as determined in the decision making process (Langston, 1984) (Schoonhoven, 1981). As a result, capability determination emerges from bounded rationality, and produces dominant coalition amongst enterprise decision makers. This bounded rationality in turn influences the direction of dynamic capability response.

Ambrosini, Bowman, and Colier, offer further analysis of the concept of dynamic capabilities based on the literature, in theorizing that they can be segmented into three levels. The first level they refer to as *incremental dynamic capabilities*, the focus of which is aimed at the process of continuous improvement in the enterprise. The second level is aimed at *renewing dynamic capabilities,* the process of refreshing, adapting, and augmenting the resource base. Conceptually, the first two are generally perceived as the definition of the concept of *dynamic capabilities.* The third category forms what the authors refer to as *regenerative dynamic capabilities;* unlike the first two levels, this one frames how an enterprise's dynamic capabilities change its resource base. In other words, it influences enterprise adaptability and can emerge from either internal or external changes in leadership, or the introduction of a change agent.

In 1990, Prahalad and Hamel introduced the rather novel concept of *core competences* (Prahalad and Hamel, 1990). All of the previous enterprise performance theories were based on the firm's relationship to its environment. For example, RBV emphasized that enterprise resources were secured from the environment, and that a firm's success depends on how it responds to changing environmental conditions in the use of those resources. This has been characterized as an "outside-in" perspective in terms of viewing the firm. The core competences theory argued that an "inside-out" perspective could be more useful. Prahalad emphasized that resources could be combined and stretched to new areas and lengths, and that with an ambitious strategic intent, could be used in unique ways that distinguished the firm from its competitors. By identifying these unique resource and capability configurations, distinctive ways of doing business, or *distinctive competencies,* could be leveraged to create superior competitive advantage.

Prahalad used the concept of distinctive competencies (advanced core competencies) to encourage and even urge managers to not be restricted or limited merely to the universe or portfolio of activities in which the firm was currently engaged. Rather, they should imagine new possibilities that might emerge with this enhanced capability, and thereby stretching, lengthening, and leveraging resources. He suggested that competitive intensity had reached such a threshold that "incrementalism" was insufficient to create distance between an enterprise and its competitors. Managers now had to "think outside the box" (Prahalad and Hamel, 1994).

Boguslauskas and Kvedariciene aimed to draw distinction, and eliminate confusion, between two terms now widely used: core competencies, and *core processes*. Their motivation was borne from the increasing inclination for enterprises to outsource portions of their overall production output to other firms, and most often, other countries that offer the potential of competitive advantage through cost savings. They point out that there is often confusion between these two terms, as many practitioners incorrectly assume "they are one and the same" (Boguslauskas and Kvedariciene, 2009). However, these authors make distinction between the two by indicating that core processes are built from core competences. In other words, a core process cannot exist without the infusion of core competencies. However, the opposite is not necessarily true.

What this means within the framework of out-sourcing consideration, according to Boguslauskas and Kvedariciene, is that core competencies should not be out-sourced, because they serve as the basis for competitive advantage and when not directly controlled, another enterprise may, or may not, correctly perceive their importance, nor utilize them effectively in the same way. Further, core processes, built with the utilization of core competencies, can be out-sourced with specification performance standards attached for the firm to which they are out-sourced. This is an important distinction that should be considered so that competitive advantage realized from the effective utilization of core or distinctive competencies is not diluted by ill-conceived out-sourcing strategies.

Giaglis and Konstantinos wanted to understand whether or not managerial perceptions of competitive dynamics had any bearing on the enterprise response capability advanced. They empirically tested some 174 firms in 22 different manufacturing, trade, and service sectors in Greece. The research model utilized Porter's Competitive Forces approach, and found that how managers perceived such factors as competitive intensity, substitution threat, and increased buyer power, had significant bearing on their response capability selection (Giaglis & Konstantinos, 2011). Additionally, their study found that managerial perceptions of both internal strengths (managerial), and external capabilities (market orienting), offered significant bearing on the degree of innovation response capability would include.

Although conducted earlier, and focused on how firms perceive their marketing position, O'Cass and Weeerawardena, found a similar relationship between managerial perceptions, and how internal competitive capabilities emerge and are developed. Through a study similarly modeled and scaled to the work of Giaglis and Konstantinos, they found that how managers perceived the dynamics of the firm's industry, had significant bearing on its capability development process. Their work sought to advance the theory that when managers perceive their industry to be turbulent, it will develop superior market learning, and capability response mechanisms within the firm (O'Cass & Weeerawardena, 2010). They suggested that more research should be devoted to the study of the relationship between industry competitive intensity and capability response leading, and its impact on firm performance.

When examining what types of capabilities optimize the creation of enterprise competitive advantage, the literature has increasingly focused on the import of knowledge and innovation. It was the late Peter Drucker that seeded the idea that knowledge would become the new economic and enterprise currency that drives performance (Drucker, 1965). In 1997 he reiterated that knowledge would be the key determinant of competitive advantage in the future, as the acquisition of capital assets, i.e., equipment, financial capital, material, and labor, would share relative equity between firms. His theory advanced the notion that competitive advantage would be attainable, with an emphasis on understanding market conditions, innovating knowledge, and promoting innovation.

Research in the literature points to several activities involved in the process of knowledge acquisition, and conversion to innovation capability, otherwise known as the knowledge management process. The key elements are knowledge acquisition, absorptive capacity, and innovation capability.

A study by Shu-Hsien, Chi-Chuan, Da-Chian, and An Guang, found a positive correlation among knowledge acquisition, and absorption (Shu-Hsien, Chi-Chuan, Da-Chian, and An Guang, 2009). Their research also found a positive correlation among absorption, and enterprise performance. Central to each of these key knowledge management phases, they found that attracting higher quality employees had significant impact on both acquisition and absorption. Their findings also included that the presence of technology capability, particularly internal to the enterprise, had the potential to enhance acquisition, absorption, and conversion to innovation capability.

Sok and Cass, reinforce this same theoretical approach in their study, which examined the relationship among innovation resource capability, and innovation-based performance, with a focus on small-to-medium-sized enterprises (SMEs). The literature reveals that early research on enterprise innovation, focused heavily and primarily on product innovation, and not on other important, but less tangible strategic constructs within the enterprise. This study found that while the presence of innovation resources within the enterprise clearly drives innovation performance, that performance is significantly enhanced when there is the presence of superior learning capacity (Sok and Cass, 2011). Just like other, previous evidence discussed in the literature, there appear to be strong linkages between knowledge-driven activities, innovation capability-capacity, and innovation-based performance, all which lead to the creation of competitive advantage.

Parnell conducted a three nation research study of retail businesses in the U.S., Peru, and Argentina. He found that beyond simply developing capabilities within the enterprise to respond to changing environmental conditions, and even those developed for the purpose of constructing core competencies, there is strong evidence that superior performance can be achieved by developing strategy-specific capabilities. That performance is enhanced with the core competencies also leverage an enterprise's strengths, and thus are enterprise specific as well (Parnell, 2011).

For example, there was strong correlation between effective utilization of the focus strategy, and both marketing, and linking capabilities. The same was found for differentiation strategy, and technology capabilities, as it was for low cost leadership strategy, and strong management capabilities. Parnell argues that these alignment arrangements between strategy and capability, and enterprise strength and capability, help to explain why, even within firms in the same strategic group, some will perform significantly better than others.

Following a similar line of reasoning, and using the theoretical construct that an alignment between enterprise and capability, and capability and strategy, can optimize performance, Perott argues that it is imperative for the firm to supplement its periodic strategic planning cycle with "a dynamic, real-time, strategic-issue-management system (Perott, 2011). As in other research noted in the literature, his findings also identify the linkage between capability, and high environmental turbulence, to be a crucial determinant of not only enterprise performance, but in some cases, sheer survival.

To that end, Perott argues from his research results, that a system of early issue management identification enables the enterprise to take anticipatory and pro-active measures, to ensure that both corporate strategy and response capability maintain the alignment that is so critical to weathering such turbulence. Consistent with Ansoff's own strategic issue management model, and with Teece's writings on *dynamic capabilities*, Perott sees this process as one that allows decision makers to rapidly execute critical rebalancing of response capability, to meet the challenges strategic issues can present, especially those that are novel and surprising.

Using a focus on enterprise technology as a catalyst to response capability development, McDonald, in an examination of the relationship between IT structure and enterprise capability, examined how a firm was organized relative to its capabilities. The firm was CEMEX, a global cement and construction supply firm, headquartered in Mexico. After seeing significant growth in the late 1990's through acquisition, the firm came to realize that it needed to update its systems for the performance year of 2000. It organized its operations into eight core processes that were labeled *The Cemex Way* (McDonald, 2004). At that time, the eight core processes consisted of 1) commercial and logistics, 2) Ready-Mix, 3) planning, 4) operations, 5) finance, 6) accounting, 7) procurement, and 8) human resources. These capabilities roughly translate to the same included in the Ansoff model. These core processes formed the basis for CEMEX's enterprise capabilities portfolio

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The implementation of this capability response strategy centered around advancing a global business model, driven by the execution of managing enterprise capabilities centrally. It required the concentration of multiple skill sets, functioning under a single enterprise-wide organization structure. Study of this model revealed several key observations and challenges. They are:

- The enterprise needs active and visible leadership. The CEMEX Way met this challenge by having the initiative led from the top, and with active participation of the CEO.
- The concentration of multiple skill sets into a central framework, can have transformative impacts on the enterprise when the skills are assembled in teams, and have clear focus.
- That flexibility comes from capability design options that go beyond only processes and systems.
- That innovation plays a key role in enhancing and improving operational performance and enterprise capabilities.

By managing enterprise capability using this model, the firm increased performance agility, thus significantly reducing implementation time for new projects.

Delving further into the relationship between organization structure and enterprise capabilities, the research supported the conclusion that how the firm is organized, has to take into account, how new strategies and objectives impact the allocation of responsibilities. To that end, three enterprise fundamentals were defined:

1) Executing current strategies, which include delivering on current commitments to customers, investors, and stakeholders, by generating results and ROI.
2) Leading and managing the enterprise, which includes governance, and oversight functions that concentrate decision making on plans, resource investment choices, performance evaluation, and assigning reward metrics.
3) Planning and preparing for the future, which involves evolving enterprise capabilities to improve current operational performance, while also developing new capabilities to maintain or extend competitive advantage.

McDonald argues that when matching structure and enterprise capabilities to enterprise fundamentals, emphasis is disproportionately placed on the first two by most firms, with little or no regard for the third. Optimal performance requires attention in all three.

And finally, throughout the focus of this research, and the overall literature itself, there is widespread agreement that leadership, as an element of enterprise response capability, is quintessentially important to achieving effective, and successful performance.

Among the significant amount of literature on this subject, Scott's work offers elements of summary that are useful to this effort. Consistent with the dominating focus of this research, the contextual examination path she took was to look at leadership under conditions of high environmental uncertainty. In so doing, and synthesizing various leadership attributes, traits, and behaviors, into eight succinct dimensions: 1) *supportive, 2) charisma, 3) intelligent, 4) responsibility, 5) vision, 6) integrity, 7) risk-taking, and 8)* *challenges tradition,* Scott concluded that all of these traits and attributes were important to high-performance leadership (Scott, 2010). However, she found more precisely that the supportive, charismatic, and risk-taking attributes, were particularly, and uniquely important during periods of high uncertainty, brought about by environmental turbulence and volatility. She indicates that competitive intensity within an industry, and technological turbulence, can add further dimensions to the importance of these attributes as well.

Capability Response for ICT Firms

While the literature reflects theoretical constructs about response capability that pertain to firms within the enterprise environment more broadly, the high technology sector, or ICTs, often contain inherent features that are unique, and necessary to compete in such areas as research and development (R&D), product innovation, marketing and management innovation, human resource innovation. The effectiveness of these and other enterprise portfolio skill sets can be accelerated with higher levels of creativity, flexibility, and/or novel behavior/activity. A sampling of some of that research is presented here for consideration within the context of the larger body of science relative to enterprise response capability.

Study of high-tech, high capability enterprises has been partially motivated by the public policy benefits they ascribe to local, regional, and even national economies (Nelson and Wright, 1992). These ICTs are generally understood to be an underpinning for economic growth, and increased per capita income. Nelson's research has defined high-tech industries as having two key characteristics important to understanding capability. First, these industries involve modern science-based technologies, around which science and technology are intertwined (Nelson and Rosenberg, 1993). Secondly, they are characterized by abounding current technology opportunities and high research and development (R&D) intensity. In other words, R&D has a significant influence on just about all aspects of the capability development framework of these industries, and the firms within them. However, technological opportunities are not distributed evenly across industries (Rosenberg, 1974). Thus, high-tech industries become the focal point of R&D opportunities and more broadly, any corresponding benefits that might accrete to the broader economy.

Borrowing from, and akin to Schumpeter's *creative destruction theory* (Schumpeter, 1942), innovation becomes the differentiator, and results in imperfect competition and market power, which in turn rewards innovation.

Consider a recent example of Apple's product innovations, the *i*Pod and *i*Tunes, which has dramatically altered the traditional music industry; the *i*Phone, which revolutionized personal wireless/mobile computing behavior; and the *i*Pad, which has breathed new life into media access of all types, and also added even newer dimensions to mobile computing.

Using these theoretical constructs as a foundation, Jian Tong proposes two broad categories of differentiation to potentially lead to competitive advantage. The first is *horizontal product differentiation*, which makes substitution between products imperfect, thus, helping to reduce competitive price intensity between rival firms. The second is *vertical advantage*, which is having superior product quality, or production cost advantage to rival firms (Tong, 2005).

Tong, also introduces the concept of a *proliferation mechanism* which enables exploitation escalation of both horizontal product differentiation, and vertical advantage opportunities.

The literature contains a significant amount of scholarly research, relative to the impact on capability development from knowledge acquisition. Yanni Yan Zhang and A. Jing, build upon the literature to suggest that in high technology environments, this key capability building activity becomes even more important relative to achieving competitive advantage (Yan Zhang and Jing, 2003). They examined the circular flow of knowledge acquisition, product innovation strategy and activity, similar to horizontal and vertical advantage differentiation strategies. They concluded from their research, that the process has a kind of self-propelling quality, relative to performance and ROI. They also found that effective knowledge acquisition activity had a positive impact on technological R&D, and other resource capability development.

In addition, Yan Zhang and Jing found that these cause and effect dynamics showed significant potential leading to superior product innovation. With this superior performance, firms were enabled to reinvest in strategic refinement of knowledge acquisition, and resource identification, both key ingredients to response capability in high-tech, high performing firms.

Praest, in a study of multinational telecommunications manufacturers, sought to examine the evolution and strength of technological capability within high-tech firms (a.k.a. ICTs). He places emphasis on competence, capabilities, and technological capabilities (Praest, 1998). In defining these terms, he first characterizes competencies as the identification of the sources, and conditions that drive "firm-specific sustainable advantages", denoting particular attention in this area to problem-solving capability features. As previously indicated, Teece et al, and Prahalad, have been referenced in the literature regarding the definition of core competencies which provide heightened competitive advantage potential.

Praest, cites Teece's first introduction of the root of technological capability, as a *technical competence-the ability to perform any relevant technical function within the firm* (Teece, 1994). Christensen offers a definition that contains the framing: *assets for technological innovation-resources and capabilities for the development of product and process technologies, not wholly or easily accessible in the market place* (Christensen, 1994). Praest advances these definitions to arrive at a focus on technological R&D, namely, *a technological capability is the specific capacity of the R&D-related resources to create performance in technological development* (Praest, 1998). So, for example, he argues that patents are a key component of the strategic technology-based capability portfolio.

Couillard, a systems engineering manager, and a technology industry operative and author, argues that the very nature of a high-technology environment, almost uniformly, equates to high-uncertainty, and high-risk context (Couillard, 2007). That condition demands as much forecasting capability as possible, because technology, no matter how well received in the market, tends toward being unstable, disruptive, and can be supplanted by technology substitution, with little advance knowledge if an enterprise isn't careful.

Thus, Couillard suggests learning enterprises are able to adapt to the kind of changing conditions characteristic of the high-technology environment, and that change-adapting capability can be a key driver of competitive advantage. Emphasis on use of cross-functional teams, and creating a boundary-less environment, are key to building an effective learning infrastructure. And as previously referenced in the literature, it is widely accepted that effective knowledge acquisition, and enterprise learning capabilities, help fuel innovation, which is an essential ingredient for high-tech success.

The literature provides significant research that point to human capital, knowledge, and expertise, to be essential elements of response capability in ICTs. One unique feature attached to the human capital equation, and the entire innovation process, in the high-technology environment and ICTs in particular, is the intensity of spin-offs. Unlike other, more traditional industrial environments, high-tech employees frequently, and commonly, leave larger enterprises to go advance their entrepreneurial aspirations by starting their own firms (Klepper, 2001). In the Silicon Valley for example, this behavior is so inculcated into the so-called "tech culture" that if an employee is working in a larger enterprise, and is known to have demonstrated significant talent or possesses valuable knowledge or unique skills, it typically is not a question of "if" that person will leave the firm to create a start-up, but more a question of "when."

Search behemoth Google, recognizing this unique phenomenon, allows employee engineers to spend as much as 20% of their "Google time" working on personal projects (Levy, 2011). The firm compensates the engineers for this time, provides an abundance of material resources to facilitate the process, and even covertly agitates a certain competition between employees to come up with innovations that would not likely have emerged through the normal process flows.

The semiconductor industry has fueled a significant portion of this high-tech cultural phenomenon. Fairchild Semiconductor is reported to have spawned dozens of employee spin-offs, including one that has notably become a giant enterprise in and of its own: Intel.

Some scholars see this behavior as counter-productive to creating the kind of sustainability incentives within the enterprise that lead to the emergence and development of innovation and technological capabilities (Florida and Keenny, 1990). Others see it in just the opposite perspective, viewing the industry as a fountain of fertile technology development and innovation itself.

What makes this phenomenon even more complex is that studies show that most employees that leave firms to create their own start-ups, do so within the same industry as the firm they left behind. Through empirical study, Wiggins, offers theoretical rationale aimed at explaining employee spin-off behavior. He posits that it first takes an expenditure of effort by the employee to either begin the development of innovation foundation or to see an innovation through to its full fruition (Wiggins, 1995).

Wiggins goes on to suggest that both emotional and compensatory factors can come into play to influence decision motivation to stay within the framework of the sponsoring enterprise or to leave to start their own firm. For example, he suggests an employer may offer an employee a payment per-unit-of-development, based on profits from the development outcome. The share of the profits offered is proportional to the probability of success and the risk of failure. The lower the probability of full development, the higher the incentive will be structured to compensate for the greater risk of failure. Wiggins suggests that the firm assumes that if development is fully realized, it can utilize legal control of the innovation to cultivate its full potential.

However, if the employee perceives that the possible benefits are potentially and likely significantly greater than the enterprise incentive being offered, they are more inclined to consider exercising their entrepreneurial inclinations and creating their own start-up. Wiggins' theoretical construct, is but one of several so-called "Agency Theories" designed to try to explain employee spin-off motivation and behavior.

The literature has informally suggested the linkage between enterprise structure and scalability. Namely, the notion that there are some product innovation development activities that are more aligned with smaller enterprises than larger ones. This reality becomes true simply because, often the larger enterprises are structurally inclined toward product scalability. And scalability, by its nature, sometimes procedurally dismisses activities not within the domain of the scale. For example, innovations that require small scale activities for optimal development-typically are more aligned with SME environments. However, there has been little empirical research to bring greater credence to this line of reasoning.

While there is substantial discussion on the concept of clustering, and more specifically technology clustering, contained in the location analysis literature, Onsager, Isaksen, Fraas, and Johnstad provide some keen insight into how enterprises located in less ideal locations, either outside of resource-rich metropolitan areas (rural), or those in old or decaying industrial areas (urban centers), can gain renewed capability that can potentially lead to successful performance.

Contemporary literature provides ample research suggesting that both of these geographic descriptions contain elements that either inhibit, or are obstacles to industrial growth, particularly technology enterprise placement. These peripheral regions are often characterized as possessing “institutional thinness, with a weak endowment of innovative firms and relevant institutions.” The old, often decaying industrial areas are said to suffer from what Todtling & Trippl refer to as “negative lock-in.” Both of these situations lead to regional innovation barriers that render them simply less innovative (Todtling & Trippl, 2005).

It seems that one ailment may feed the other, however, the lack of dynamic clustering and the inherent innovation systems that come with them stand in the way of these areas attracting knowledge-intensive industries. These industry types, which are dominated by high-technology ICTs, are overwhelmingly found in or near large well-diversified services and knowledge-based cities (Cooke, 2002), just not in the urban core of those cities.

To understand how this characterization integrates with capability theory, a look at some theoretical causal constructs can be instructive. According to Lundvall, the reason these stubborn obstacles remain and seem to attract little attention from a public policy perspective, is related to three conditions linked to innovation development. First, innovation is seen as a complex, interactive, and dynamic process, inside firms and between firms and their environment (Lundvall, 1992) -- not dissimilar from the *dynamic capabilities view*. Thus, cooperation, and a systemic view of innovation, is a key element. Second, clustering, by widely regarded scientific accounts contained in the literature, is promoted by geographic proximity of firms, networking, and inter-firm collaboration (Storper, 1997; Cooke, 2002). That is true in part, because much of innovation knowledge is tacit and firm-specific, and exchange and cooperation is only facilitated by nearness, familiarity, the building of trust, and reciprocity (Boschma, 2005). And third, peripheral regions are hampered by a lack of actors to formulate such models. Similarly detached, the old industrial areas (urban) are anchored by strong orientation toward traditional economic and technological structures that essentially do not promote innovation (Todtling & Trippl, 2005).

What Onsager, Isaksen, Fraas, and Johnstad, found in a study of technology firm clustering in four Norwegian cities, is that several conditions should be present in order for firms to optimize their own internal development of innovation capability. They found that the conditions for innovation knowledge flow sharing is more optimally encouraged and motivated when firms are in the same or similar industries, surrounding similar technologies (Onsager, Isaksen, Fraas and Johnstad, 2006). Considering the earlier need for the building of trust and reciprocity (Boschma, 2005), they found that low knowledge sharing flows within the clusters, caused by enterprise industry differentiation, or a lack of trust and reciprocity, resulted in lower, or less optimal innovation capability development within the firms.

In this regard, Onsager, Isaksen, Fraas, and Johnstad, emphasize that organizational, or enterprise proximity, is much more significant in terms of facilitating innovation capability development than geographic proximity, which according to their research, has definite limitations.

Although a bit dated, research by Bahrami and Evans, in terms of identifying the key elements that foster innovation capability, would tend to echo the previous findings.

They sought to characterize the unique nature of Silicon Valley in terms of how high-technology firms are able to develop capabilities in an environment that is unusually volatile, known for its high enterprise failure rates, and equally reputable for its occasional spectacular growth trajectories. They attribute the area's unique scale and success for creating one of the largest high technology clusters in the world with a succession of pioneering products, and high-value-high-income producing jobs, to a nearly unparalleled spirit of entrepreneurship and a quest for innovation (Bahrami and Evans, 1995).

These researchers suggest that a key component of the foundational infrastructure for Silicon Valley's success is brought about by what some would characterize as a near ingrained intellectual DNA requirement to challenge, and deviate from, several core assumptions embedded within traditional management theory and practice. One critical assumption that perhaps guides all others is the traditional notion of "permanence." Bahrami and Evans cite in the literature the preponderance that this single traditional intellectual enterprise principle, namely, that a driving goal of the enterprise is to create a going concern that is "lasting," is pervasive in economic theory. They characterize it as driving the quest for equilibrium, and that it appears throughout management theory as part and parcel of achieving competitive advantage, and is a key indicator of enterprise (organizational) effectiveness.

However, in describing the origins and evolution of the Silicon Valley, they argue that this principle is significantly absent in the eco-system there because the prevailing aspiration is not to necessarily build an enterprise that lasts into perpetuity, but rather, to build an environment, the sole purpose of which is to create innovations and products that meet societal (environmental) needs. They suggest these activities are often executed by a band of rather “wild” entrepreneurs, whose personality and leadership traits also run counterintuitive to the notion of permanency, and more toward flexibility and mobility.

To that end, and one key implication for response capability development, is that while high-technology firms generally experience high failure rates, Silicon Valley continues to thrive and prosper. Bahrami and Evans characterize this unique nature of failure-recapture, namely, when one firm fails it often spawns the creation of new firms either directly or indirectly. In this process of *flexible recycling*, novel re-configurations of knowledge and human capabilities facilitate success in these newly created firms, leveraging knowledge gained from the failures of their predecessors.

One can point to few regions in the U.S., or even the world for that matter, in which this unique environmental feature exist. In many regions suffering from economic stagnation, the industrial Midwest for example, otherwise commonly referred to as the “rust-belt”, when a major firm fails in an area, it is often followed by the demise of most other industry-related and support firms, crippling the entire region economically. There are countless documented examples of those kind of realities occurring in that geographic region. This phenomenon of regeneration, which Bahrami and Evans describe as a key element, is not present in most other areas.

In addition to this concept of *flexible recycling,* Bahrami and Evans, describe a type of *constituent eco-system,* that fuels both the internal and external capabilities of the enterprise environment within the “Valley”. Discussed in a broader context within this writing in the location analysis section relative to “clustering”, they hone in on specific elements that bolster enterprise capability, and without which, the successes associated with the Silicon Valley would likely not exist (and while other technology clusters within the U.S. and abroad contain some of these same elements, the unique configuration, and the emphasis on their linkage to the firm, is perhaps more specialized in the "Valley".)

Briefly stated, when considering what they term as the *focal firm*, it is this constituent eco-system that helps determine not just success, but sustainability as well. They are: first, *universities and research institutions*-these institutions have a strong technology orientation, and are the engine of entrepreneurial fertilization and cultivation, training young engineers, and other creative potentials that constantly seek to start firms within Silicon Valley. Then, these universities and institutions also serve as a source of pre-commercialization stage technology incubators, in part through the works of the students they train, that also become a source of innovation to the general area. Bahrami and Evans, suggest that these institutions may be the actual "nutrient base" of the eco-system itself.

Of course, financial resources are a critical "birth" component if you will, to entrepreneurial activity seeking to develop and cultivate innovation. In the Silicon Valley, the presence of a significant *venture capital* community, is a driving force not just in the continuation and sustainability of the innovative and creative streams that characterize the area, but in essence, provide significant management know-how and expertise in a sort of what this writer refers to as "strategic mentoring" capacity, that again, is rarely found outside the area (Morse, 2001). There are plenty of areas with venture capitalists looking to fund, and then exploit new technologies and creative innovations, but few that provide this unique, and critical incremental value-added feature.

A *sophisticated service infrastructure* is a key component of the constituent eco-system, that allows focal firms to concentrate on their unique innovations. This service infrastructure includes such features as: contract manufacturing services that develop prototypes and/or sub-systems to disseminate finished goods. It includes public relations firms providing strategic marketing, and other product-related functions. And it includes accounting firms, that have specialized high-technology practices. These are but a few examples of how start-ups particularly, are able to leverage little internal capability into scalable function needed to build and grow their enterprises.

Because of the global reputation of the Silicon Valley, the *talent pool* represented there, becomes a strategic asset and eco-system capability. People from all over the world come there for any number of reasons, some to study at the bevy of top-notch universities in the area, i.e. Stanford, Cal Berkeley, etc. Others are moved there to work and thus, there is a concentration of *talent diversity* that contributes to a global capability that can be ramped up rather quickly.

And finally, the drive and thrust of the *entrepreneurial spirit,* has already been referenced, however, it is worth mentioning that California has a history of pioneers, and this pioneering spirit serves as a strong underpinning and driving force of the entrepreneurial spirit. One key feature of this spirit, essential to Silicon Valley success, is that entrepreneurs bring a singular focus to the innovation process. Schumpeter once said, "The inventor produces ideas, the entrepreneur gets things done."

Literature Observations and Conclusions

Schumpeter (1934), Penrose (1959), Williamson (1975,1985), and Barney (1986), among others, all contributed to the early development of the *Resource-based view,* and the *Efficiency-based view*. These were the first real theoretical constructs that aimed to explain how the nature and context of capabilities influenced enterprise performance.

Chandler's early focus on capabilities theory, helped marshal emphasis from *transaction cost economics* (Willimason,,1975), which focused on enterprise performance in terms of lowest unit cost, to contemporary capabilities theory (Chandler,1990)..

Later, Teece (Teece et al, 1997), offered challenge to what had been the dominant management paradigm of the 1980s, Porter's Competitive Forces Model (Porter, 1980), in arguing that it, and other resourced-based, efficiency-based constructs, had been effective in characterizing firm level performance and competitive advantage in the more restricted, and localized space. However, they argued that the emergence of a new global environment, one with high turbulence and rapid change, rendered the process of achieving competitive advantage as being much more complex. They said it called for new paradigms to analyze and understand the new dynamics of enterprise behavior. As a result of this thinking, they introduced the concept of *Dynamic Capabilities,* a theory that is widely shared by contemporary management scientists today.

Around that same time period, Schwandt's research considered the process of enterprise learning, by examining the influence of cognition and action, as key elements of the development of capability (Schwandt, 1994, 1995, 1999). His work resulted in the development of the Dynamic Organizational Learning Model (DOLM), which defines the relationship between enterprise cognition and action.

Winter and Zollo, built upon that research, and other previous research, that analyzed how enterprises learn, and whether or not what they learn influences behavior (Zollo and Winter, 2002). Using a cognitive-behavioral approach, they explored the relationship between cognition, behavior, and what impact those elements might have on enterprise performance. They examined such concepts as absorptive capacity, and knowledge conversion capacity (codification), to test the value of knowledge as an asset that might have an affirmative effect on performance.

Several scientists have advanced analysis of just what are the key elements that feed enterprise innovation performance, with emphasis on three key ingredients, knowledge acquisition, absorptive capacity, and innovation capability.

And finally, Prahalad, and Hamel (Prahalad and Hamel,1990), reasoned firms were typically oriented around those things it does well. And that if an enterprise focused on the things it does well, which they viewed as *core competencies*, then that could be the foundation for the emergence and development of competitive advantage. With that focus, if an enterprise developed a particular skill or aptitude that elevated it above its competitors, those attributes could be viewed as *distinctive competencies*., and thus an even stronger catalyst for the attainment of competitive advantage.

There is room for a good deal more research on capabilities, particularly as the emphasis shifts, as Drucker predicted it would (Drucker, 1965), from hard assets to knowledge, as the key currency by which firms achieved competitive advantage.

For ICTs, innovation becomes the differentiator, and knowledge acquisition and product innovation strategy are significant determinants of the success associated with innovation.

In the Silicon Valley, known as one of the, if not the most innovative high-technology cluster in the world, two features, unique when compared to other known clusters, are thought to be a key catalysts in triggering innovation activity within the enterprise environment. The first is *flexible re-cycling*, namely, that instead of high-technology enterprise failure having negative effects on the economic and innovation activity of the geographic area (cluster), new start-ups are able to leverage knowledge acquired from the successes and failures of failed enterprises, to heighten increasing probabilities of success in each round of renewal. The second feature is the existence of an innovation eco-system. With the focal firm as the centerpiece of the system, other elements fueling innovation include: *universities and research institutions, venture capital, sophisticated service infrastructure, diversified talent pool,* and *entrepreneurial spirit.*

The research challenge relative to this effort, is to examine whether or not the elements that have so successfully fueled innovation and thus, effective enterprise performance in the Silicon Valley, can be emulated in urban clusters attempting to build innovation capability and capacity. Further, if so, are they likely to deliver similar results in terms of overall enterprise performance (profitability)?

Selected Background Literature Review

of Strategic Investment

To consider the literature on strategic investment, we begin with Ansoff's *strategic success hypothesis,* which states *that the components of the firm's capability must be supportive of one another.* This provision of the hypothesis essentially means that in order for the firm to achieve optimal performance (profitability), it must have sufficient resources to support the execution of its strategy and its capability. In each Strategic Business Area (SBA), and for purposes of this research, the SBA is comprised of technology firms (ICTs), there is a *critical mass,* which is the *strategic break-even point* below which profitability is not attainable (Ansoff, pg. 73).

There is also an *optimum mass*, below which profitability begins to decline, largely due to decreased response capability, which can manifest in several of the response factor categories (i.e. capability factor-general or functional management attribute degradation-climate, competence, capacity, etc.). So, the area of profit potential lies between the points of critical mass and optimum mass, according to the theory.

The science attached to determining both critical mass, and optimum mass, is not fully developed, and thus relies largely on estimates grounded in both industry, and enterprise capability understanding.

The *strategic investment ratio* ((SIR), is a measure of the estimate of future investment necessary to achieve anticipated profitability, minus current investment; compared to an estimate of optimum investment, minus current investment; given optimal strategy and capability. The formula that best describes this relationship appears as follow:

$$\frac{I_f - I_{cr}}{I_{opt} - I_{cr}} \times \alpha \times \beta$$

Figure 2

Strategic Investment Ratio Equation
(Ansoff, pg. 73)

Even though strategic investment levels can only be estimated, focus on three investment categories aid the process of calculating a meaningful ratio. They are 1) capacity, 2) strategy (strategic behavior), and 3) capability (Ansoff, pg. 74).

The literature however, departs from the Ansoff theory, and offers a range of strategic investment analysis strategies and tools. According to research conducted by Scholleova, Fotr, and Svecova, one of the first considerations involved in understanding strategic investment, is to identify the criterion for how it is measured-evaluating investment outcomes (Scholleova, Fotr, and Svecova; 2010). They also make distinctions between static criterion and dynamic criterion – the more contemporary measures. Static criterion for investment evaluation include the simple measure of profitability (payback), and a payback period measure. Dynamic criterion include discounted payback period, internal rate of return (IRR), net present value (NPV), profitability index (PI), and benefit-cost ratio (BCR), to name some of the most preferred, according to the literature.

Their research also shows that the choice of criterion is influenced by industry norms, enterprise size, level of environmental turbulence, and orientation of the decision makers themselves. The goal, of course, in criterion selection, is to utilize measurement equations that capture the most complete set of data influencing investment outcomes, so that variables that are controlled, can be identified and isolated, and variables that are not controlled, or, more independent, can also be identified and isolated. For example, large enterprises have a tendency toward dynamic criterion, such as discounted cash flows (DCF), and internal rate of return (IRR).

The extensive research conducted by Scholleova, Fotr, and Svecova, reveals that several investment evaluation criterion can exist at one time in measuring one project, each approaching it from a different angle. For example, NPV quantify value--measuring earnings during project operation at any given point in time, but with no relative relation to capital expenses. IRR evaluates relative rate of return only. Both of these measures are connected to profitability index, but leave out a measure of actual cash gain from a given project investment. Payback period relates to liquidity, and the availability of cash for other utility, i.e. investment in other projects. Discounted Economic Value Added (DEVA) considers capital valuation in light of retained capital, irrespective of operating cash flows.

Church and Smith, offer useful process analysis and strategic investment analysis tool recommendations, borrowing from a wide array of accepted methodology contained in the literature, to explain first, the inherent biases in both qualitative analysis, and quantitative assumptions advanced by managers as a mere function of their experience orientation. They begin by segmenting the strategic planning process into two key elements: 1) strategy formulation, which offers the highest potential for managerial bias, because goal setting is generally assumption-based; and 2) strategy implementation, which is where strategic initiative decisions are made, and the corresponding capital investment needed to support those initiatives (Church and Smith, 2008).

These researchers build upon previous work, suggesting that one method useful in aiding the decision making process, and reducing managerial biases, is modeling and simulation technology (Greasely 2004; Sterman 2000). But to make sense of how some investment analysis tools are more useful than others, they present a chart that lists the various strategic investment analysis options. In an effort to catalog these tools, along with their advantages and disadvantages, Table 9 is provided below:

Table 9

Comparing Strategic Planning/Strategy Implementation Techniques

Approach	Advantages	Disadvantages
Traditional budgeting techniques: Net Present Value (NPR) Internal Rate of Return (IRR) Profitability Index (PI)	Consider cash flows of the project; Consider time value of money ; Incorporate risk through cost of capital; Useful in project selection under capital rationing scenario	Require estimates of cost of capital; Estimates cash flows based on assumptions about the economy, competition, consumer tastes, construction costs, etc. Fail to consider range of alternative scenarios; Fail to consider qualitative benefits/costs; Typically ignores value of options to abandon, defer, or expand investment
Real Options Analysis	Considers values of options to abandon, defer, or expand investment	Same as above except value of options; may require complex option valuation models
Sensitivity Analysis	Analyzes the sensitivity of project value to cash flow and risk assumptions for different future scenarios	Requires assumptions about likely future scenarios; Focuses on one change at a time; becomes unmanageable when considering two or more factors in combination
Monte Carlo Simulation	Allows consideration of multiple factors simultaneously	Requires assumptions about likely future scenarios and probability distributions
Scenario Planning	Explores multiple uncertainties impact; uses techniques to address expected managerial biases, i.e. overconfidence, under and over prediction of	Relies heavily on management judgment to assess potential scenario outcomes; Often lacks feedback loop to learn from prior decisions

	change; supports management learning	
Simulation Models	Provides all benefits listed above; Provides immediate feedback on likely decision outcomes	Requires assumptions about likely future scenarios and probability distributions; Requires design, development, and implementation of potentially complex computer-based business process simulation models; Requires investment in management training in simulation use
Ontology-based Simulation Models	Same benefits as simulation models; Offers an accepted model as starting point for synchronizing management judgment	Same as simulation model, but ameliorated

Greasely et. al, 2004

Church and Smith, conclude from their research, that scenario planning lends itself to an over-reliance on executive bias, and thus, Real Options Analysis (REA) in their view, increases value to the strategic investment analysis by facilitating "what-if" scenarios, that can actually be schemed out through the outcome phase, enabling an examination of investment required, and outcomes potential. Ultimately, they have found that in order for REA to function at optimal levels, the mechanical use of semantics must be synchronized within the environment, and they suggest that the purpose of Ontology-based Simulation models is to do just that.

Bernard and Leroy (2004), examined what factors drive strategic investment decisions, and concluded from their research, that decisions are based on financial incentives associated with enterprise growth, or payback. Their focus target was machinery and equipment investment (M&E). However, as previous research has suggested, the managerial decision making process, aiming for strategic quality, is fraught with flaws driven by the inherent bias orientation of the decision makers themselves. Thus, subsequent investment decisions are not optimized, because they are not always integrated with the knowledge and experience gained from earlier decisions.

Kersyte, offers an effective summary of strategic investment in his review of the literature attached to the capital budgeting process, which guides enterprise investment decisions. He separates analysis of what he characterizes as one of the most important, and critical decisions enterprises make in pursuit of their goals into two categories: 1) project financial evaluation techniques, and 2) enterprise process evaluation (Kersyte, 2011). He notes that research conducted by financial scholars, particularly in recent years, has contributed a literature that contains extensive project evaluation techniques. He contrasts that by noting the literature developed by management scholars that have participated in the evolution of the process approach, which places financial evaluation within the context of a complex enterprise decision making process.

Kersyte, goes on to highlight the two main approaches dominating the literature, that define capital budgeting in the investment management literature-*the normative approach*; and *the process approach*. The normative approach, is essentially placing emphasis on presenting traditional theory rules, upon which capital budgeting is conducted that serve as the foundation for enterprise investment decisions. It focuses upon financial evaluation, and selection of long-term investment in assets, and development of advanced capital budgeting techniques for various situations in which the enterprise might engage (Saaty, (1994), Prueitt & Park (1997), Trigeorgis (2000)).

However, Farragher, and later, Adler, suggested that the normative approach, which was presented essentially as a ranking of capital investment projects based on return attractiveness, was “myopic”. They also suggested, that to fully understand strategic investment decisions, and their implications, capital budgeting had to be conducted within a broader enterprise perspective (Farragher *et al.* (1999), Adler (2000)).

A significant body of empirical studies on this process approach, have strongly advanced the theory that strategic investment is best understood by analyzing how the enterprise puts an investment into effect, i.e. how are investments identified and analyzed: how are decisions made: and how returns on investment are evaluated (Ducai, 2009). Several capital investment process models permeate the literature, however, according to Kersyte, the dominant model is the Bower-Burgelman model (Maritan & Coen, 2004), which characterizes capital investment decisions as a multi-stage process, in which managers at each level have unique contributions to the investment decision.

Chang-Yang and Mahmood, conducted research (Chang-Yang, and Mahmood; 2009), to help validate two prevailing theories on the inter-industry differences in profitability, and on the relationship between industry profitability, and market concentration. The market-power hypothesis, which, simply put, attributes profitability to certain characteristics of market concentration and strength. And the efficiency hypothesis, which argues that market concentration is triggered by superior efficiencies, and that as a result, higher profitability results. However, they argue that more empirical evidence is needed to substantiate these theories, and as a result of their own extensive research, offer some new models.

These researchers propose the strategic-investment model of profitability, which identifies four key factors that jointly influence industry profitability. This is particularly pertinent to the development of a greater understanding of the technology sector. The four factors are: 1) the intensity of strategic investment; 2) the distribution of market share among firms; 3) the appropriability of strategic investment; and 4) the strength of the linkage between firms' strategic investment intensity, and their market share. Additionally, Chang-Yang and Mahmood, found that industry characteristics, such as the degree of product differentiation, and product substitutability, which impacts appropriability of strategic investment, also were identified as having an effect on industry profitability.

There has been a good deal of research regarding the relationship between capital investment, and research & development expense (R&D), resulting in early tests suggesting little causality/correlation relationship (Mairesse and Siu, 1984). Other later tests suggest that these two key enterprise tools are indeed related, singularly-directional, capital expense to R&D (Lach and Schankerman, (1989); Lach and Rob, (1996); and bi-directionally-one triggering additional activity in the other (vice versa) (Chiao, 2001).

Jong's test of 223 pharmaceutical industry firms, ultimately resulting in a panel of 36 firms, confirmed Mairesse and Siu's early theory, that there is no short-run relationship between capital investment and R&D. However, the research also found that there was a long-run relationship confirmation, in which R&D had a causal relationship to capital investment. In other words, successful R&D will drive increased capital investment, i.e. facilities, equipment, other R&D support elements (Jung, 2007).

There has also been considerable research in Strategic Cost Management Theory, that has yielded one of several methods of evaluating strategic investment effectiveness. Calculating return on capital (ROC), is but one element in a catalog of quantitative tools. However, another frequently referenced in the literature, is the quotient that results by combining capital investment and R&D expense, and measuring it as a percentage of enterprise gross revenue. This quantitative tool enables relatively easy comparisons of strategic investment levels between enterprises, and also between sectors. It is particularly useful in relatively heavy R&D intensive sectors, such as technology. It is a key measure of strategic investment in this research.

And finally, brief attention is given to the issue of sunk costs influence on strategic investment decision making. O'Brien and Folta, extend the research of strategic investment, largely concentrated on the dynamics influencing investment initiation decisions, and examine what determines whether or not an enterprise will be willing to remain in an investment, and under what conditions.

Using real options theory as a moderating variable in their research, O'Brien and Folta, relied on two accepted principles contained in the literature: "if there is uncertainty about future payoffs, owners may be willing to accept low levels of performance, with the hope conditions will improve" (Gimeno *et al*., 1997: 751); and that "under uncertainty, it is rational to keep options open, to hesitate when uncertainty is beyond one's ability to influence it" (McGrath *et al*., 2004:99).

Omitting the research focus of the value of real options theory in examining industry exiting decisions, and focusing primarily on factors that emerge when sunk costs are realized, the literature suggests, and O'Brien and Folta confirm, that once an investment decision has been made, uncertainty discourages industry exit when sunk costs of both entering and exiting are high. Sunk costs levels though, can be influenced by industry technological intensity, innovation competitive intensity, and whether or not a firm has a diversification strategy that might mitigate risks of exit.

Strategic Investment and ICT Firms

One key source of innovation, in terms of the creation and evolution of high-tech firms (ICTS), has been the fostering of entrepreneurial energies. And while entrepreneurs arise from a wide range of sources and motivations, a consistent feature surrounding high-tech entrepreneurship have been the presence of universities. As evidenced throughout the literature, high-tech clusters, not just in the U.S., but throughout the globe, have shown a close proximity to universities, as an almost imperative component of the innovation echo-sphere if you will, needed to spawn continuous, and sustainable technological creativity.

To that end, Wright, Vohora, and Lockett, explored the joint venture path to creating successful entrepreneurial efforts. They examined start-up ventures that were born out of research activity sponsored by a university, now seeking to move to the next level of evolution through commercialization. One set of spin-outs, as they are labeled, were also attached to an industrial partner, and one set of spin-outs was not. Their findings reveal some interesting developmental discoveries, that can serve those seeking to create public-policy initiatives aimed at fostering innovation and entrepreneurship.

Using a resource-based framework for their research, Wright, Vohora, and Lockett, suggested that spin-outs by nature, face severe resource and capability constraints, that often prevent full exploitation of new technologies they may have developed, or are developing. Exacerbating this condition, is that spin-outs rarely have the financial support, or managerial expertise, required to meet certain thresholds for resource acquisition. They found that by simply matching a spin-out with an industrial partner, the capability structure was enhanced significantly. It put these start-ups in a much stronger position to attract venture capital, necessary to advance their technological innovation for commercialization (Wright, Vohera, and Lockett, 2004).

These findings support a strategy introduced by this author, described as "Strategic Mentoring" (Morse, 2001), in which strategic partnerships are created that match promising entrepreneurs that have already begun the process by creating a start-up, aiming to advance products or services built upon technological innovation, with established high-tech firms. By providing "Strategic Mentorship", the mentoring firm can help guide the entrepreneurial activity in the right direction, to help fill gaps in managerial expertise. It can also facilitate resource acquisition processes, such as meetings with angel investors, other venture capital types, and even help promote the start-ups story in the public domain, to advance technology and/or product awareness.

Research by Napp and Minshall, informs that Corporate venture capital (CVC)--namely, equity investments by large corporations in entrepreneurial ventures originating outside the enterprise itself, are emerging as vibrant, and viable innovation strategies for large-sized enterprises. They cite 2010 reports by PriceWaterhouse-Coopers, and National Venture Capital Association, that in 2009, after a period of decline due to the so-called "dot.com boom" collapse (2001-2003), large corporations invested some $17.8 billion in CVC activities. The sizable investment accounted for 13.3 percent of the total number of venture capital deals, and 7.4 percent of total U.S. venture capital investments that year.

Other research notes trends that suggest large enterprises see external corporate venturing as yet another strategic tool for developing and enhancing innovation strategies and processes (Birkinshaw and Hill, 2005; Dushnitsky and Lenox, 2006; Gompers, 2002;McGrath, Keil, and Tukiainen, 2006). They continuously demonstrate that they can serve as a fertile value-creator for both the enterprise, and the start-up.

As CVC activity has intensified, examination of how to evaluate effectiveness, and return on such programs. has merited further scrutiny, and that's what these researchers set out to do. In evaluating case study situations, that included CVC activities, these researchers concluded that the metrics for measuring effectiveness, would be slightly different than the conventional metrics the enterprise might use for its own performance evaluation. The metrics will include both qualitative and quantitative measures. And to make distinctions, they are grouped by the type of value they create. Some of the key performance metrics worthy of attention, according to these researchers are: explorational value, exploitational value for the parent firm, value for the start-up firm, synergistic value for both the parent firm and start-up firm.

Their analysis concludes that developing an effective CVC program requires that the goals of the program-and those set out for the start-up, align well with the enterprise goals. For example, engaging in such a program could be for the purposes of exploring insights into new market, and technological opportunities with a partner. Or, the goals might be aimed at exploiting new technology innovations created by the start-up, without being burdened internally with the day-to-day operational activity that might bleed into an enterprise's primary-core activities. In all cases, the strategic investment made by the CVC will reflect these goals.

Literature Observations and Conclusions

Ansoff, provides a rational method of viewing strategic investment, by stating in the *Contingent Success Hypothesis,* that it must match the level of environmental turbulence, and align with enterprise capabilities, in order for successful performance to occur. He then provides a formulaic approach to identifying, and analyzing appropriate levels of strategic investment, by segmenting critical investment mass, and optimal investment. In his strategic investment ratio, the Ansoff model asks the question-how much investment will be needed to meet future performance requirements-profitability, by determining the future need, minus the current investment level. It then aims to analyze the optimum level of investment using a similar operation.

The literature contains a good deal of research on traditional measurement tools to evaluate strategic investment, while recognizing an evolutionary trend in the enterprise environment that makes *dynamic* indicators in real time more valuable to decision making, compared to *static* measures that emanate from traditional budgeting techniques.

The literature informs analysis of capital investment, and its relationship to research and development (R&D), as a percentage of enterprise gross revenue, as an effective analytical tool used to measure strategic investment. It enables relatively easy enterprise—to-enterprise comparisons, and sector-to-sector comparisons, and is particularly useful in relatively heavy R&D intensive sectors such as technology. It is a key measure of strategic investment in this research

We learn that as a result of emerging technological and innovation trends, corporations are once again, pursuing strategies that enable the formation of outside developmental work, with the aid of well-structured corporate venture capital programs

(CVCs). Pursuit of this strategy can have the effect of benefiting both the enterprise and the entrepreneurial start-up with which it chooses to align.

Perhaps what is most telling, is the degree of research that has been devoted to developing an understanding of how strategic investment decisions are made, and the various stakeholder tensions that play a role in that dynamic. Placing a value on options, as is done in real time options analysis, is but one example of how complex, and sophisticated strategic investment science has come However, the research indicates that there is still a vast amount of opportunity to address unanswered questions in this key strategic enterprise area.

Selected Background Literature Review of Strategic Aggressiveness and Environmental Turbulence

Kipley and Lewis, argue that traditional strategic management literature supports previous claims that mostly, only large firms are subject to fluctuations in environmental turbulence (Kipley and Lewis, 2009). However, they go on to state, that as a result of "exponential advancements in technology and globalization" that dynamic for smaller firms has changed. Cataloged in their work as small to medium sized enterprises (SMEs), they indicate that these firms are now also subject to environmental turbulence, and therefore must be armed with new tools in order to optimize profitability. They discuss the "scalability" of Ansoff's Contingent Success Paradigm, as a prescription for that optimization (Ansoff, McDonnell, 1993).

Seeking to add further validation to Ansoff's Contingent Success Paradigm, as previously mentioned, Gustafson managed to establish strong correlations between environmental turbulence, strategic behavior, and firm performance (Gustafson, 2003). His research found that environmental turbulence impinged on just about all strategic elements contained in the Ansoff model, such that the configuration of resource allocation, and their relationship to enterprise priorities, is determined by the level of environmental turbulence present.

Perrott's writing adds further reasoning to the impact of the presence of environmental turbulence. In a Journal of General Management article, he highlights the inherent conflict between those that manage (management team), and those that govern (board of directors), and that it is intensified as environmental turbulence increases (Perrott, 2008). As a result, he goes on to suggest that environmental turbulence challenges the strategic management and planning constructs of the enterprise with increasing frequency. This in turn, compels the need for both structured, and formalized systems of tracking key strategic issues, and the changes with which they are confronted, within the framing of their relationship to the environment. Such tracking, according to Perrott, can facilitate more effective alignment of strategic issue planning with environmental challenges, and also strengthen strategic response capability, regardless of environmental turbulence intensity level.

Danneels and Sethi, conducted research aimed at segmenting different types of turbulence, in order to examine the impact on explorative product behavior in enterprises (innovation) (Danneels and Sethi, 2011). Their research first identified two enterprise factors related to explorative product behavior: 1) willingness to cannibalize-introduce new products before current product maturity occurs; and 2) future-oriented market scanning. Then they examined whether or not the relationships of these factors, with product exploration, were contingent upon environmental turbulence in customer, competitive, and technological sectors. The study focused on 145 U.S. public manufacturing firms as subjects, to determine just how robust their innovation cycles were, as defined by willingness to introduce products distinct from competitive alternatives.

What the research revealed, was that both, willingness to cannibalize, and future-oriented market scanning, promote explorative product behavior. However, the behaviors were different in each of the sectors targeted. For example, willingness to cannibalize with explorative products, was stronger under customer turbulence. Whereas by contrast, future-oriented market scanning and explorative products, were weaker under both customer, and competitive turbulence, and stronger under technological turbulence. These results lead to the conclusion that the two enterprise factors do promote explorative product behavior. However, the effectiveness of each is contingent upon the level of turbulence present in each sector of the environment.

Jimenez and Sanz-Valle, conducted an empirical study of 451 Spanish firms, to further advance research in the literature, that already asserts that enterprise learning has a positive relationship on performance and innovation. Their research reaffirmed that enterprise learning, and innovation, have a positive impact on enterprise performance, and that learning also affects innovation (Jimenez and Sanz-Valle, 2011). However, what their research also found, is that several variables moderate the relationships that include enterprise size and age, industry, and the presence of environmental turbulence.

Using Ansoff's Strategic Issue Management System, Carver and Kipley, write about the applicability of the system to the American banking industry. They note that the sector has experienced a particularly high degree of turbulence, triggered most severely by the global liquidity crisis that began in late 2008, followed by what has been termed the "Mortgage Meltdown." They point out that the high level of turbulence created by those events, impacted nearly every institution in the industry, in one way or another (Carver and Kipley, 2010). However, they also suggest, that while impacting banking institutions whose principle business model focused on lending, and also those that focused on retail banking, banks that were previously strong got stronger, while those that were already in a weakened state simply failed, or were taken over by the governing regulatory authorities. The applicable Ansoffian thesis they aim to advance in their writing is that "management that can implement a system that will respond to strategic surprises during these highly turbulent levels, are those who have a higher probability of survival and success"

Calantone, Garcia, and Dröge, explored the relationships between environmental turbulence, new product development (NPD), and strategic planning. Their model set a baseline for NPD speed, and corporate strategic planning, by positioning innovativeness, market orientation, and top management risk-taking tendencies, as antecedents. Calantone, Garcia and Dröge, 2003). This framing then, also serves as antecedents to overall NPD program performance. Their target hypotheses were that market turbulence, and technological turbulence, create the conditions that determine NPD program effectiveness. Also, that the strength or weakness of the baseline elements were also influenced by environmental turbulence levels.

To facilitate a wider range of understanding, Calantone, Garcia, and Dröge, used a cross-section of research targets, that included four diverse industries: 1) automotive, 2) electronics, 3) publishing, and 4) manufacturing/research and development (R&D) laboratories. What their research experimentation methodology revealed, is that the paths from innovativeness to strategic planning, and from risk taking to NPD speed, were significantly intensified high turbulence environments. These researchers suggest that the implications of their findings are that first, integrating NPD personnel into strategic planning can increase overall planning quality….and second, that managers should strongly consider increased risk strategy analysis, and execution in high turbulence environments.

Morris, Avila, and Pitt, conducted earlier research that was also focused on the relationship between environmental turbulence, enterprise strategy, and decision making. Specifically, they focused on pricing strategies, and the dimensions that frame the overall enterprise pricing orientation. They point to several pricing dimensions that include risk aversion, level of reactiveness versus pro-activeness, cost-based versus market-based, and standardized versus flexible (Morris, Avila, and Pitt, 1996).

Using some 200 manufacturing firms in the Midwest, their research found that pricing orientation, like other strategic behavior assessments, should be aligned with environmental turbulence levels. If properly aligned, pricing decisions will include two key features in high turbulence environments. They will lean toward higher risk tolerance, and increased flexibility, to adjust to changing conditions.

Morris, Avila, and Pitt, argue that the implications of their research reveal that enterprise decision makers often do not approach pricing orientation with any degree of scientific or empirical analysis, but more, and generally, as reactionary response to myriad market and cost conditions. The research suggests that enterprise pricing orientation should be approached first, by dissecting the decision components into smaller, more analytical elements, and ensuring that they take turbulence levels into consideration.

Banham, contributes to the literature on environmental turbulence, by introducing her own measurement instrument, she has labeled the "Degrees Of Turbulence Assessment Tool." It is specifically designed to aid environmental turbulence assessment by small to medium sized enterprises (SMEs) (Banham, 2010). Much like the Ansoff turbulence measurement model, she identifies five "forces of change." They are 1) Technological Advances – what technology advances are occurring in the environment; 2) Customer Expectations – how have customer expectations changed in price, product, features, delivery, and warranty/after sales service; 3) Supplier Requirements – note the impact of any new requirements imposed by suppliers; 4) Regulatory Environment – an assessment of the volume, and impact of all regulations impacting the SME in the last three years; and 5) Increasing Competition – an assessment of competitive forces – (Porter's Competitive Intensity Model (aka "Five Forces")).

In Banham's "Degrees Of Turbulence Assessment Tool", a rating is assigned for each of these categories from 0 to 9. Then a similar rating is applied to each force category, to measure the "strength of the force." Finally, the force rating is multiplied by the force strength. The total is aligned with an interpretation scale that characterizes the environment for five rating categories. It is quite similar to the Ansoff model, except that the force strength relies on the Porter model, which takes a different approach from Ansoff.

Environmental Turbulence and ICT Firms

The literature widely and consistently, advances analysis that strongly suggests environmental turbulence levels in the technology sector tend to be higher than in most other industries. High turbulence in this sector is triggered by the constant pace of change which, in and of itself, is driven by a high degree of product innovation as the basic nature of the industry. This high innovation intensity contributes to high market uncertainty and environmental complexity, two key characteristics of turbulence. Further, distinctions between technological turbulence, and market turbulence, can add even more complexity to an already complicated environment.

Qureshi and Kratzer, conducted research that focused on small technology firms in Germany, to better understand the relationship between entrepreneurial and marketing orientation, and how that relationship might impinge upon the development of enterprise marketing capabilities (Qureshi and Kratzer, 2011). After setting entrepreneurial and marketing orientation as antecedents to market capability, they then used a marketing capability construct to test outcomes as represented by firm performance.

What the research uncovered was that environmental turbulence had a significant effect on the framing of entrepreneurial orientation and market orientation. That framing in turn, had a significant effect on marketing capabilities. Marketing capabilities were found to have a strong impact on overall enterprise performance. So, the research suggests, as has other inclusions in the literature, that environmental turbulence really has a determinant effect on the framing of much of an enterprise's strategic behavioral modeling, leading to overall performance.

The literature provides further examination of the relationship between environmental turbulence and new product development (NPV) (aka product innovation), which while present in a variety of industry sectors, is a hallmark characteristic of the technology sector particularly. Research in this sector consistently highlights a prescription for systematic and programmatic enterprise flexibility when turbulence is high, as a key component leading to effective performance.

Literature Observations and Conclusions

What the literature reveals with consistency, is that first, an understanding of the relationship between enterprise performance and environmental turbulence, is a relatively recent area of examination within the context of contemporary management science. Two key elements of environmental turbulence, uncertainty and complexity, have intensified even more in recent year. The onset of the global financial crisis that began in 2008, has significantly intensified turbulence levels. The subsequent trends that have emerged since then, have created the need to build upon previous research in this area, to better understand new environmental features that only add to the complexity of current turbulence trends.

Ansoff, provides an early method by which individual characteristics of turbulence can be systematically measured and analyzed. Others have effectively utilized the Ansoff process to evaluate the relationship between environmental turbulence and performance of different groups of enterprises. The literature provides a modicum of research on the impact of turbulence on small to medium-sized enterprises (SMEs). However, what has unfolded are significant opportunities to conduct additional research on some of the more granular elements of enterprise performance that are distinctively impacted by environmental turbulence.

Distinguishing between technological turbulence, which facilitates an examination of new product development (NPV) impacts, and market turbulence, which guides toward analysis of enterprise strategic aggressiveness (particularly customer-centric behavior), are just two examples of the opportunity for this kind of structurally decompressed research. Examination of the relationship between environmental turbulence and firm tendencies toward strategic planning, represent another area of research opportunity, as does the little researched area of enterprise pricing strategy-environmental turbulence relationships.

Banham, and others have provided alternative means by which environmental turbulence can be analyzed, that contribute to an increased interest in this area of scientific examination.

There are clear opportunities to fill research voids that need more clarity. Two key opportunities are: 1) a lack of significant research volume aimed at examination of the relationship between environmental turbulence and strategic enterprise behavior in U.S. firms; and 2) an intensified examination of the relationship between environmental turbulence and strategic enterprise behavior in technology-intensive firms, a.k.a. innovation-focused firms.

Selected Background Literature Review

of Strategic Aggressiveness and Location

The relationship between strategic choice and location is complex. It is one that cannot be considered in a vacuum that isolates these two factors alone. The early work of economists Joseph Schumpeter, cataloged in *The Theory of Economic Development,* began to introduce the influence of location choice as one key determinant in the success of the firm, even though he considered firm size and shape to be more critical factors (Schumpeter, 1934). His pioneering focus on highlighting the importance of the entrepreneur, and his theory of innovation and progress, included in his highly popularized "creative destruction" model on the rhythmic dynamics of capitalism, also included discussion of the relationship between location and enterprise success in the context of location analysis and spatial theory (Schumpeter, 1942).

Chandler's early work on the evolution of strategy and structure of the firm, gave heightened visibility to the challenges raised by multi-unit firms, and the influence unique operating units functioning in different locations has on overall enterprise success (Chandler, 1969).

However, since that early foundation was set, two key developments have emerged in the modern firm: 1) the expansion of the multi-unit enterprise has intensified significantly, making location analysis much more complex and 2) a new global economy has emerged, compeling not only location analysis of enterprise nodes, but their relationship to both strategic partners, and competitors worldwide. This is an added complexity making location decision models all the more challenging.

On a broader scale, John H. Dunning advanced thinking about competitiveness and location in his Eclectic Paradigm, also known as the OLI-Model (Dunning, 1988). The intent of this model is to explain why investment will be directed into local markets or international locations. He posits that there are three distinct factors that help determine the outcomes: 1) Ownership advantages (trademark, production technique, entrepreneurial skills, return to scale); 2) Location advantages (existence of raw materials, low wages, special taxes, or tariffs); and 3) Internationalization advantages (advantages by producing through a partnership arrangement, such as licensing, or a joint venture). Dunning's model amplifies the challenges urban centers face in attempting to attract technology firm investment, because location costs of operating can be seen as difficult for the firm to absorb when a foreign location may look much more attractive.

Empowerment Zones were originally designed to overcome some of these challenges, with special tax incentives for firms locating in urban centers. However, as previously referenced, the veracious models, spread out across the country, have not worked.

As the science of location analysis and spatial relationships has matured, research has focused in on varied dynamics that impact firm choice. Bandri, Davis, and Davis, conducted research on a key element of the location choice decision-the executive decision maker themselves, which is modeled to represent firm attitude toward location (Badri, Davis, & Davis;1995). The methodology used measured the tendencies of some 250 companies with international operations, with the target determinant an industrial park in Dubai, UAE.

The research model distinguished between factors that measured “adequacy” - conditions that met minimal standards for affirmative location choice consideration. It also measures factors of importance-those that more directly impact firm performance. The results of the study revealed that the adequacy variables that were most prevalent in the group, that made an affirmative decision to locate in the industrial park, were waterway availability, airway, and pipeline facility and capacity. The primary factors of importance for this same group were proximity to consumer goods market, size of market, location of competitor(s), and community position toward future expansion.

A host of quality of life factors were also evaluated, as a third layer of consideration, i.e. attitude of community leaders toward enterprise presence, living conditions, monthly average temperature, availability of shopping centers, hotels, motels, and commercial and residential zoning codes. The differences between the group of executives that made affirmative decisions to locate in the park, and those that declined to do so, was their own evaluation on a scale of each of these factors. The study showed strong correlation between the combination of adequacy, factors of importance, and quality of life factors, and the nature of the decision in each group.

Cromley, Hempel, and Hilyer, conducted a study of the relationship between market entry strategy and spatial impact on performance expectations. It examined the weight of market dynamics, and competitive resistance promulgated by the number of firms in the same area. Distinguishing itself from previous studies that measured distance friction (enterprise spatial relationships) by transaction flows only, this study examined the impact of market complexity on distance resistance through a broader set of variables, using simulated interaction dynamics (Cromley, Hempel, and Hilyer, 1993). What it found is that in markets that portray complex dynamics, i.e. demand, product complexity, and competitive intensity, distance resistance has an increasing, or higher coefficient. In markets portraying more homogenous characteristics, distance resistance decreased.

As multi-unit expansion and globalization has intensified, location analysis as a science has become more complex. As a result, an increased level of attention has been applied to assessment of the market conditions for each location node in the enterprise. This has emerged as being particularly true for firms operating internationally. A good deal of research catalogs the literature on this subject. Alexander's study of market power in spatial location decisions, examined enterprise location choice amongst firms assumed symmetric (having similar context in size, shape, scope and demand), and also amongst asymmetrical firms (Alexander,2001). The results showed that symmetrical firms will be more inclined to enter into clusters when agglomeration economies outweigh any price degradation impact resulting from close proximity to similar firms. The same finding was revealed for asymmetrical firms.

At the European Business Forum in 2004, Gadiesh, introduced an additional consideration impacting location choice that is a rather new phenomenon resulting from the emergence and solidifying of a robust global market. He indicates that in order to protect enterprise identity and values (namely, brand), when global scale is an essential component of strategic choice, it has become increasingly apparent that local brand awareness and responsiveness are key to optimizing performance (Gadiesh, 2004). In other words, while firms become large enterprises as a result of global scale, the degree to which they are able to localize the full impact of a particular strategic business unit, will be a key determinant of optimum performance. This line of thinking adds a new dimension to the science of location choice.

If location science clearly indicates that selection quality can be a key determinant to enterprise performance, then a methodology for setting a baseline with which to measure that performance becomes instructive and useful. Tandy and Stovel, examined banks with multiple branch units dispersed throughout the U.S. and Canada (Tandy and Stovel, 1989) . Using previous studies of retail banks, they operated on the assumption that location of distribution operations have a definite influence on where people bank. Therefore, setting the baseline involves first selecting locations in specific local and regional geographic markets, based on the cumulative quality of secondary data available, and establishing branch locations in the best ones identified. Then, the process of simplifying the measurement baseline is less complex. Each distribution unit (bank branch) is input into a decision matrix that facilitates measured performance against the market potential of each location. Continuing this practice over time, yields predictive models about the relationship between market dynamics of similar nature, spatial relationships, and enterprise unit performance.

As location analysis continues to evolve, providing increasingly instructive benefit to enterprise decision makers, so has the technology to enable the science to become ever more precise. Murray, informs that geographic information systems, which are essentially data-bases that capture a variety of variable inputs that aid the process of characterizing locations for better choice analysis, have advanced both the science, and the complexity involved in geographic decision making (Murray, 2010). These systems are able to tailor data output to align with enterprise needs, such that location choice is optimized.

Literature Observations and Conclusions

Schumpeter's early work in the first half of last century, began the process of recognizing location choice as a key determinant in enterprise performance.

Chandler's work on the relationship between strategy and structure in multi-unit enterprises, heightened the influence of location on firm performance. Both multi-unit enterprise expansion intensification, and the emergence of a robust global economy, gave rise to even further weight of the importance of what has become location analysis science.

Dunning's Eclectic Paradigm, or OLI-Model, helped usher in an even clearer understanding of the factors that influence location choice, particularly when international firms are the target of analysis. Since that early work, a variety of variables have been examined, to determine the most prominent influences on location choice, such as executive decision-making attitudes, agglomeration economies, location specific competitive distance friction, and localized brand recognition and responsiveness, just to name some.

Geographic information systems have emerged to make location analysis much more accessible and useful, as a key tool to more accurately assess the geographic impacts on enterprise performance. The field will no doubt continue to produce new scientific analysis, as the location dynamics of operating in an ever-evolving global economy continue to mature.

Selected Background Literature Review

of ICT firms and Location Choice

Giving increased credibility to the theory of critical resource mass, advanced in the literature regarding clustering of high technology firms (ICTs), Grant examines the import of knowledge assets and their location, relative to an enterprise's critical functions. The work creates a baseline foundation that relies on a knowledge-based theory of capability-namely, that the most important element is knowledge, and that knowledge resides with enterprise members (Grant, 1996). It goes on to shape the model, that if knowledge is the most important asset, then how the enterprise organizes those assets will be a key determinant of capability. Therefore, the linkage between knowledge inputs and product outputs is essential to the enterprise, and impends upon location analysis. It is vitally necessary to have knowledge resources close to product outputs in order for the enterprise to develop the "dynamic" and "flexible-response" capabilities. Such capabilities are deemed critical to enterprise success in hypercompetitive markets. However, Grant, concludes that creating this ideal location configuration is difficult for myriad reasons, not the least of which are location specific economic conditions, and enterprise internal capability assessment.

In an article written for the *Journal of Technology Transfer*, Clark uses previous work, some of which is referenced here, regarding spatial relationships relative to location choice, to suggest that regional economic policy plays an important role in how specific geographies go about attracting and developing the requisite resources required to create innovation environments (innovation environments are comprised of ICT firms supported by appropriate R&D capability, often generated by research institutions such as universities, as well as enabling infrastructure features) (Clark, 2010). She suggests that advantage is gained by areas becoming "conscious geographies", where public policy and private sector initiative align, with the aim of achieving optimal concentration of resources needed for innovation environments to emerge.

In a nearly nine year study of some 4, 400 ICT start-ups in Sweden, Wennberg and Lindqvist, found that agglomeration by sector, otherwise known as "clustering", was responsible for strong enterprise performance, as measured by number of jobs created, tax payments, and employee wages (Wennberg and Lindqvist, 2010). They did however, discover that agglomeration measures were more consistent for enterprise employee count than location quotients. Still, the study adds to a considerable volume of literature that supports key location strength being bolstered by agglomeration economies.

In an analysis study of the global semiconductor industry, Alcacer and Zhao, found that the character and nature of principal R&D innovation takes on unique form when firms are located within clusters (Alcacer and Zhao, 2010). Their study revealed that first, the leading industry players were invariably multi-location enterprises. Second, that when these firms, as a result of being located in clusters, faced competitive innovation exposure risks, that internal linkages built for innovation sharing across locations intensified. In other words, multi-location ICTs tend to initiate R&D innovation from their principle location (most often R&D headquarters), and distribute it to their own enterprise network through internal linkages (internal communication systems). And that when outer nodes are located in clusters with the presence of competitive ICTs, this internal innovation sharing intensifies with the goal of achieving competitive advantage.

An earlier study by Johansson and Lööf. of nearly 2,100 individual firms, a mix of both stand-alone and multi-location enterprises, examined innovation initiative based on a unique combination of factors (Johansson and Lööf). The factors examined were firm location, industry type, and attributes of the firm itself. Contrary to the findings of Alcacer and Zhao, Johansson and Lööf, found that location did not influence R&D intensity, nor the frequency of interaction within horizontal and vertical innovation systems, when capability, capital intensity, industry, and firm size, were similar (research controlled).

Finally, when considering other factors that are impinged by the science of location analysis, two key areas of ICT development should be considered. First, when analyzing the full spectrum of ICT firms, the unique characteristics of bio-technology warrants description. British scientist Phillip Cook, found that bio-tech clustering emerges in rather significantly different ways than other ICTs. He points out that there is far less *Schumpeterian* behavior present in bio-tech clustering environments-namely, the forces of "creative destruction" are less obvious, if present at all, as there is significant reliance on publicly funded science institutions (i.e. scientific universities), as a key element of innovation infrastructure. And while there is a good deal of scientific collaboration, and sharing in bio-tech clustering locations, because there is often significant value attached to innovation (i.e. financial, scientific, and institutional) , there is also great concern about appropriable risk, due to invention and patent intensity.

The second area deserving examination is the impact of outsourcing on innovation capability, relative to location analysis.

In research conducted by Rubin, he uncovers some key determinants often found missing from contemporary discussion and analysis of technology development location visa vie efficiency and labor costs. The conventional and prevailing theories surround the notion that global firms enhance increased profitability when producing technology, if key operations are located in cheap labor markets. In other words, efficiency follows labor costs. However, in Rubin's research, a key metric is added that disclaims this theory. The prevailing theories surrounding cheap labor markets are based on a cost-per-labor-hour metric, as the key determinant of efficiency, particularly in its relationship to profitability. Rubin examines not just that metric, but then adds throughput-per-labor-hour, or more commonly known in the U.S. as per-unit-cost-of-labor (Rubin, 2010). The difference between the two is significant, and changes the way the analysis is framed, within the context of this research and location analysis.

According to Rubin, as it currently stands, about 40 percent of technology personnel, and about 35 percent of technology operations personnel, are located in the Asia-Pacific region. That compares to 33 percent and 35 percent respectively, being located in North America. When measuring a macro indicator of annual gross domestic product (GDP$) per worker, as a measure of productivity, the U.S. posts the #1 ranking at $63,885, fourteen percent above the second-highest nation. However, when the metric is shifted to GDP$ per worker hour, the U.S. slips down several places.

A closer examination in Rubin's research focused upon technology production and costs. He notes that *The Economist* (magazine publication) ranked the U.S. as #1 overall in this somewhat broad category. However, when throughput, as measured by worker output in hardware and software products are considered, the U.S. drops to seventh place (Taiwan ranking #1). What's noted in the research as significant though, is that the U.S. ranking is four times higher than India, considered one of the cheapest, and most opportune technology locations in the world

To further narrow understanding of this dynamic, Rubin's worldwide database (www.rubinworldwide.com), constructed yet another key indicator it calls the "cost of goods/cost of service" metric—what is the cost per contact center, or per payment processed. This measure touches the quality quotient on the periphery. The research shows that when comparing these three metrics, worker productivity, hourly labor costs, and cost per payment processed, there can be wide variation that does not always support the viability of the cheapest labor market being the best economic decision. And this finding gives rise to what numerous firms are discovering, triggering the question: When considering all metrics, does the product provide potential customers with the quality and benefits they are seeking given the costs? More research is needed on this subject, however, at a minimum, it heightens the need for more examination of the value of simply selecting cheap labor markets principally, just to save money.

Urban and non-urban enterprises

When considering the distinctions between urban and non-urban locations, relative to the primary targets of this research (ICT and innovation environments), a variety of approaches can be taken. Strange, Hejazi, and Jianmin, conducted a study to examine the relationships between uncertainty, and the formation of agglomeration economies, or clustering. The research model defined uncertainty as competitive instability, the need for skilled workers, and technological innovativeness. The key research finding revealed that firms facing high degrees of uncertainty, as measured by these variables, are likely to agglomerate with each other in large cities-otherwise known as clustering.

Conversely, firms facing less uncertainty are more likely to locate in small cities, outside clusters, often suburbs (Strange, Hejazi, and Jianmin, 2006).

The empirical data of all the firms surveyed was consistent with the presence of, and reaction to, the three forces contained in the model. However, further differentiation in the forces was also found. City-size appeared to influence competitive instability and innovativeness, while skill development was influenced by industry clustering.

These findings, are particularly relevant and important to this research for several reasons. First, the literature provides myriad factors that contribute to competitive instability in urban areas, so the Strange, Hejazi, and Jianmin, research provides foundation for the premise building pursued for this research model. Secondly, it anecdotally suggests that when a critical mass of ICTs are present in urban areas, the potential benefits of agglomeration economies, and skill development, enhance enterprise success potential, and might possibly overcome uncertainty impacts normally present in urban environments.

Bieri's research appears to have run counter to the focus on competitive instability in urban areas influencing location choice for ICTs. In a research effort specifically designed to confirm or disconfirm Florida's *Creative Class* theory, Bieri sought to measure economic growth across two levels of spatial aggregation. The goal was to first characterize US metropolitan areas, and then examine how that correlates to regional growth, and the concentration of talent in the high-tech industry (ICTs) (Bieri, 2010).

To recall, Florida's model essentially advances the theory that high concentrations of R&D, most often generated by institutional initiative (universities), and high concentrations of diverse and creative talent, most often found in urban locations, results in spillover effects that trigger the establishment of high technology firms (ICTs) in those locations.

Controlling for location costs, local demand, and aggregation economies, the research found the impact of high concentrations of R&D to be only marginal, as a determinant of location choice amongst ICTs. However, there were strong indications that high concentrations of diversity and talent (as fueled by high educational achievement and skill development), was clearly a determinant in location choice for ICTs. Further, it found that such factors are tending to skew establishment of such enterprises toward urban locations within broader metropolitan areas.

In research Florida conducted much earlier than his focus on the *creative class* theory, he joined Feldman in building upon theoretical constructs that examined the relationship between the diffusion of innovation, R&D concentration location, and the geography of the high-technology industry (ICTs). They examined geographic sources of innovation, placing heavy focus on the relationship between product innovation and technological infrastructure. Infrastructure, in their research, is defined as enterprise agglomerations specifically linked to manufacturing, industrial R&D concentration, institutional R&D concentration (universities), and business services firm presence (Feldman and Florida, 1994).

The model developed for this research, tested the hypothesis that innovations cluster in geographies that have concentrations of specialized resources that contribute to the evolution of particular types of industrial (technological) infrastructure. It also confirms that geographic infrastructure concentration enhances enterprise innovation capacity. Thus, the spatial concentration of infrastructure resources reinforces the capacity to innovate. This finding would explain why technology clusters dispersed throughout the U.S., and globally for that matter, are distinctive in terms of their innovation focus.

For example, Silicon Valley (California) can be characterized largely as linked with all forms of computing and communications technology. The Greater Boston (Cambridge), Massachusetts, cluster's major strengths focus on research (home to several research universities, the most prominent of which is Massachusetts Institute of Technology (MIT)), high-end engineering, electronics, and bio-technology (a.k.a.bio-tech). Austin, Texas, for example, can also be linked with computing technology, technology business services, and bio-tech. San Diego, California, is a major bio-tech hub. And further north, Los Angeles, as a major national and global entertainment and media center, has a high concentration of digital arts technology. It also has high concentrations of high-end engineering, space exploration technology, defense and missile technology, life-science and environmental-science technologies (Jet Propulsion Laboratory (JPL), California Polytechnic State University, Raytheon, Northrop Grumman, General Dynamics, Boeng, etc.)

Forman, Goldfarb, and Greenstein, sought to advance previous research that resulted in the emergence of two key hypotheses that characterize the distinctions between location choice in urban centers, and non-urban or rural (isolated) locations (Greenstein, Forman, & Goldfarb, (2005).

In order to identify these distinctions, the focus of their research was targeted to examining how location affects Internet adoption for commercial use. The first theoretical construct to be tested is the *global village hypothesis,* borrowed from work first introduced by Cairncross, that suggests the Internet will eliminate the impact of geographic distance from economic activity (Cairncross, 1997). Presented as simple illustration, enterprises located in Witchita, Kansas, and Des Moines, Iowa, will be able to compete with enterprises located in New York and Los Angeles.

The second theoretical construct to be tested, is the *urban leadership hypothesis,* which proposes that enterprises located in urban centers are more likely to adopt and benefit from advanced technology, due to greater access to complimentary infrastructure, and support services, typically located in urban settings. The hypothesized result is that there is a clear distinction between urban and non-urban enterprises, the benefits of which are skewed to favor those in urban locations.

To test this comparison, Forman, Goldfarb, and Greenstein, created a baseline measurement of comparison by defining basic Internet uses, largely universal, i.e. email, browsing against more advance uses of technology, i.e. database management, and e-commerce, as just two examples. To get a real clear reading and understanding of the relationships between adoption and location, secondary data was used that came from a 2000 Harte Hanks Market Intelligence survey of nearly 87,000 commercial enterprises with 100 or more employees. What the research revealed, is that as expected, a large percentage of the firms-88.6 percent, used simple Internet functions, while only 12. 6 percent used more advanced applications. However, the data further revealed that 14.7 percent of urban-based enterprises used more advanced applications, compared to 10.6 percent of rural (isolated) enterprises.

So, the findings confirm that simple technology use (Internet email and browsing), already tends to be low cost, and relatively low maintenance, and supports the *global village hypothesis* of removing distance from the economic equation.

However, use of advanced technology is quite a different matter, and is further impacted by whether or not enterprise communication is merely internal, or between intra-enterprise nodes (SBUs). The greater the distance between intra-enterprise communication nodes, the more complex the economic model become. This finding supports the *urban leadership hypothesis*-namely, that the more information technology intensive are an enterprise's activities, the more likely they will locate in urban centers to benefit from infrastructure and support services. The farther from urban centers an enterprise locates when using advanced technology applications, the greater their costs and the complexity of usage itself.

Considering Florida's Creative Class theory, Smit and Jantien, conducted research in the Netherlands, aimed at uncovering what might be a key consideration of creative entrepreneurs, in terms of attraction relative to location choices. They found that particularly when the goal, as they acknowledge is a pattern in many western urban locations, is to attract creative entrepreneurs to formerly abandoned or neglected districts (urban centers), the visual assets of these districts play a significant role in driving affirmative location choice decisions (Smit and Jantien, 2011).

Specifically, Smit and Jantien, argue that visual distinction, in otherwise less attractive districts, is very important because creative managers are significantly influenced by the power of their perceptions of such stimuli. They go on to suggest that creative managers seek to leverage these distinct visual assets, to feed creative energies, and thus enhance and raise productivity to optimal levels.

One can easily point to the current situation in Detroit, Michigan, to see evidence of this very dynamic at work, manifesting itself in almost exactly the pattern suggested by Smit's and Jantien's research. In a 2011 feature story gathered for the New York Times, titled "Detroit Pushes Back With Young Muscles", Conlin, provides a catalogue of examples of how young, graduate educated entrepreneurs, artists, and other creative types, are flocking to what were once dilapidated and abandoned neighborhoods, to start new lives and new careers. As a result, new affordable housing developments are cropping up, new street-side merchants, and the emergence of a creative vibrancy, that has not been seen in quite a few years.

After losing nearly twenty-five percent of its city population over the last decade, this new energy is sending encouraging signs to many responsible for urban economic development in the Detroit area (this writer has spent a good deal of time there on visits to friends and relatives during childhood, and in conducting business in adulthood, providing first-hand perspective). Conlin, reports "Not unlike Berlin, which was revitalized in the 1990s, by young artists migrating there for the cheap studio space, Detroit may have this new generation of what city leaders are calling "creatives", to thank if it comes through its transition from a one-industry town."….."It feels like TriBeCa back in the early days, before double strollers, sidewalk cafes, and Whole Foods," said Amy Moore, 50, a film producer working on three Detroit projects. "There is a buzz here that is real, and the kids drip with talent and commitment, and aren't spoiled."

There does indeed appear to be what is being called a "digital renaissance" in downtown Detroit. The most recent evidence of this development, is the announcement by major social media player Twitter, that it is opening an office in downtown Detroit, so it can be closer to its automotive customers. Twitter president of global revenue, stated "Detroit's emerging mix of automotive and digital cultures, made it a natural location for Twitter's newest office"…he went on to say "We're excited to work face-to-face with the city's most established brands, and happy to play a role in downtown Detroit's digital renaissance."

Seeking to build upon, and borrowing from, Dr. Richard Florida's work on his so-called *Creative Class, a*s others noted in the literature have as well, Park, Warner, and Wylie, et. al., engaged in a research exercise to attempt to give more identification to the dynamics of this phenomenon. They identified what they have termed as "Fast Cities" (Park, Warner and Wylie, et. al., 2007). Their research was aimed at a global perspective, however, for purposes of this research, the focus will is U.S. based. They ascribe to the definition of these rising "metros", several key characteristics, that separate them from other growing metropolitan areas that do not contain the same dynamics.

To begin, these so-called Fast Cities are magnets for new ideas, and visions that spawn the most important thinking. They attract newly shaped enterprises to foster those ideas.. Fast Cities tend to attract the world's brightest, and most energetic people. They are considered among the best places to live and work. Beyond economics, the cultures of Fast Cities nurture creative action, and paradigm-shifting enterprise (their reference- "game-changing"). One element of evidence of this characteristic, is that the number of patents filed in such locales, tends to be demonstrably higher than other, even larger metros. These areas have technology sectors that are expanding, not just existing in a status quo.

Park, Warner, and Wylie, et. al., note that Fast Cities aggressively facilitate innovation. To achieve that end, these cities invest in physical, cultural, and intellectual infrastructure, that is oriented toward sustaining growth. They cite Florida, who states "The real forces for change in America, and around the world, are the mayors and the local communities" (Florida, R. (2002). And finally, they describe Fast Cities as having "energy". This dynamic, characterized by Florida, is the "ethereal that emerges when highly creative people concentrate in one place." While they might appear slightly obscure to some, this ethereal energy is manifested by the number of venues in a city for example, that stimulate young, fresh thinking, i.e. cultural, scientific, and spiritual.

Park, Warner and Wylie, et. al., give us some examples of Fast Cities. In the U.S., to describe just a handful, starting with:

Creative Class Meccas

New York City-leading indicator>nation's highest per capita income in the urban core;

San Francisco-leading indicator>No. 1 in the world in scientist citations; pull from and feeder to Silicon Valley;

R&D Clusters

Fort Collins, Colorado-leading indicator>Generating patents at rate of 11.45 per year per 10,000 people-nearly four times avg. U.S. city.

Raleigh-Durhan, North Carolina-leading indicator>highest percentage of college grads aged 25 to 34 in U.S.

Urban Innovator

Salt Lake City, Utah-leading indicator>youngest urban citizenry in U.S.

Finally, initially seen as an innovative approach to improving the socio-economic landscape of urban inner-cities, Enterprise Zones, were thought to have significant promise. However, comprehensive research by Oakley and Tsao, found that these initiatives had little if any positive impact on the urban areas in which they were established (Oakley and Tsao, 2006).

Enterprise Zones were originally purposed as initiatives to rebuild poverty-stricken urban inner cities, through the implementation of four equally weighted principles: (a) economic opportunity; (b) sustainable community development; (c) community-based partnerships; and (d) strategic vision for change. The method of their research, essentially compared zone results against non-zone areas, on the same economic measures that focus on job growth, unemployment, income growth, and other factors, using U.S. Census tract data.

Oakley and Tsao concluded that the four overarching programmatic goals,, were not implemented consistently from zone to zone, and that emphasis on community development was not significant. In terms of economic opportunity, zone initiatives did not generate positive results, except in one location-Chicago.

These researchers pose some provocative questions regarding the Enterprise Zone initiative: 1) did the initiative fail because it did not live up to the original purpose and mission-are they the right goals?.....2) if the initiative would have been implemented consistently in all zone areas, would it have yielded different, and more affirmative results?..... And 3) was the concept really innovative, or, simply old ideas disguised as "new ones"? They propose these questions for future research.

Quality of Life and Location

Studies of *work life quality* began in earnest right after World War II, integrating industrial efficiency methodologies, i.e. Hawthorne Studies (originally conducted from 1924-1932 (Mayo and Roethlisberger, 1932)); updated with *Hawthorne Effect* (Landsberger, 1950); *Maslow's Hierarchy of Needs* (Maslow, 1943); with modern motivation theory: Herzberg's *Motivator-Hygiene Theory* (Herzberg, 1968); and Hersey and Blanchard's *Situational Leadership Theory* (Hersey and Blanchard, 1969). However, little attention, until the most recent few decades, and even more intensely in the last, has been given to the relationship between enterprise effectiveness, and quality of life outside the workplace. And as we learn below, Hofstede's research suggests that work, and life quality, are not separate and distinct concepts, but directly linked to each other, and have a real impact on enterprise performance and effectiveness.

This recent consideration of *quality of life* factors, has been integrated into location analysis, as an examination of just how factors outside the immediate enterprise work environment impact actual performance inside it. Specifically, *quality of life* factor integration with location analysis, has surrounded the strategic examination of how these factors, which vary from location to location, can be leveraged to create competitive advantage, particularly in terms of attracting human capital (talent pool), and which might denigrate such potential.

Quality of life factors raise the specter of competitiveness, when trying to recruit personnel to fill key positions in technology firms (ICTs). A good deal of attention has been given to the subject of quality of life (QOL), as it relates to work life in recent years. It is believed to have been first introduced, or "popularized" if you will, in modern management thinking in the 1970s, when UAW and General Motors created quality of life programs to improve employee life linkages to their communities. The expectation was that it would have a direct bearing on productivity inside the firm (Bluestone, 1980).

Geert Hofstede conducted early research on this subject that culminated in an article published in the Academy of Management Review titled *The Cultural Relativity of the Quality of Life Concept*. What he found, in researching value patterns in 53 countries, is that life quality is a concept of perception, based on one's values, and that those values are a function of the culture in which one has been brought up. What he also found that is particularly relevant to this research, is that work and life quality are not separate and distinct concepts, but directly linked to each other, in part because they are value driven, and that values are a matter of personal choice that affect just about everyone (Hofstede, 1984).

Leo Jeffries, and Cheryl Bracken, have conducted very recent research in a nationwide survey, asking direct questions about the factors that impact qualify of life perceptions. Their hypothesis for the research, was that QOL perceptions correlate with the number of so-called "Third Places" individuals could identify in their respective communities. Third places in their model are defined as locations within a community or close geographic area that go beyond home, school, and church, and typically involve culture and/or recreation. These would include proximity to shopping and entertainment locations, recreational parks, museums, and other cultural destinations of interest.

In recent years, there have been a variety of metric reports published in an effort to characterize QOL data, and relate it to a range of economic indicators for a given geographic region. Many of these indicators are considered in this research.

The Economic Intelligence Unit of *The Economist* (magazine), publishes a periodic *Global Livability Report* (GLR), that quantifies the challenges that might be presented to an individual's lifestyle in 140 different cities in the world. This index is directly related to a firm's decision to locate in a specific location, based on its attractiveness across a range of measures. The GLR assigns a score for over thirty qualitative, and quantitative factors, across five broad categories that include: Stability, Healthcare, Culture and Environment, Education, and Infrastructure. In the January, 2010 report release, Vancouver, Canada, was ranked as the number one city in the world for quality of living.

The Gallup-Healthways Well-Being Index (given a common title of *Happiest Cities In America: 2010 Well-Being Index*), which surveyed more than 350,000 people across the U.S., measured several factors that relate to this research: Life Evaluation-How one perceives the current state of their life, and their expectations for the next five years; Emotional Health-which also includes how one's environment makes them feel; Work Environment-job satisfaction and future prospects; Physical Health; and access to basic needs-healthcare facilities, food, other shopping needs, etc.

One finding in the report directly relevant to this research, was that "Residents of large cities—those with a population of 1 million or more—generally report higher levels of well-being, and more optimism about the future, than those in small or medium-sized cities. In small cities, at 250,000 or less, people are more likely to feel safe walking alone at night, and have enough money for housing (Gallup-Healthways Well-Being Index, 2009)

In July, 2009, Kiplinger released its *Best Cities Report*, which is an analysis of the best places to work, and live, in the U.S. The research was conducted by Kevin Stolarick, of the Martin Prosperity Institute, a think tank that focuses on economic prosperity. The methodology used to compile the report, included stability of employment, and prospects for income growth, cost of living data, and quality of workforce, among other factors. Stolarick, also anecdotally, tried to assess the density of creative talent in each location, relying on Dr. Richard Florida's theory of the *Creative Class*, previously referenced and discussed.

Forbes/CNN Money Magazine's annual *Best Places For Business and Careers,* is an amalgamation of various index data from multiple sources. It is a compilation of secondary data, assembled to construct a primary ranking tool. The rankings covered the 200 largest metro areas (populations over 240,000), as defined by the U.S. Office of Management and Budget. The Index is based on nine factors. West Chester, Pa.-based economic research company Economy.com, owned by Moody's, supplied data on five-year historical job and income growth, as well as migration trends. Economy.com's business cost index was included, which looks at labor, tax, energy, and office space costs. It also examines what it has developed as its living cost index, which factors in housing, transportation, food, and other household expenditures.

The cost of residential real estate, otherwise known as the affordable housing index, K-12 and higher education school quality, crime rate, community culture, and other factors, play a key role in firms deciding where to locate primary and satellite operations. This consideration arises from an increasing awareness of the profile needed to attract the talent that will impact strategic aggressiveness, capability response, and profitability.

Tax structures, in some of the nation's largest urban centers, provide one more potential obstacle to business location. A CNN/Money Survey released in 2004, showed that some thirty of the largest metropolitan areas, taken out of a total sample of fifty-one, had state, and local taxes, exceeding 9% of family income.

Joel Kotkin, a leading U.S. demographer, in an article published in the Wall Street Journal titled "The Great California Exodus" (Finley,2012), he characterizes his view of how quality of life issues are having a significant impact on business location decisions, and how, in his view, California's misguided policies are triggering an exodus, both in terms of businesses, and population.

Of particular note relative to this research, Kotkin, suggests that presently, there are four "growth corridors", as he describes them, that are emerging as key locations attracting major technology firms. They are the Gulf Coast, the Great Plains, the Intermountain West, and the Southeast. He points to Salt Lake City, as an example, also highlighted in Park, Warner, and Wylie, et. al.'s "Fast Cities", as a location rapidly amalgamating a tech zone from many of the major firms. He notes Twitter, Adobe, eBay, and Oracle, as just some of the firms that have recently established locations there.

Kotkin takes notice of Texas, which he claims is aggressively aiming "to steal California's tech hegemony", as the greater Austin area has emerged as one of the major tech clusters in the country. He reports that Apple has announced plans to spend some $300 million to build a major campus there. Facebook planted it flag there last year, and eBay is planning an addition of some 1,000 new jobs in this Austin innovation hotbed- now characterized as a technology cluster.

New Orleans, is cited as an example of tech migration in the film industry, a hallmark of the Southern California economy (Hollywood). Current data suggests that it is on track to surpass New York, as the second largest film center in the country. Kotkin, highlights New Orleans as "the best bargain for urban living in the United States." He notes "It's got great food, great music, and it's inexpensive….a real bargain for living that has appeal."

Literature Observations and Conclusions

A common thread integrated into much of the literature relating to ICT location choice, is that resource critical mass appears to be an enterprise magnet, regardless of the particular technology sector, and because of it, clustering occurs as a result of the formation of agglomeration economies. Grant emphasized the importance of knowledge assets, as essential to enterprise success, particularly amongst ICT firms (technology). Thus, he found that identifying where these assets reside, will have a significant bearing on location choice. That is one element of the resource critical mass thread.

Clark discusses the impact of regional economic policies on the formation of the resource critical mass required to facilitate the emergence of innovation environments (IEs). These IEst are founded on requisite, and appropriate research and development resources (R&D), sufficient infrastructure, and other enabling features.

Wennberg, and Lindqvist, contributed further to the science of understanding enterprise performance, within the context of clustering, arguing that an affirmative correlation existed between agglomeration economies and positive firm performance.

Johansson, and Lööf, added that clustering and agglomeration economies had an impact on the performance of multi-unit firms.

Rubin's research, reveals that contemporary discussion of ICT location choice in the U.S., compared to foreign locations with what appear to be cheaper labor markets, omit other key factors that provide domestic location favorable features, when appropriate metrics are examined.

The relationship between location choice, quality of life factors, and enterprise performance, is receiving increasing attention. This new attention builds upon early research conducted by Hofstede (Hofstede, 1984). His research surmised that work and life quality are not separate and distinct concepts, but directly linked to each other, in part, because they are value driven, and that values are a matter of personal choice that affect just about everyone (Hofstede, 1984). What the literature also suggests, is that QOL factors have a significant impact on enterprise performance and effectiveness.

A number of indexes have been created in order to capture various metrics associated with QOL factors. Among them, Global Livability Report (GLR) (Economist); *Happiest Cities In America: 2010 Well-Being Index* (Gallup); *Best Cities Report* (Kiplinger); and *Best Places For Business and Careers* (Forbes/CNN Money Magazine), are some of the more prominent surveys, that are now bringing heightened attention to these important indicators.

Kotkin, suggests that the key decision elements of location choice, are shifting in terms of what have been traditionally considered attractive regions, due to major changes in economic policy. These changes, he suggests, are transforming the technology clustering map, and spreading it into areas not considered attractive as innovation environments in the past.

What is clear from the literature, is that the level of uncertainty, combined with the dispersion of resource critical mass elements, i.e. R&D, infrastructure, regional economic policies, human talent, as well as myriad other factors, all have bearing on ICT location choice. Those same factors have even further influence on the distinctions between urban, and non-urban location choice, and how they impinge upon optimizing performance potential.

Selected Background Literature Review

of Profitability in Firms (also considered Performance)

A significant amount of the research on profitability is contained in the analysis of specific strategic management elements, extensively presented in the literature review above. Therefore, this section is kept brief to avoid content duplicity. However, there are some unique elements that drive profitability, that do deserve unique discussion.

The work of Abbott and Banerji, previously mentioned, which focused upon transnational corporations, found factors influencing profitability, and competitive advantage. They determined that *strategic flexibility* was essential (Abbott, Banerji, 2003). They defined three key areas of strategic flexibility: 1) market flexibility; 2) production flexibility, and 3) competitive flexibility. Abbott, and Banerji's definitions were an extension of the work of Evans, who defined flexibility, as a number of senses attached to the firm, including adaptability, agility, corrigibility, elasticity, hedging, liquidity, malleability, plasticity, resilience, robustness, and versatility (Evans, 1991). Evans, argued that each of these organizational flexibilities would be in response to some form of external environmental uncertainties, or pressures.

Pelham's work, which focused on the comparison of industry environment impact with firm strategy impact, and market orientation culture on small manufacturing firms, argued that the match between strategy and environment must be high for a firm to achieve profitability (Pelham, 1999). However, he further argued that the high correlation between growth differentiation strategy, and market orientation, positioned firms for higher profitability.

Although further research has built upon Pelham's work since, and added further insight, Rhyne, explored whether or not there was any correlation between firms that engaged in effective planning, and if such strategic behavior enhanced enterprise profitability potential (Rhyne, 1987).

Using discriminant analysis, the research involved breaking down the planning process into several dimensions to evaluate planning quality within targeted enterprises. Planning analysis elements were 1) planning dimensions; 2) formality of the planning process; 3) complexity; and 4) sources of information; which were then compared against the financial performance of target firms that were taken from the contemporary Fortune 500 list.

What the research uncovered was that firms that optimized profitability, engaged in a series of key strategic behaviors that included high attention to environmental trends, had a strong market focus, installation of effective cost controls, and clear paths of communication regarding enterprise objectives and performance expectations. These combined features, were consistently present in those firms that achieved high profitability leadership within their respective industry sectors.

Other studies in the literature, such as Schramm's comprehensive study of the relationship between innovation focus and firm profitability in the pharmaceutical industry, reveal that increased focus on innovation, combined with well analyzed and measured risk, does have an affirmative impact on increased profitability in that industry. This specific research was triggered by a growing awareness of the increasing decline in long-term strategic investment required in that industry, due to the long development and test cycles inherent in the industry (Schramm, 2011)

Urban and non-urban enterprises

The literature provides some empirical analysis, albeit limited, that suggests that firm profitability is impacted by location population density. Research has been conducted on firms that operate in unique locations, both urban and non-urban. The research trends suggest that the cost-benefit analysis has revealed that urban locations (high population density) tend to attract higher density talent pools, which can impinge favorably upon overall enterprise performance. However, those benefits are generally outweighed by increased operating costs, specifically driven by higher wages, and real estate costs (rents). More broadly, it is reasoned that firms operating in high density zones, are generally inclined to produce lower Return-On-Assets (ROA), and consequently, lower profitability. More research in this area is needed.

Literature Observations and Conclusions

The work of Abbott and Banerji, emphasized the need for *strategic flexibility* to enhance the attainment of profitability, and competitive advantage. They defined three key areas of strategic flexibility: 1) market flexibility; 2) production flexibility, and 3) competitive flexibility. The concept of flexibility, was initially introduced by Evans. He defined it as a number of senses attached to the firm, including adaptability, agility, corrigibility, elasticity, hedging, liquidity, malleability, plasticity, resilience, robustness, and versatility, and that these flexibilities are used to respond to external environmental uncertainties.

With reasoning similar to Ansoff, Pelham argued that the match between strategy and environment must be high for a firm to achieve profitability. More specifically, that the high correlation between growth differentiation strategy, and market orientation, positioned firms for higher profitability.

Rhyne's research examined the correlation between effective strategic planning, and profitability. He found that firms that optimized profitability, engaged in key strategic behaviors, such as high attention to environmental trends, strong market focus, installation of effective cost controls, and clear paths of communication regarding enterprise objectives, and performance expectations.

Schramm, focused specifically on the pharmaceutical industry, and found high profitability amongst those firms that had high innovation focus, combined with measured risk.

Finally, the literature contains examination of urban environments, compared to non-urban. It reveals that high-density areas are attractive talent magnets. However, those benefits are generally, and more broadly, outweighed by the increased operating costs associated with functioning in high density locations.

Chapter 3

THE RESEARCH METHODOLOGY

Chapter 3 is a presentation of the methodology used in this research effort. It includes seven sub-sections: 1) research strategy, 2) research population, 3) research sampling methodology, 4) data collection methodology, 5) research method validation, 6) data analysis methodology, and 7) anticipated results of research.

The Research Strategy

The research method in this model focuses upon quantitative study, and correlate the relationships among independent, moderating, intervening, and dependent variables. The research model is designed to examine the relationship among the variables contained in the *Strategic Success Hypothesis* (Ansoff, 1990), location, and innovation quality--as constructed in the model-on enterprise performance (profitability), in urban technology firms ((ICTs)-Department of Commerce-Bureau of Economic Analysis (BEA)), and suburban technology firms. Unlike the abundance of primary research noted in the literature, this effort relies almost exclusively, upon secondary data available for the public companies that are the focus target. While not prolific, some validated studies contain measurements that are similar, and support the development of anecdotal evidence. Such evidence supporting this research, is integrated into required constructs.

More on this process is explained in the methodology description presented below in the chapter.

The theoretical constructs presented in the *Strategic Success Hypothesis*, also known as the *Contingent Success Paradigm,* have been empirically validated not only by research conducted by its creator and author, Dr. H. Igor Ansoff, but also subsequently by numerous doctoral dissertations similar to the focus of this research.

An extensive review of the available literature has been done (see Chapter 2) and is extended during the course of the research process, to ensure that the methodology is sound.

Research Questions and Hypotheses

Isolating differences and relationships among, and between specific variables in this research model, allows for a determination of strength of the correlations among environmental turbulence (ETL), strategic aggressiveness (SA), capability response (CR), and strategic investment (Budget) (SI). It also examines correlations among location innovation quality (IQI), location choice (designated U and SU), and enterprise performance (profitability (P)), for technology firms (ICTs) located in or near urban centers compared to those located in suburban areas. It also reveals whether or not any identified differences and relationships, suggest systemic issues that lend themselves to remedy by the application of strategic diagnosis, and other features inherent in the body of strategic management science.

With those considerations, the relationships leading to the primary research questions and hypotheses targeted by this research are highlighted as follows:

Variable Symbol Key:

U = Urban (location)

SU = Suburban (location)

SA = Strategic Aggressiveness

CR = Capability Response

SI = Strategic Investment (Budget)

ETL = Environmental Turbulence Level

G = Gap

IQI = Innovation Quality Index

P = Enterprise Performance (Profitability)

<u>Research Questions</u>

RQ.1. What is the relationship among environmental turbulence (ETL) and strategic aggressiveness (SA) for ICTs located in or near urban centers (U) and suburban locations (SU)?

H.0: U-(ETL - SA G) $\leq$ SU-(ETL - SA G)

H.1: U-(ETL - SA G) > SU-(ETL - SA G)

RQ.2. What is the relationship among strategic aggressiveness (SA) and capability response (CR) for ICTs located in or near urban centers (U) and suburban locations (SU)?

H.0: U-(SA – CR G) $\leq$ SU-(SA – CR G)

H.1: U-(SA – CR G) > SU-(SA – CR G)

RQ.3. What is the relationship among capability response (CR) and strategic investment (Budget) (SI) for ICTs located in urban areas (U) and suburban locations (SU)?

H.0: U-(CR – SI G) $\leq$ SU-(CR – SI G)

H.1: U-(CR – SI G) > SU-(CR – SI G)

RQ.4. What is the relationship among the Innovation Quality Index (IQI) and Location for urban (U) and suburban areas (SU)?

H.0: U-IQI = SU-IQI

H.1: U-IQI < SU-IQI

RQ.5. What are the relationships among strategic posture (ETL–SA G, SA-CR G, CR-SI-G), Innovation Quality Index (IQI), and Profitability (P), for ICTs located in urban areas (U) and suburban areas (SU)?

H.0: U-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI = SU-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI

H.1: U-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI < SU-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI

The Research Target

This research is focused on examination of technology firms, located in different geographic areas.

Technology Firm (IV). The operational definition of a technology firm and its values are presented below.

Operational Definition. A *technology firm* is operationally defined as being in one of several specific categories designated by The Department of Commerce's Bureau of Economic Analysis (BEA), as industry sub-sectors included in the sector category Information-communication-technology-producing (ICT).

Specifically, ICTs included in the research sample population have total revenues that range from $25 million to $500 million annually. The specific NAICs and industry sectors are listed below in the section describing data sources.

For purposes of this research, ICTs have one defining characteristic, with two possible values. The defining characteristic is the moderating variable of geographic area in which the firm is located. ICT location has been identified by principal place of business (headquarters operations). The two possible values are urban technology firm (U - ICT), and suburban technology firm (SU - ICT). Operational definitions of these two values appears below. Each is a nominal data type.

The characteristic and two value definitions are further defined under geography.

The Research Variables

The variables focused upon in the research consist of four independent variables, three moderating variables, three intervening variables, and one dependent variable. The variables are listed by category below:

Independent Variables (IV)

Strategic aggressiveness (SA)

Capability response (CR)

Strategic Investment (Budget) (SI)

Moderating Variables (MV)

Geographic location

Key-elements:

Urban (U)

Suburban (SU)

Environmental turbulence (ETL)

Innovation Quality Index (IQI)

Key-elements:

Workforce Availability (WFA)

Quality of Life Index (QOLI)

Intervening Variables (IV)

Environmental Turbulence/Strategic Aggressiveness Gap (SA/ETL G)

Capability Response/Strategic Aggressiveness Gap (CR/SA G)

Capability Response/Strategic Investment (Budget) Gap (SI/CR G)

Dependent Variable (DV)

Enterprise Performance (a.k.a. Strategic Business Unit (SBU) performance (Profitability) (P))

Operational Variable Definitions

The operational definition of a technology firm and its values are presented below.

Moderating Variables

The moderating variable is one that, when introduced into a given environment, can have the effect of changing the condition of dependent variables and thus, is a causal agent of a result.

The first moderating variable is geographic area – urban and suburban – described below. This variable category is repeated below for other moderating variable definitions.

Geographic Area (MV). The operational definitions of a geographic area appear below. Also, following are the characteristics and two value definitions of this variable.

Operational Definition. Operationally, a *geographic area,* for purposes of this research, has two possible values. They are urban (U) and suburban (SU). Each is a nominal data type.

The two definitions are further defined as follows:

Element 1: Urban (U)/. The operational definition of Element 1 appears below.

Operational Definition. Operationally, selected urban geographic locations (U), for purposes of this research, are defined as the city-municipal jurisdiction of Metropolitan Statistical Areas (MSAs), with populations of 1 million people or more. Further, diversity in the population is a significant feature, which suggests high concentrations of minorities residing, and working within the defined area.

Element 2: Suburban (SU). The operational definition of Element 2 appears below.

Operational Definition. Operationally, selected suburban geographic locations (SU), for purposes of this research, are defined as areas that are also part of large metropolitan areas (MSAs), outlying a large city, that does not include the city jurisdiction, or urban center to which it is related, and has populations less than 1 million.

Independent Variables (IV)

As previously stated in Chapter 1, Dr. Ansoff's *strategic success hypothesis* (Ansoff, 1990), already shows strong evidence that there is a relationship between environmental turbulence, strategic aggressiveness, and optimal performance of the firm. However, this relationship has not been considered in the context of technology firms (ICTs), that are located in U.S. urban centers, compared to those that operate in suburban areas. This research examinex if there are differences in the strength of these variables, given those two environments, and identifies the strength of relationships to optimal enterprise performance of the firm, namely, profitability. The independent variables are strategic aggressiveness (SA), capability response (CR), and strategic investment (budget) (SI).

Conceptual variable definitions have been presented in Chapter 1. Below are the operational variable definitions that will be used in the research model.

Strategic Aggressiveness (SA). The operational definitions of a geographic area appear below.

Extensive research on the use of financial metrics to evaluate strategic effectiveness, capability, and performance, put forth in the literature suggests that there are multiple methods that can, and have been used, and that they are influenced by the strategic tendencies of the firm, and/or the industry. Thus, metric configuration is widely varied. To that end, strategic aggressiveness (SA), and capability responsiveness (CR), is most accurately measured by integrating quantitative data from financial statements, with qualitative information, that accommodates conversion into quantitative data, that also supports accurate reflection of the variable.

Operational Definition. Strategic aggressiveness (SA), is measured by an assessment of multiple sub-elements. Each is measured on a five-point scale consistent with the Ansoff definition of SA components. They are:

Innovation Aggressiveness (IA):

New Product Dev. Strategic Focus

New Product Introduction Frequency

M&A Activity

R&D Intensity

Future Industry Critical Innovation Trend

Marketing Aggressiveness (MA)

Market Development Intensity

Industry Market Structure

Industry Growth Rate

ICT Strategic Aggressiveness (SA) score is calculated as follows: (IAI + MA)/2 = SA score.

Ansoff Strategic Aggressiveness Scale

Table 10

Strategic Aggressiveness	Stable Based on precedents	Reactive Incremental Based on experience	Anticipatory Incremental Based on extrapolation	Entrepreneurial Discontinuous Based on expected futures	Creative Discontinuous Based on creativity

Compared with Ansoff Turbulence Scale (see description below)

Capability Response (CR). The operational definitions of a geographic area appear below.

Operational Definition. Capability Response (CR) is measured by an assessment of multiple sub-elements. Each is measured on a five-point scale consistent with the Ansoff definition of CR components. They are:

Competence Responsiveness:

> half executive team

Managerial Skill set Alignment Quality

New Product Dev. Strategic Focus

Executive Team Tenure

Time Orientation

Climate Responsiveness

Enterprise Values and Attitudes (corporate statement analysis: as expressed in mission and value statements/Annual Report Comments)

Enterprise Change Catalysts

Employee Growth - 1 yr.

Capacity Responsiveness

Functional Distribution Quality (FDQ)

Staffing Sufficiency (Manager and Staff Headcount)

ICT Capability Responsiveness (CR) score is calculated as follows: (CO + CL + CA)/3 = CR score.

Ansoff Capability Response Scale

Table 11

Responsiveness of Capability	Custodial Precedent-driven	Production Efficiency-driven	Marketing Market-driven	Strategic Environment-driven	Flexible Seeks to create environment

Compared with Ansoff Strategic Aggressiveness Scale (see description below)

Strategic Investment (Strategic Budget) (SI). The operational definitions of a geographic area appear below.

Operational Definition. Strategic Invesment (Budget) (SI) is the firm's commitment of resources to support execution of the strategy. For purposes of this research, SI is represented by the last year of research and development expense, as a percent of total revenue. Then an ordinal Likert Scale rating is applied based on the R&D percent, in a range from 0 to more than 20%. The calculation is represented as: R&D Exp./total revenue: Likert rating 1-5.

Moderating Variables (MV)

The moderating variable is one that when introduced into a given environment, can have the effect of changing the condition of dependent variables and thus, is a causal agent of a result.

The first moderating variable is geographic area – urban and suburban – described above.

The second moderating variable is environmental turbulence (ETL). because it is the factor that influences both strategic aggressiveness and capability response. Those two variables are also calibrated against ETL. Both must be aligned with the environmental turbulence level in order to influence optimal performance (profitability (P)).

The third moderating variable is the *Innovation Quality Index* (IQI), because it also is anc element that influences optimal performance (profitability (P)).

The *Innovation Quality Index* has two primary elements: Workforce Availability Index (WAI), and Quality of Life Index (QLI), each with sub-elements that are defined as measurable units used to characterize the innovation quality of a given geographic area.

It is anticipated that during the course of this research, these moderating variables will be shown to demonstrate either strong or weak relationships to the independent variables. They are also expected to be a determinant on the nature of relationships to the dependent variable,, which is optimal performance as represented by profitability (P) for technology firms (ICTs) located in or near urban centers compared, to those located in suburban areas.

Environmental Turbulence. The operational definition of *Environmental turbulence* appears below.

Operational Definition. The operational definition of environmental turbulence level (ETL), is the single primary data factor contained in the research methodology. It is captured by utilizing a panel of experts, assembled to provide ETL assessment analysis data on each industry sector (NAIC). Each member of the panel completes a custom-crafted Environmental Turbulence Assessment tool (Kipley, 2012), which analyzes ETL along two dimensions: 1) Future Industry Innovation Turbulence; and 2) Future Market Turbulence.

Future Industry Innovation Turbulence Elements

Frequency of New Products in Industry

Length of Product Life Cycle in Industry

Number of Competing Technologies in Industry

Industry Technology Intensity

Rate of Technological Obsolescence

Level of Product Performance Differentiation in Industry

Industry Societal Pressures

Visibility of Future Change Events in Industry

Industry's Demand for Growth Capital

Rate of Change in Technology in Industry

Barriers to Entry of New Competitors in Industry

List Future Market Turbulence Elements

Industry Market Structure

Consumer Pressure in Industry

Pressure by Government

Industry Growth Rate

Level of Capital Intensity

Pressure by Environmental Groups

Innovation Quality Index (IQI). The operational definition of the Innovation Quality Index (IQI) appears below.

Operational Definition. The *Innovation Quality Index* (IQI), is a measure of two key indicators: Workforce Availability (WAI), and Quality of Life Index (QLI). Each indicator is a separate element. The ICT *Innovation Quality Index* (IQI) score is calculated as follows: WAI + QLI/2 = IQI score.

Element 1: Workforce Availability Index (WAI). The operational definition of Element 1 appears below.

Operational Definition. There are two sub-elements in this examination. Workforce Availability Index (WAI) is a measure of two sub-elements: Workers with Requisite Skills (WRS), and Tech. Education Accessibility Index (TEAI), and is calculated as: WRS + TEAI/2 = WAI Score

Sub-Element i: Workers with Requisite Skills (WRS). The operational definition of Sub-Element i appears below.

Operational Definition. The availability of Workers with Requisite Skills (WRS), is measured by recording the ratio of the total number of people employed in technology occupations in a specific geographic location, as a percent of the total workforce (see data sourcing below). That ratio is then calculated as the difference from the mean variance from all geographic locations. The calculation is represented as Tot. Tech. Empl./Tot. Empl. : mean var.

Sub-Element ii Tech. Education Accessibility Index (TEAI). The operational definition of Sub-Element i appears below.

Operational Definition. The Tech. Education Accessibility Index (TEAI), is a measure the number of colleges, universities, and technical schools, in each targeted geographic area. (see data sourcing below). Specifically, it is a measure of S.T.E.M. – science, technology, engineering, and math, education institutions. It is calculated by recording the total number of S.T.E.M. institutions in the area, and then calculating the distance from the mean variance from all geographic locations. The calculation is represented as: S.T.E.M. Inst. : mean var.

Workforce Availability Index (WAI), and its sub-elements are both ratio and interval data types.

Element 2: Quality of Life Index (QLI). The operational definition of Element 2 appears below.

Operational Definition. Operationally, quality of life (QLI), is a measure of three sub-elements: i) Home Ownership Index (HOI), ii) Arts; Entertainment, and Recreation Index (AERI); and iii) Primary/Secondary Education Quality (K-12) (PEQI). It is calculated as: HOI + AERI + PEQI/3 = QLI Score.

Sub-Element iii Home Ownership Index (HOI). The operational definition of Sub-Element iii appears below.

Operational Definition. Operationally, the Home Ownership Index (HOI), is measured by the percent of the population in each geographic area that own their own homes, and then calculating the difference from the mean variance for all geographic locations. The calculation is represented as: % Owner Occupied : mean var.

Sub-Element iv: Arts, Entertainment, and Recreation Index (AERI). The operational definition of Sub-Element iv appears below.

Operational Definition. Operationally, the Arts, Entertainment, and Recreation Index (AERI), is a measure of the number of establishments in each geographic area contained in the sample, and then calculating the mean variance from the sample city average (all sample geographic locations). The calculation is represented as. # establ. per geographic area: mean var.

Sub-Element v: Primary/Secondary Education Quality (K-12) (PEQI). The operational definition of Sub-Element ii appears below.

Operational Definition. Operationally, Primary/Secondary Education Quality (K-12) (PEQI), is a measure of two sub-ratings: Reading At Grade Level Index (RGLI), and Math Comprehension Index (MCI) (see data sourcing below). The Primary/Secondary

Education Quality (K-12) Score is calculated as: RGLI Var. + MCI Var./2 = PEQI Score.

<u>Sub-rating a: Reading At Grade Level (RGLI).</u> The operational definition of Sub-rating a appears below.

<u>Operational Definition</u>. Reading At Grade Level Index (RGLI), is the percent of students (K-12), demonstrating a proficiency in reading comprehension in each geographic area, compared to the national average, and then calculating the variance. The calculation is represented as RGLI – nat. avg: mean var.

<u>Sub-rating b: Math Comprehension (MCI).</u> The operational definition of Sub-rating b appears below.

<u>Operational Definition</u>. Operationally, the measure of Math Comprehension (MCI), is the percent of students (K-12) demonstrating a proficiency in math in each geographic area, compared to the national average, and then calculating the variance. The calculation is represented as MCI – nat. avg: mean var.

<u>Intervening Variables (IV)</u>

As previously indicated, the Ansoff model-the *strategic success hypothesis* (Ansoff, 1990) states that f*or optimum potential performance, three conditions must be* *met: 1) aggressiveness of the firm's strategy must match the turbulence of the environment. 2) responsiveness of the firm's capability matches the aggressiveness of its Strategy and 3) the components of the firm's capability must be supportive of one another (strategic investment (budget)).* Therefore, measurements of variable gaps are calculated as follows:

<u>Environmental Turbulence/Strategic Aggressiveness Gap.</u> The operational definition of environmental turbulence/ strategic aggressiveness gap appears below.

<u>Operational Definition</u>. Environmental turbulence/Strategic aggressiveness gap (ETL - SA G), is operationally defined as the absolute difference between the level of environmental turbulence for the specific technology sector (NAIC) and the strategic aggressiveness of the ICT. It is represented as ETL - SA G.

<u>Capability Response/Strategic Aggressiveness Gap.</u> The operational definition of capability response/strategic aggressiveness gap appears below.

<u>Operational Definition.</u> Capability Response/Strategic Aggressiveness Gap (SA – CR = G), is operationally defined as the absolute difference between the strategic aggressiveness and capability response measures of the ICT. It is represented as SA – CR = G.

Capability Response /Strategic Investment (Budget) Gap. The operational definition of Capability Response/Strategic Investment (Budget) Gap appears below.

Operational Definition. Capability Response/Strategic Investment (Budget) Gap (CR – SI G) is operationally defined as the absolute difference between the capability response and the Strategic Investment (Budget) ratio measures of the ICT. It is represented as CR – SI G.

Dependent Variable

The dependent variable, enterprise performance (a.k.a. Strategic Business Unit (SBU) performance (Profitability (P))), results from the execution of the firm's strategy and its operations to achieve a targeted outcome.

Enterprise peformance (Profitability Profitability (P)). The operational definition of enterprise performance (Profitability (P)) appears below.

Operational Definition. Operationally, enterprise performance (profitability (P)), is measured by calculating the average net operating income of each ICT, as a percent of total revenue, taken from the firm's financial statements for the last three years, using the sources previously designated. It is represented as P = (yr.1 np/tr + yr.2 np/tr + yr. 3 np/tr)/3. Profitability is a measure of both ratio and interval data types.

The Research Strategy

The research focus is aimed at ICTs with total revenues in a range from $25 million to $500 million. Urban geographic locations (U), are defined as the city-municipal jurisdiction of Metropolitan Statistical Areas (MSAs), with populations of 1 million people or more. Suburban geographic locations (SU), are defined as the areas also within those MSAs, but with less population. The mean employee population of all sample firms is 714.

The Research Sampling Methodology and Data Sources

Location data (U and SU – Moderating Variables (MV)) is taken from the U.S. Census Bureau, Statistical Abstract of the United States: 2012: Table 20.Large Metropolitan Statistical Areas (MSAs)-Population: 1990 to 2020. The firm sampling population of public technology firms (ICTs), is selected from the Mergent Online data-base. Hoover's First Research database is the source of the following list of NAIC ICT categories (presented by NAIC and industry sector):

List of North American Industry Codes (NAICs)

Table 12

334111	Electronic Computer Manufacturing
334112	Computer Storage Device Manufacturing
334113	Computer Terminal Manufacturing
334119	Other Computer Peripheral Equipment Manufacturing
334210	Telephone Apparatus Manufacturing
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing
334290	Other Communications Equipment Manufacturing
334310	Audio and Video Equipment Manufacturing
334412	Bare Printed Circuit Board Manufacturing
334413	Semiconductor and Related Device Manufacturing
334414	Electronic Capacitor Manufacturing
334416	Electronic Coil, Transformer, and Other Inductor Manufacturing
334417	Electronic Connector Manufacturing
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing
334419	Other Electronic Component Manufacturing
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables
334514	Totalizing Fluid Meter and Counting Device Manufacturing
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals
334516	Analytical Laboratory Instrument Manufacturing
334517	Irradiation Apparatus Manufacturing
334518	Watch, Clock, and Parts Manufacturing
334519	Other Measuring and Controlling Device Manufacturing
334611	Software Reproducing
423430	Computer and Computer Peripheral Equipment and Software Merchant Wholesalers
511210	Software Publishers
518210	Data Processing, Hosting, and Related Services
541511	Custom Computer Programming Services
541512	Computer Systems Design Services
541513	Computer Facilities Management Services
541519	Other Computer Related Services
541710	Research and Development in the Physical, Engineering, and Life Sciences

This sampling selection collectively identified a total of 380 ICTs. Of that population, there are 100 urban ICTS.

The values for the independent variables (SA,CR, and SI - (ID)), are developed using financial data taken from Mergent Online financial statements and ratio analysis information; quantitative data, and qualitative data converted to quantitative data, taken from Hoover's First Research-Industry Intelligence; Hoover's Academic: Company Reports; Morningstar Investment Research; Lexus-Nexus Academic; Pro-Quest Historical Annual Reports; and the investor relations pages for each ICT specific websites.

The moderating variable – *environmental turbulence* (ETL - ((MV)), as previously indicated, is the single primary data factor contained in the research methodology. It is captured by utilizing a panel of experts, assembled to provide ETL assessment analysis data. The backgrounds of each expert on the panel is provided in Chapter 4, which details research findings. Each member of the panel completed a custom-crafted Environmental Turbulence Assessment tool (Kipley, 2012), which analyzed ETL along two dimensions: 1) Future Industry Innovation Turbulence; and 2) Future Market Turbulence.

The moderating variable - *Innovation Quality Index* (IQI - (MV)) , has two key-elements: Workforce Availability Index (WAI); and Quality of Life Index (QLI).

Workforce Availability Index (WAI) has two sub-elements: Workers with Requisite Skills (WRS); and Tech. Education Accessibility Index (TEAI). First, Workers with Requisite Skills (WRS), is measured by the total number of people employed in technology jobs, as a percent of the total population for each MSA. The data is taken from the U.S. Census Bureau report: PERCENT OF CIVILIAN EMPLOYED POPULATION 16 YEARS AND OVER IN COMPUTER, ENGINEERING, AND

SCIENCE OCCUPATIONS - United States -- Metropolitan and Micropolitan Statistical Area; and for Puerto Rico Universe: Civilian employed population 16 years and over 2010 American Community Survey 1-Year Estimates

The second sub-element, Tech. Education Accessibility Index (TEAI), measures the proximity of colleges and universities in each specific geographic area that provide degrees in science, math, engineering, computer science and other technical fields (i.e. life sciences), etc. These institutions are referred to as S.T.E.M. – science, technology, engineering, and math, education institutions. The data is gathered by readily available information regarding universities, and other targeted institutions, and their specific program characteristics, in each geographic area.

Quality of Life Index (QLI), has three sub-elements: Home Ownership Index (HOI), Arts, Entertainment, and Recreation Index (AERI), and Primary/Secondary Education Quality (K-12) (PEQI).

First, the sub-element - Home Ownership Index (HOI), is measured by the percent of the population in each geographic area that own their own homes. The data is taken from the citydata.com (a compilation that goes beyond just U.S. Census data—includes other databases, that take a more precise focus on specific geographic locations).

The second sub-element, Arts, Entertainment, and Recreation Index (AERI), is measured by the number of so-called “third place” venues in each geographic location. The data is taken from the U.S. Census Report – 2009 Arts, Entertainment, and Recreation: Geographic Area Series: Summary Statistics.

The third sub-element, Primary/Secondary Education Quality Index (K-12) (PEQI). has two sub-rating indicators: Reading At Grade Level Index (RGLI), and Math Comprehension Index (MCI). Reading At Grade Level Index (RGLI), is a measure of the K-12 reading comprehension ability of students attending schools in each geographic area, compared to the national average. Math Comprehension Index (MCI), is a measure of the K-12 math comprehension ability of students attending schools in each geographic area, compared to the national average. Both RGLI, and MCI data, is taken from the data base – Neighborhood Scout-*Enterprise-grade data for every neighborhood and city in the U.S.* (an extremely high-quality data base that provides measures all the way down to school district in every U.S. city)

The intervening variables (IV), Environmental Turbulence/Strategic Aggressiveness Gap (ETL/SA G); Capability Response/ Strategic Aggressiveness Gap (SA – CR G); and Strategic Investment (Budget) /Capability Response Gap (CR – SI G); are each calculated using data collected from the previously defined sources, i.e. Mergent Online, Lexus-Nexus Academic, ICT Annual Reports, etc.

Finally, the dependent variable, enterprise performance (profitability (P) - (DV); is calculated using financial data – net operating income as percent of total revenue (3 yrs.) - specific to each ICT. This data is taken from Mergent Online financial statements, Lexus-Nexus Academic, ICT Annual Reports, etc.

Research Method Validation

Research methods are validated through multiple paths. First, the variables being researched and tested in the Ansoff model, have been empirically validated by numerous dissertations completed by confirmed doctoral degree recipients from Alliant International University, and other graduate institutions and research enterprises. Consistent results have been advanced over time. The research approach and methods are subject to review and approval from a panel of experts in the field, that form the dissertation committee: Dr. Louise Kelly-Chair and strategic management expert; Dr. Daniel Kipley-Committee Member and Ansoff expert; Dr. Fred Phillips-Committee Member and innovation expert; and Dr. Renee` Naert--Committee Member and information technology expert.

Additionally, data sources such as U.S. Census, local and national education testing scores, housing data, and financial information, originate from validated sources.

Data Analysis Methodology

Data analysis is conducted through the use of several statistical tests, and raw data pattern analysis. The statistical tests include: Kolmogorov-Smirnov test for normalcy; the non-parametric Mann-Whitney *U*; General Linear Model Regression (GLM), Spearman's rho correlation, the means, medians, and standard deviations, and Pearson Correlations.

Anticipated Results of Research

This research is designed, and anticipated to reveal important information regarding the differences in how two distinct sets of technology firms-(ICTs)-those located in urban centers, and those located in suburban areas - select their strategic posture, and the impact it has on enterprise performance (profitability(P)). Further, the research model is designed to measure, and identify some of the key gaps between these two types of technology firms, that could lead to further research on how to close them.

The descriptive, and correlational relationships revealed in this research, will catalog how the environments in which urban ICTs, and suburban ICTs, influence how they must operate, and what challenges that might portend that helps illuminate the clear lack of location choice by ICTs in the nation's urban centers.

By illuminating differences in strategic behavior (strategic choice, response capability, and strategic investment commitment), more can be learned regarding any tendencies isolated to geography. The focus is aimed at how these differences may influence enterprise decision making, and the corresponding impact on profitability of the firm that might result. Analyzing those outcomes could potentially lead to prescriptive research for improving the conditions that support optimal performance by ICTs, for business leaders, policy makers, educators, and communities, at the regional and national levels.

The ultimate goal of the research is identify methodologies that might be considered to help turn traditionally underserved communities-urban centers-into greater participants in a global economy, which is driven by emerging technologies. If such a path is pursued, it also has the potential to create brighter socio-economic prospects in those communities going forward into the 21st Century.

Chapter 4

THE RESEARCH FINDINGS

In this chapter, the results of the research data analysis are presented. The chapter is divided into five sections: 1) methodology composite and variable targets measured 2) descriptive statistics, 3) hypothesis test results, 4) findings and observations, and 5) chapter summary.

Methodology Composite

To confirm and update the methodology description summarized in Chapter 1, and detailed in Chapter 3, this research is focused on the current position of ICT firms using *Ansoff's Strategic Diagnosis* methodology (Ansoff, 1990), geographic area (urban and suburban), innovation quality, and enterprise performance (profitability). The Ansoff formula variables have been and are specifically defined. (It should be noted that the fully developed Ansoff formula calls for current and future capabilities i.e., environmental turbulence level, strategic aggressiveness, capability response, strategic investment (budget), other strategic elements. This research focuses on only the current Ansoff elements). Innovation quality, as compiled in the Innovation Quality Index (IQI) developed for this research, has been specifically defined. And enterprise performance, defined as the 3 yr. net profit average of each ICT, has been specifically defined.

To facilitate and initiate the research, a search was performed for companies that qualify as ICTs with total revenues in a range from $25 million to $500 million. The Mergent Online Financial and Company Information Data Base was the source for the search. That search initially yielded 380 firms, the raw data of which was analyzed. After conducting that analysis, exactly 98 urban ICTs (firms located in urban geographic locations (U) defined as the city-municipal jurisdiction of Metropolitan Statistical Areas (MSAs) with populations of 1 million people or more) were selected. The analysis also identified exactly 103 suburban ICTs ((SU) (located in geographic areas near urban locations, but with smaller populations).

The firms were segmented by North American Industry Code (NAIC). The resulting ICT research population was divided into some 34 individual NAICs. However, by NAIC definitions, several industry segments are described as having similar characteristics and were combined for analysis purposes. Thus, 34 unique NAICs were compressed to 15 individual industry segments that serve as strategic groups. After the researcher conducted his own analysis on these NAIC industry strategic groups to gain an understanding of their general and unique characteristics, further steps were taken to determine environmental turbulence levels for each - a key moderating variable in the Ansoff methodology. A panel of six professional experts was asked to complete an environmental turbulence assessment tool that included each NAIC strategic group (see Chapter 3 for specific assessment tool elements).

In order to determine other specific enterprise characteristics and other variable information, ICT and geographic area analysis was conducted using a variety of data bases and other electronic resources that include Mergent Online, Morningstar, Hoover's

Academic, Dun & Bradstreet Key Business Ratios, Nelson's Public Company Profiles, Standard & Poor's Corporate Descriptions, Zacks Investment Research, Securities & Exchange Commission (SEC) Public filings, U.S. Census Bureau, city-data.com, Neighborhood Scout, New York Times Online, Bloomberg News, Fortune, and each ICT company website. (See Appendix for data worksheets.)

Environmental Turbulence Level (ETL) Expert Panel Assessments

While the researcher's ETL assessment scores were conducted to gain an understanding of industry segment characteristics, the results of that analysis were not included in the research model itself. Instead, and in order to gain an optimally objective assessment, a panel of experts was assembled to provide ETL assessment analysis data. Each member of the panel completed a custom-crafted Environmental Turbulence Assessment tool (Kipley, 2012), which analyzed ETL along two dimensions: Future Industry Innovation Turbulence and Future Market Turbulence. The experts represent different industry backgrounds; however, all have exposure to the on-going tendencies of the respective industry groups included in the research. Each expert's field of expertise is listed below:

1) Leading U.S. university innovation institute principal Ph.D. with extensive experience in technology transfer and commercialization. Also technology sector venture capital. As a result of that experience, the expert has examined ICTs in every NAIC targeted in the research, and provides a keen techno-centric perspective.

2) Recognized international financial services industry research analyst that examines firm performance across industries both in the U.S. and throughout Europe. The scope of that analysis covers a wide range of ICTs, including the NAICs targeted in this research.

3) A second financial services industry research analyst that examines firm performance across industries both in the U.S. and throughout Europe. The scope of that analysis covers a wide range of ICTs, including the NAICs targeted in this research.

4) A senior university professor, Ph.D., whose field of expertise is international business, with extensive exposure to the study of ICTs included in the NAICs targeted in this research.

5) A senior university professor, Ph.D., whose field of expertise is organizational management/Leadership, with extensive exposure to study of ICTs included in the NAICs targeted in this research.

6) Co-founder of prominent tech sector entrepreneurial start-up consultancy, with extensive exposure to study of ICTs included in the NAICs targeted in this research.

Data Analysis

The analysis involved some thirty-nine (39) data points and/or computations for each ICT targeted, prior to statistical analysis, which resulted in some 7,917 data points viewed. The variables are defined both conceptually and operationally in Chapters 1 and 3. The primary variables measured using statistical testing methodology, are listed as follows:

U ETL –SA G: Urban ICT Envir. Turb. Level - Strategic Aggressiveness Gap

U SA – CR G: Urban ICT Strategic Aggressiveness – Capability Response Gap

U CR – SI G: Urban ICT Capability Response - Strategic Investment (Budget) Gap

U IQI: Urban ICT Innovation Quality Index

U P: Urban ICT Enterprise Performance (Profitability)

SU ETL –SA G: Suburban ICT Envir. Turb. Level - Strategic Aggressiveness Gap

SU SA – CR G: Suburban ICT Strategic Aggressiveness – Capability Response Gap

SU CR – SI G: Suburban ICT Capability Response - Strategic Investment (Budget) Gap

SU IQI: Suburban ICT Innovation Quality Index

SU P: Suburban ICT Enterprise Performance (Profitability)

Relationships among variables also included:

SA = Strategic Aggressiveness

CR = Capability Response

SI = Strategic Investment (Budget)

ETL = Environmental Turbulence Level

IQI –Innovation Quality Index

Data Analysis and Statistical Tests

Data analysis was executed through the use of several statistical tests. First, a Kolmogorov-Smirnov test for normalcy, of both urban and suburban sample populations was conducted. Those tests revealed that the urban sample population had a normal distribution. However, it found that the suburban sample population did not contain a normal distribution. As a result, the non-parametric Mann-Whitney *U,* was identified as the appropriate test for the variables. A Mann-Whitney test was performed on each of the intervening variables: ETL–SA G, SA–CR G, CR–SI G-(although not a primary component of the Ansoff hypothesis, this gap configuration was constructed based upon previous work conducted by Gustafson and Sullivan, 2003), and the moderating variable, IQI, to determine if there was any statistical significance between the other moderating variables: U - Urban ICTs and SU - Suburban ICTs. These tests were conducted using the entire U sample population and SU sample population.

These tests were repeated for specific NAICs, containing the largest sample-size populations for SU and U.

In light of the inherent statistical challenge that emerges when both linear (3yr. Net Profitability (P)) and ordinal data (Likert Scale ratings) are analyzed, a General Linear Model Regression (GLM) was employed to determine significance between P, and the intervening variables (G (Gaps)), and the moderating variable IQI.

In order to examine the relationships between the variables: independent (IV): SA, CR, SI; intervening (Int. V) ETL–SA G, SA–CR G, CR–SI G; and moderating (MV) ETL, and IQI, a Spearman's rho correlation was conducted.

Finally, the means, medians, and standard deviations, were calculated for the primary variables being measured (Gs), IQ1, and P.

Descriptive Statistics

To begin constructing the statistical models, the first step required collecting data that measured the environmental turbulence levels of each NAIC, and/or strategic NAIG group. The assessments were conducted by the expert panelists, characterized in Chapter 3. The result of each assessment appears below:

Expert Panel Environmental Turbulence Level (ETL) Scan Assessment

NAIC#: 334111 Industry Sector: Electronic Computer Manufacturing

Environmental Turbulence Level (ETL)

Innovation Cntr Ph.D. ETL Assmt.	Int. Fin. Srvs Ind. Analyst ETL Assmt.	2^{nd} Fin. Srvs Ind. Analyst ETL Assmt.
3.24	2.42	2.77
Int. Bus. Ph.D. ETL Assmt.	**Mgmt/Ldrsp Ph.D. ETL Assmt.**	**Tech Strt-up Consltnt. ETL Assmt.**
2.88	3.24	3.50

Mean ETL Score = 3.01

Special NAIC ETL Notes: biggest share personal computers….U.S. accounts for 20% of global demand….global demand down…largest U.S. firms…HP, Dell, Apple, Acer, Toshiba…Growth expected on 1% from 20112 thru 2015….visibility reasonable……driving dynamic, migration from desktop to hand-held devices that perform desktop utility, i.e. smart phones, iPads, other notebooks…accounts for high change complexity, but slow growth pushed ETL down a bit…..highly concentrated industry…top 20 companies produce 95% of $9b industry revenue

Calculating the turbulence level for each ICT sectors included in the research study (NAICs), is plotted on the turbulence scale illustrated below:

Table 13

Ansoff Turbulence Scale Rating, NAIC#: 334111

	1	2	* 3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 334112 Industry Sector: Computer Storage Device Manufacturing

Environmental Turbulence Level (ETL)

Innovation Cntr Ph.D. ETL Assmt. 2.88	Int. Fin. Srvs Ind. Analyst ETL Assmt. 2.00	2nd Fin. Srvs Ind. Analyst ETL Assmt. 3.04
Int. Bus. Ph.D. ETL Assmt. 3.05	Mgmt/Ldrsp Ph.D. ETL Assmt. 3.07	Tech Strt-up Consltnt. ETL Assmt. 2.97

Mean ETL Score = 2.83

Special NAIC ETL Notes: industry growth slow….major firms... EMC, NetApp, Seagate, Western Digital…OEMs-HP and IBM attached to enterprise purchase patterns…which have slowed (linked to economic slowdown)….competitive tension in the industry driven by storage disk – solid-state memory devices, i.e. flash-drives…visibility reasonable

Calculating the turbulence level for each ICT sector included in the research study

(NAICs) is plotted on the turbulence scale illustrated below:

Table 13-a

Ansoff Turbulence Scale Rating, NAIC#: 334112

	1	2 *	3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 334113 and 334119 Industry Sector: Computer Terminal Manufacturing, Other Computer Peripheral Equipment Manufacturing

Environmental Turbulence Level (ETL)

Innovation Cntr Ph.D ETL Assmt.	Int. Fin. Srvs Ind. Analyst ETL Assmt.	2nd Fin. Srvs Ind. Analyst ETL Assmt.
2.92	2.16	2.72
Int. Bus. Ph.D. ETL Assmt.	**Mgmt/Ldrsp Ph.D. ETL Assmt.**	**Tech Strt-up Consltnt. ETL Assmt.**
3.36	2.93	3.25

Mean ETL Score = 2.89

Special NAIC ETL Notes: 650 companies in two NAICs cross-referencing NAIC categories…# of printed pages/employee/month dropped nearly 50% from 2005 (1000 pgs.) to 2012…multi-functional printer (MFP) sales increased 175..growth forecast 2% 2012 to 2015… visibility reasonable….rapid product obsolescence (2 to 3 yrs)…..innovation intensity demand high (high R&D spending)…10% to 20% of tot. rev. ...major companies...Lexmark (printers), Logitech (peripherals)…divisions of NCR, Diebold, Apple, HP and Dell….

Calculating the turbulence level for each ICT sectors included in the research study

(NAICs) is plotted on the turbulence scale illustrated below:

Table 13-b

Ansoff Turbulence Scale Rating, NAIC#: 334113 and 334119

	1	2 *	3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 334210 Industry Sector: Telephone Apparatus Manufacturing

Environmental Turbulence Level (ETL)

Innovation Cntr Prncpl ETL Assmt.	Int. Fin. Srvs Ind. Analyst ETL Assmt.	2nd Fin. Srvs Ind. Analyst ETL Assmt.
2.73	1.50	2.87

Int. Bus. Ph.D.
ETL Assmt.
3.40

Mgmt/Ldrsp Ph.D.
ETL Assmt.
3.84

Tech Strt-up Consltnt.
ETL Assmt.
3.19

Mean ETL Score = 2.92

Special NAIC ETL Notes: 1,500 firms generating about $45b industry total ..Apple, Cisco Systems, Motorola, and Qualcomm…highly concentrated….50 top firms gen. 80% of rev….China's "smart city" initiative, including Beijing and Shanghai…..high telecommunications and infrastructure demand…2% growth – 2012-2015… visibility reasonable….sell to telecommunications service providers……consumer demand impacted by economy…rapid product obsolescence (2 to 3 yrs)…..innovation intensity demand high (high R&D spending)…10% to 20% of tot. rev. ...new consolidated public system underway…will include fiber optic to the home….VOIP by cable operators and telecom service firms…..seen as opportunity

Calculating the turbulence level for each ICT sectors included in the research study

(NAICs) is plotted on the turbulence scale illustrated below:

Table 13-c

Ansoff Turbulence Scale Rating, NAIC#: 334210

	1	2 *	3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 334220, Industry Sector: Radio & Telev. Brdcstng & Wireless Comm. Eqpmt. Mfg.

Environmental Turbulence Level (ETL)

Innovation Cntr Prncpl
ETL Assmt.
3.17

Int. Fin. Srvs Ind. Analyst
ETL Assmt.
2.04

2nd Fin. Srvs Ind. Analyst
ETL Assmt.
3.47

Int. Bus. Ph.D.
ETL Assmt.
2.93

Mgmt/Ldrsp Ph.D.
ETL Assmt.
3.74

Tech Strt-up Consltnt.
ETL Assmt.
3.31

Mean ETL Score = 3.11

Special NAIC ETL Notes: 800 firms generating about $35b industry total...Apple, Motorola Mobility and Qualcomm…highly concentrated….50 top firms gen. 90% of rev….5.2 billion wireless subscribers worldwide…Ericcson among global players …innovation intensity triggers aggressive price-cutting…spectrum deregulation triggering increase in wireless tech apps….no growth projections – low visibility…

Calculating the turbulence level for each ICT sectors included in the research study

(NAICs) is plotted on the turbulence scale illustrated below:

Table 13-d

Ansoff Turbulence Scale Rating, NAIC#: 334220

	1	2	* 3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 334412 Industry Sector: Bare Printed Circuit Board Manufacturing

Environmental Turbulence Level (ETL)

Innovation Cntr Prncpl ETL Assmt. 2.78	Int. Fin. Srvs Ind. Analyst ETL Assmt. 1.35	2nd Fin. Srvs Ind. Analyst ETL Assmt. 3.37
Int. Bus. Ph.D. ETL Assmt. 2.89	Mgmt/Ldrsp Ph.D. ETL Assmt. 3.77	Tech Strt-up Consltnt. ETL Assmt. 3.20

Mean ETL Score = 2.89

Special NAIC ETL Notes: Included in 3344 NAIC category, which is centered on Semiconductor & Other Electronic Component Manufacturing…4,300 companies generating about $100b……Intel, Texas Instruments, Micron Technology, AMD…50 largest generate 65% of rev….printed circuitry – 20% of NAIC sector….5% growth– 2012-2015… visibility reasonable…..production attached to rise and fall of enterprise and consumer spending…industry challenge -rapid product obsolescence- component mfg commoditized (circuit boards)….expanding emerging economy middle class demand increase equals opportunity….desktop computers down…but other devices growing…(high R&D spending)…10% to 20% of total revenue.

Calculating the turbulence level for each ICT sectors included in the research study (NAICs) is plotted on the turbulence scale illustrated below:

Table 13-e

Ansoff Turbulence Scale Rating, NAIC#: 334412

	1	2 *	3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 334413, Industry Sector: Semiconductor and Related Device Manufacturing

Environmental Turbulence (ET)

Environmental Turbulence Level (ETL)

Innovation Cntr Prncpl ETL Assmt. 3.15	Int. Fin. Srvs Ind. Analyst ETL Assmt. 2.89	2nd Fin. Srvs Ind. Analyst ETL Assmt. 2.97
Int. Bus. Ph.D. ETL Assmt. 3.71	Mgmt/Ldrsp Ph.D. ETL Assmt. 2.89	Tech Strt-up Consltnt. ETL Assmt. 3.32

Mean ETL Score = 3.21

Special NAIC ETL Notes: about same as 334412….4,300 companies generating about $100b……Intel, Texas Instruments, Micron Technology, AMD…50 largest generate 65% of rev…. ….5% growth– 2012-2015… visibility reasonable….production attached to rise and fall of enterprise and consumer spending…industry challenge -rapid product obsolescence-expanding emerging economy….middle class demand increase equals opportunity….desktop computers down…but other devices growing…(high R&D spending)…15% of total revenue.

Calculating the turbulence level for each ICT sectors included in the research study (NAICs) is plotted on the turbulence scale illustrated below:

Table 13-f

Ansoff Turbulence Scale Rating, NAIC#: 334413

	1	2	* 3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 334414, 334416, 334417, 334418, 334419, Industry Sector: Electronic Capacitor Manufacturing…also Electronic Coil, Transformer, and Other Inductor Manufacturing, Electronic Connector Manufacturing, Printed Circuit Assembly (Electronic Assembly) Manufacturing, Other Electronic Component Manufacturing

Environmental Turbulence Level (ETL)

Innovation Cntr Prncpl ETL Assmt.	Int. Fin. Srvs Ind. Analyst ETL Assmt.	2nd Fin. Srvs Ind. Analyst ETL Assmt.
2.55	2.43	2.42
Int. Bus. Ph.D. ETL Assmt.	**Mgmt/Ldrsp Ph.D. ETL Assmt.**	**Tech Strt-up Consltnt. ETL Assmt.**
3.53	2.93	2.82

Mean ETL Score = 2.85

Special NAIC ETL Notes: about same as 334412, and 413 above….4,300 companies generating about $100b……Intel, Texas Instruments, Micron Technology, AMD…50 largest generate 65% of rev…. ….5% growth– 2012-2015… visibility reasonable…….production attached to rise and fall of enterprise and consumer spending…industry challenge -rapid product obsolescence-component mfg commoditized (i.e. capacitors, coil)…expanding emerging economy middle class demand increase equals opportunity….desktop computers down…but other devices growing…(high R&D spending)…10% to 20% of tot. rev…

Calculating the turbulence level for each ICT sectors included in the research study

(NAICs) is plotted on the turbulence scale illustrated below:

Table 13-g

Ansoff Turbulence Scale Rating, NAIC#: 334414, 334416, 334417, 334418, 334419

	1	2 *	3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 334310 Industry Sector: Audio and Video Equipment Manufacturing

Environmental Turbulence Level (ETL)

Innovation Cntr Prncpl ETL Assmt. 3.17	Int. Fin. Srvs Ind. Analyst ETL Assmt. 2.04	2nd Fin. Srvs Ind. Analyst ETL Assmt. 3.47
Int. Bus. Ph.D. ETL Assmt. 2.93	Mgmt/Ldrsp Ph.D. ETL Assmt. 3.74	Tech Strt-up Consltnt. ETL Assmt. 3.31

Mean ETL Score = 3.11

Special NAIC ETL Notes: 400 companies generating about $3b……Harman Int. Bose, Panasonic, and Toshiba (U.S. divisions) …50 largest generate 80% of rev…. ….3% growth– 2012-2015… visibility reasonable…..production attached to rise and fall of commercial and consumer spending…industry challenge –supply chain delays …constant price erosion due to retail competitive intensity…Internet video both an opportunity and challenge….shifting viewer habits…..In-Home theaters growth shows industry promise

Calculating the turbulence level for each ICT sectors included in the research study (NAICs) is plotted on the turbulence scale illustrated below:

Table 13-h

Ansoff Turbulence Scale Rating, NAIC#: 334310

	1	2	* 3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 334510, 334516, 334517, 334518, 334519, Industry Sector: Electro-medical and Electrotherapeutic Apparatus Manufacturing, Irradiation Apparatus Manufacturing, Watch, Clock, and Parts Manufacturing, Analytical Laboratory Instrument Manufacturing, Other Measuring and Controlling Device Manufacturing

Environmental Turbulence Level (ETL)

Innovation Cntr Prncpl ETL Assmt.	Int. Fin. Srvs Ind. Analyst ETL Assmt.	2nd Fin. Srvs Ind. Analyst ETL Assmt.
2.62	2.77	2.69
Int. Bus. Ph.D. ETL Assmt.	**Mgmt/Ldrsp Ph.D. ETL Assmt.**	**Tech Strt-up Consltnt. ETL Assmt.**
3.53	3.01	3.02

Mean ETL Score = 2.99

Special NAIC ETL Notes: **7**00 companies generating about $32b……Hologic, Medtronic, St. Jude Medical, Varian Medical Systems, and Zoll Medical, medical device divisions of General Electric and Johnson & Johnson …highly concentrated…50 largest generate 85% of electromedical rev…. and 95% of X-ray apparatus equipment rev.….4% growth– 2011-2016… visibility opportunistic…..highly regulated..(federal and state)…FDA approval required….price pressure triggered by purchasing power from healthcare provider consolidation…pressure to reduce healthcare costs…health concerns over radiation exposure

Calculating the turbulence level for each ICT sectors included in the research study

(NAICs) is plotted on the turbulence scale illustrated below:

Table 13-i

Ansoff Turbulence Scale Rating, NAIC#: 334510, 334516, 334517, 334518, 334519

	1	2 *	3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 334611, 334611, Industry Sector: Software Reproducing, Magnetic & Optical Media Manufacturing

Environmental Turbulence Level (ETL)

Innovation Cntr Prncpl ETL Assmt.	Int. Fin. Srvs Ind. Analyst ETL Assmt.	2nd Fin. Srvs Ind. Analyst ETL Assmt.
2.52	2.92	2.49
Int. Bus. Ph.D. ETL Assmt.	**Mgmt/Ldrsp Ph.D. ETL Assmt.**	**Tech Strt-up Consltnt. ETL Assmt.**
2.89	3.45	3.01

Mean ETL Score = 2.96

Special NAIC ETL Notes: 100 companies generating about $2b……FUJIFILM Recording Media, Seagate, and Western Digital. …highly concentrated…4 largest generate 80% of rev…. visibility low….)….competitive threat to traditional media manufacturers triggered by solid-state memory devices, i.e., flash-drives…..changing consumer behavior-shifts to streaming and cloud computing a threat…supply chain challenges….visibility sub-optimal

Calculating the turbulence level for each ICT sectors included in the research study

(NAICs) is plotted on the turbulence scale illustrated below:

Table 13-j

Ansoff Turbulence Scale Rating, NAIC#: 334611, 334611

	1	2 *	3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 423430 Industry Sector: Computer and Computer Peripheral Equipment and Software Merchant Wholesalers

Environmental Turbulence Level (ETL)

Innovation Cntr Prncpl ETL Assmt.	Int. Fin. Srvs Ind. Analyst ETL Assmt.	2nd Fin. Srvs Ind. Analyst ETL Assmt.
3.38	2.59	2.62

Int. Bus. Ph.D. ETL Assmt.	Mgmt/Ldrsp Ph.D. ETL Assmt.	Tech Strt-up Consltnt. ETL Assmt.
3.05	3.78	3.41

Mean ETL Score = 3.24

Special NAIC ETL Notes: 18,000 companies generating about $265b……Ingram Micro, ScanSource, Tech Data, and Weston Group…also, Arrow Electronics and Avnet. …highly concentrated…top 50 4 largest generate 75% of rev….2% growth– 2012-2015… visibility reasonable…sales and revenue triggered by enterprise and consumer spending…revenue dropped by 20% during recession peak….competitive threat from manufacturers themselves, seeking to by-pass distributors…productivity increased by consolidation…opportunity to take over inventory control systems in enterprise environment, resulting in cost savings for firms..

Calculating the turbulence level for each ICT sectors included in the research study

(NAICs) is plotted on the turbulence scale illustrated below:

Table 13-k

Ansoff Turbulence Scale Rating, NAIC#: 423430

	1	2	* 3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 511210, 541511, 541512, 541519, 518210, 541513 Industry Sector: Software Publishers, Custom Computer Programming Services, Computer Systems Design Services, Other Computer Related Services, Data Processing, Hosting, and Related Services, Computer Facilities Management Services
Environmental Turbulence Level (ETL)

Innovation Cntr Prncpl ETL Assmt.	Int. Fin. Srvs Ind. Analyst ETL Assmt.	2nd Fin. Srvs Ind. Analyst ETL Assmt.
3.11	2.14	2.56

Int. Bus. Ph.D. ETL Assmt.	Mgmt/Ldrsp Ph.D. ETL Assmt.	Tech Strt-up Consltnt. ETL Assmt.
3.01	3.80	3.31

Mean ETL Score = 3.07

Special NAIC ETL Notes: 60,000 companies generating about $240b……60% from software…remainder custom programming. …highly concentrated…top 50 largest generate 70% of rev.…Adobe Systems, CA (Computer Associates), Microsoft, Oracle, and Symantec…..50 companies generate 79% of U.S. packaged software.…custom programming more fragmented-en.…global industry rev. more than $450b.…3% growth– 2012-2015… visibility reasonable… as in many other sectors… sales and revenue triggered by enterprise and consumer spending…economic downturn depresses software sales…industry dominated by large firms…Linux-based open source software presents competitive threat…so does cloud computing proliferation, reduces need for stand-alone software packages…cloud computing also presents opportunity.

Calculating the turbulence level for each ICT sectors included in the research study

(NAICs) is plotted on the turbulence scale illustrated below:

Table 13-l

Ansoff Turbulence Scale Rating: NAIC#: 511210, 541511, 541512, 541519, 518210, 541513

	1	2	* 3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 334511, 334512, 334513, 334514, 334515 Industry Sector: Srch, Detection, Navgtn, Guid. Aerontcl, & Naut. Syst. & Inst. Mfg, Auto.Envir. Cntrl Mfg for Resid, Commerc, & Applnc. Use Instrmts. Mfg for Measg., Displyg, & Cntrllg Indust.Process Varbls, Totalizing Fluid Meter and Counting Device Manufacturing, Instrmt Mfg for Measuing & Testing Electrcy & Electrc Signals

Environmental Turbulence Level (ETL)

Innovation Cntr Prncpl ETL Assmt. 2.85	Int. Fin. Srvs Ind. Analyst ETL Assmt. 2.55	2nd Fin. Srvs Ind. Analyst ETL Assmt. 3.27
Int. Bus. Ph.D. ETL Assmt. 2.85	Mgmt/Ldrsp Ph.D. ETL Assmt. 3.74	Tech Strt-up Consltnt. ETL Assmt. 2.91

Mean ETL Score = 2.98

Special NAIC ETL Notes: 500 companies generating about $50b……highly concentrated…8 largest generate 75% of rev…Boeing, General Dynamics, Northrop Grumman, and Raytheon….3% growth– 2012-2015… visibility reasonable… revenue triggered and dependent on federal government contracts…(large percent of industry rev…major changes in agency budgets can have significant impact in industry…..products among the most technologically advanced in the scientific field…must attract high-end top engineers and computer talent….can outsource some work to India and China, but not all….some national security sensitive…cost reduction, M&A(consolidation) most critical business trends….global exports opportunity…

Calculating the turbulence level for each ICT sectors included in the research study

(NAICs) is plotted on the turbulence scale illustrated below:

Table 13-m

Ansoff Turbulence Scale Rating, NAIC#: 334511, 334512, 334513, 334514, 334515

	1	2 *	3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

NAIC#: 541710 Industry Sector: Research and Development in the Physical, Engineering, and Life Sciences

Environmental Turbulence Level (ETL)

Innovation Cntr Prncpl
ETL Assmt.
1.86

Int. Fin. Srvs Ind. Analyst
ETL Assmt.
3.19

2nd Fin. Srvs Ind. Analyst
ETL Assmt.
3.34

Int. Bus. Ph.D.
ETL Assmt.
2.89

Mgmt/Ldrsp Ph.D.
ETL Assmt.
3.78

Tech Strt-up Consltnt.
ETL Assmt.
3.45

Mean ETL Score = 3.03

Special NAIC ETL Notes: a.k.a. bio-tech sector… 2,400 companies generating about $17b……60% from software.. remainder custom programming. …highly concentrated…top 50 largest generate 70% of rev….Scripps Research Institute (SRI), Howard Hughes Medical Institute, and Jackson Laboratory….and govt. and university research entities….e.g., Whitehead Institute (MIT). Research divisions of large bio-techs, i.e. Amgen, Genentech, and Genzyme…..(doesn't include mfg)…..5% growth– 2012-

2015… visibility reasonable… driven by demonstration of viable product development….dependent on high-end scientific human talent....FDA regulatory streamlining aiding industry growth... i.e., “Fast Track” approval process….opportunity…bioinfomrmatics (bio-tech and IT development)

Calculating the turbulence level for each ICT sectors included in the research study (NAICs) is plotted on the turbulence scale illustrated below:

Table 13-n

Ansoff Turbulence Scale Rating, NAIC#: 541710

	1	2	* 3	4	5
Environmental Turbulence	Repetitive No Change	Expanding Slow Incremental Change	Changing Fast Incremental Change	Discontinuous Discontinuous Predictable Change	Surpriseful Discontinuous Unpredictable Change

Ansoff, 1990, pg.33

Data Source for industry segment notes: Hoover’s First Report Industry Intelligence

<u>ETL Expert Panel Assessment Results – Cross Relational Analysis.</u> The assessment scores of the six experts, largely fell within a range that did not create any conspicuous outliers. Thus, the scores would appear to reflect a fairly good assessment of the various NAIC sector environments, as seen through the lens of people that look at various data flows, relative to the targeted industry segments regularly.

Post-assessment interviews with the experts, revealed one consistent thread relative to factors that influenced their ETL ratings. It was thought that while several NAIC sectors could be seen to traditionally lean toward high turbulence, in large part due to the innovation intensity in the sector, the economic downturn that began in the Fall of 2008, in their view, has had a mitigating effect on the level of volatility. They each believe that the slowing down of innovative and competitive intensity generally, as a function of an overall slowing of the economy globally, has left few industries with the turbulence and volatility that had emerged during the relative normal business cycle that preceded the downturn.

A few experts also commented that as the leading technologies in some of the NAICs had garnered higher levels of market absorption and penetration, commoditization has entered as a by-product, placing downward pressure on pricing, and thus reducing actual turbulence.

Hypothesis Test Results

RQ.1 What is the relationship among environmental turbulence level (ETL) and strategic aggressiveness (SA) for ICTs located in or near urban centers (U) and suburban locations (SU)?

H.0: U-(ETL –SA G) $\leq$ SU (ETL –SA G)

H.1: U-(ETL –SA G) > SU-(ETL –SA G)

The hypothesis suggests that the environmental turbulence/strategic aggressiveness gap in urban geographies will be larger than those found in suburban locations, which would be one potential causality for ICTs moving into suburban areas at a higher frequency than urban.

A Mann-Whitney *U* test was used to determine if there is a difference in the Environmental Turbulence Level (ETL) and Strategic Aggressiveness (SA) Gap (G), between Urban (U), and Suburban (SU) areas. The test determines whether the two samples are significantly different from one another. Table 14 shows the results of this analysis.

Table 14

Mann-Whitney Test for ETL - SA Gap in Urban and Suburban Areas

	Suburban ETL-SA Gap	Urban ETL-SA Gap
N	103	98
Mean	0.88	-0.83
Median	0.83	-0.83
Mann-Whitney U	23.5	
Wilcoxon W	4874	
Z	-12.188	
Asymp, Sig, (2 tailed)	0.000	

The observed difference between U and SU is highly significant ($p < .001$, $U = 23.5$, $Z < -1.96$). The U G is less than the SU G. Therefore, the null hypothesis is accepted.

RQ.2 What is the relationship among strategic aggressiveness (SA) and capability response (CR) for ICTs located in or near urban centers (U) and suburban locations (SU)?

H.0: U-(SA – CR G) $\leq$ SU-(SA – CR G)

H.1: U-(SA – CR G) > SU-(SA – CR G)

The hypothesis suggests that the strategic aggressiveness/capability response gap in urban geographies, will be larger than those found in suburban locations. That finding would be one potential causality of an expectation that urban ICTs are more likely to under- perform. In this measurement, the statistical analysis would appear to support that theory.

Once again, the Mann-Whitney *U* test was used to determine if there is a difference in the Strategic Aggressiveness (SA) and Capability Response (CR) Gap (G), between Urban (U), and Suburban (SU) areas.

Table 15 shows the results of this analysis.

Table 15

Mann-Whitney Test for SA - CR Gap in Urban and Suburban Areas

	Suburban SA-CR Gap	Urban SA-CR Gap
N	103	98
Mean	0.02	0.18
Median	-0.04	0.19
Mann-Whitney U	4177	
Wilcoxon W	9533	
Z	-2.116	
Asymp, Sig, (2 tailed)	0.034	

In this measurement, the analysis did show significance. The Mann-Whitney *U* test confirms that there is a difference between U and SU ($p < 0.05$, U = 4177, Z = -2.116). The U G is greater than the SU G. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted.

RQ.3 What is the relationship among capability response (CR) and strategic investment (Budget) (SI) for ICTs located in urban areas (U) and suburban locations (SU)?

H.0: U-(CR – SI G) $\leq$ SU- (CR – SI G)

H.1: U-(CR – SI G) > SU- (CR – SI G)

The hypothesis suggests that the gap in alignment between capability response and strategic investment (budget) in urban geographies will be larger than those found in suburban locations. Such a finding would support the potential expectation that urban ICTs are more likely to under-perform. Again, the Mann-Whitney *U* test was used to determine if there is a difference in the Capability Response (CR) and Strategic Investment (SI) Gap (G), between Urban (U) and Suburban (SU) areas.

Table 16 shows the results of this analysis.

Table 16

Mann-Whitney Test for CR-SI Gap in Urban and Suburban Areas

	Suburban CR-SI Gap	Urban CR-SI Gap
N	103	98
Mean	1.08	0.38
Median	1.17	0.32
Mann-Whitney U	3632	
Wilcoxon W	8483	
Z	-3.432	
Asymp, Sig, (2 tailed)	0.001	

In this measurement, the analysis showed the median for U-(CR – SI G): 0.32, is smaller than the median for SU-(CR – SI G): 1.17. The Mann-Whitney *U* test confirms that there is a significant difference between U and SU ($p \leq .001$). The U G is less than the SU G. Therefore, the null hypothesis is accepted.

RQ.4 What is the relationship among the Innovation Quality Index (IQI) and Location for urban (U) and suburban areas (SU)?

H.0: U-IQI ≥ SU-IQI

H.1: U-IQI < SU-IQI

The hypothesis suggests that innovation quality will be better in suburban geographies than urban. Such a finding would be one potential causality for ICTs moving into suburban areas at a higher frequency than urban.

Table 17 shows the results of this analysis.

Table 17

Mann-Whitney Test for IQI in Urban and Suburban Areas

	Suburban IQI	Urban IQI
N	103	98
Mean	33.82	50.44
Median	16.84	46.12
Std. Deviation	59.64	60.63
Mann-Whitney U	3366	
Wilcoxon W	8722	
Z	-4.08	
Asymp, Sig, (2 tailed)	0.000	

The results show there is a statistically significant difference ($p < .001$) in the Innovation Quality Index (IQI) between the urban and suburban areas. Both the median and the mean values of the IQI were higher in the urban areas than the suburban. These results suggest that IQI is better in urban areas. The U IQI is greater than the SU IQI. Thus, the null hypothesis is accepted. However, it should be noted that mitigating any potential meaning of these measures, is a finding of high standard deviation values in both.

After measuring the variable relationships for each of the aggregate samples, U and SU, statistical tests were conducted to analyze the relationships between variables in specific NAICs (and strategic NAIC groups). Of the four NAICs analyzed, it included 83, or 81% of the suburban ICTs, and 78, or 80% of the urban ICTs.

For these more specific analysis applications, the Mann-Whitney *U* test was used to determine if there are differences in the gaps previously noted, and IQI.

Tables 18 thru 21 show the results of this analysis.

NAIC#: 511210, 541511, 541512, 541519, 518210, 541513 Industry Sector: Software Publishers, Custom Computer Programming Services, Computer Systems Design Services, Other Computer Related Services, Data Processing, Hosting, and Related Services, Computer Facilities Management Services

Table 18

Mann-Whitney Test: NAICs 511210, 541511, 541512, 541519, 518210, 541513

511210	ETL-SA Gap		SA-CR Gap		CR-SI Gap		IQI	
	Suburban	Urban	Suburban	Urban	Suburban	Urban	Suburban	Urban
N	46	41	46	41	46	41	46	41
Mean	-0.51	-0.54	-0.01	0.27	1.05	0.40	35.94	61.58
Median	-0.56	-0.49	-0.04	0.22	0.12	0.15	14.90	43.95
Mann-Whitney U	19.00		677		687.50		505.00	
Wilcoxon W	880.0		1758.0		1548.5		1586.0	
Z	-7.859		-2.262		-2.17		-3.73	
Asymp, Sig, (2 tailed)	0.000		0.024		0.030		0.000	

First, the ETL – SA G showed significance between U and SU, however, the results reflect that U median is smaller than SU median (in a negative direction) and thus, the null hypothesis is accepted.

The SA – CR G showed significance between U and SU. The U G is greater than the SU G. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted.

The CR – SI G showed significance between U and SU. The U G is greater than the SU G. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted.

The IQI showed significance between U and SU. The U IQI is greater than the SU IQI. Thus, the null hypothesis is accepted.

NAIC#: 334510, 334516, 334517, 334518, 334519, Industry Sector: Electromedical and Electrotherapeutic Apparatus Manufacturing, Irradiation Apparatus Manufacturing, Watch, Clock, and Parts Manufacturing, Analytical Laboratory Instrument Manufacturing, Other Measuring and Controlling Device Manufacturing

Table 19

Mann-Whitney Test: NAICs 334510, 334516, 334517, 334518, 334519

334510	ETL-SA Gap		SA-CR Gap		CR-SI Gap		IQI	
	Suburban	Urban	Suburban	Urban	Suburban	Urban	Suburban	Urban
N	16	12	16	12	16	12	16	12
Mean	-0.43	-0.63	0.01	-0.01	0.91	0.14	38.34	18.50
Median	-0.51	-0.63	-0.13	-0.15	0.84	1.87	24.71	23.01
Mann-Whitney U	0.00		90.50		78.00		70.00	
Wilcoxon W	78.0		168.5		214.0		148.0	
Z	-4.458		-0.255		-0.836		-1.209	
Asymp, Sig, (2 tailed)	0.000		0.802		0.423		0.241	

Utilizing the Mann-Whitney Test, Table 17 indicates that there is significance for the ETL – SA G between U and SU in this specific NAIC group. However, when viewing these results, care must be given because the sample size is smaller than the Mann Whitney test recommends for accurate measurement.

In this NAIC, none of the other variable tests reflected significance.

NAIC#: 334413 Industry Sector: Semiconductor and Related Device Manufacturing

Table 20

Mann-Whitney Test: NAIC 334413

334413	ETL-SA Gap		SA-CR Gap		CR-SI Gap		IQI	
	Suburban	Urban	Suburban	Urban	Suburban	Urban	Suburban	Urban
N	12	15	12	15	12	15	12	15
Mean	-0.56	-0.37	0.08	0.30	1.02	-0.47	51.40	41.85
Median	-0.61	-0.37	0.10	0.14	1.00	-0.58	21.02	46.12
Mann-Whitney U	0.00		54.00		41.00		43.00	
Wilcoxon W	120.0		132.0		161.0		163.0	
Z	-4.394		-1.76		-2.39		-2.35	
Asymp, Sig, (2 tailed)	0.000		0.079		0.016		0.019	

Utilizing the Mann-Whitney *U* test, Table 18 indicates that ETL – SA G, and CR-SI G, both showed significance between U, and SU, in this specific NAIC group. However, again, the sample size is small and thus interpretations are limited.

NAIC#: 334220 Industry Sector: Radio & Telev. Brdcstng & Wireless Comm. Eqpmt Mfg

Table 21

Mann-Whitney Test: NAIC 334220

334220	ETL-SA Gap		SA-CR Gap		CR-SI Gap		IQI	
	Suburban	Urban	Suburban	Urban	Suburban	Urban	Suburban	Urban
N	9	10	9	10	9	10	9	10
Mean	-0.75	-0.91	0.14	0.37	0.77	0.50	28.02	74.88
Median	-0.74	-0.91	0.15	0.51	1.07	0.76	12.31	48.99
Mann-Whitney U	0.00		29.00		38.00		31.00	
Wilcoxon W	55.0		74.0		93.0		76.0	
Z	-3.674		-1.31		-0.57		-1.14	
Asymp, Sig, (2 tailed)	0.000		0.211		0.604		0.278	

Utilizing the Mann-Whitney *U* test, Table 19 indicates that only the ETL – SA G showed significance in differences between U, and SU, in this specific NAIC group. And, like the previous two tables, the sample size is small, and thus interpretations are limited.

RQ.5 What are the relationships among strategic posture (ETL–SA G, SA-CR G, CR-SI-G), Innovation Quality Index (IQI) and Profitability (P) for ICTs located in urban areas (U) and suburban areas (SU)?

H.0: U-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI = SU-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI

H.1: U-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI < SU-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI

The hypothesis suggests that the combined strategic posture (SA-G, CR-G, SI-G), and Innovation Quality Index (IQI), will deliver a higher degree of optimal ICT performance (net profitability (P)), in suburban geographies than urban. Of course, if this aggregate theory is found to be true, it would provide significant understanding of the foundations underneath ICT location choice. However, the results of this research do not support that theory.

When measuring the aggregate equation of strategic posture (variables noted above), with the dependent variable of performance (profitability (P)), the previously aforementioned statistical conflict arises. It is the challenge of positioning ordinal data (intervening variables (gaps)) against linear data (moderating variable – IQI, and the dependent variable – profitability (P)), to secure an accurate measure of the relationships. As a result, a General Linear Model Regression (GLM), was used to test for significance against the dependent variable.

The test was conducted to see if the dependent variable, as measured by the three year average of net profit, has any relationship to the SA, CR, SI gaps and the IQI, while controlling for location (urban (U), and suburban (SU)).

Table 22 shows the results of this analysis.

Table 22

General Linear Model Regression:
Strategic Posture + IQI Regressed Against Profit in Urban and Suburban Areas

Urban: Dependent Variable: Profit			Suburban: Dependent Variable: Profit	
	Sig			Sig
CR/SI Gap	0.600		CR/SI Gap	0.002*
ETL/SA Gap	0.174		ETL/SA Gap	0.100
SA/CR Gap	0.366		SA/CR Gap	0.990
IQI	0.137		IQI	0.727

The only variable that proved to be significant at the 95% confidence level, was the CR-SI G in suburban areas. Given this finding, it is hard to draw substantive conclusions from the analysis. However, more will be discussed about this finding in Chapter 5.

One possible explanation for this result, is the high negative net profitability registered for a preponderance of the ICTs. To illustrate further evidence of the results that showed no relationship between the variables and ICT performance (profitability (P)), Table 23 below reflects just how embedded negative net profit performance is amongst these firms. The mean 3-Year Average Net Profit for all ICTs in the study is -$1.7 million.

Table 23

Mean and Standard Deviation of Variables

Variable	N	Min	Max	Mean	Std. Dev
Environmental Turbulence / Strategic Aggressiveness Gap	201	-1.74	1.74	.0458	.94844
Strategic Aggressiveness / Capability Response Gap	201	-1.65	2.03	0.0965	0.5087
Capability Response / Strategic Investment Gap	201	-2.2	3.8	0.7409	1.44429
Innovation Quality Index	201	-22.67	348.11	41.9246	60.55059
3-Year Average Profit (Performance)	201	*-$271,860,000*	$109,961,333	*-$1,699,425*	$41,385,701
Total Revenues	201	$30,521,000	$491,625,000	$229,843,078	$129,031,462

After uncovering non-significant results when measuring the impact of targeted variables against ICT performance (profitability (P)), the Pearson Correlations were examined against all linear variables. These factors are sub-elements of the variable computations that resulted in the primary measurements of the study.

Table 24

Pearson Correlations of Linear Variables to 3-Year Profit vs. Revenue

		Pearson Corr	Sig (2-tailed)	
Total Revenue	Number of Employees	0.37	0.000	
Total Revenue	R&D spending	0.468	0.000	
Total Revenue	% Tech Employment	0.115	0.113	no correlation
Total Revenue	Workforce availability	-0.61	0.388	no correlation
Total Revenue	Innovation Quality Index	-0.045	0.522	no correlation
Total Revenue	Home Ownership Index	0.291	0.000	
Total Revenue	Arts, Entertnmnt & Recreation Index	-0.075	0.292	no correlation
Total Revenue	Primary Secondary School Quality Index	0.231	0.001	
Total Revenue	Quality of Life Index	-0.022	0.755	no correlation
Total Revenue	Three Yr Avg Profit	0.094	0.186	no correlation
Three Yr Avg Profit	Number of Employees	0.057	0.421	no correlation
Three Yr Avg Profit	R&D spending	0.104	0.142	no correlation
Three Yr Avg Profit	% Tech employment	-0.009	0.901	no correlation
Three Yr Avg Profit	Workforce availability	0.021	0.764	no correlation
Three Yr Avg Profit	Innovation Quality Index	0.077	0.279	no correlation
Three Yr Avg Profit	Home Ownership Index	0.046	0.521	no correlation
Three Yr Avg Profit	Arts, Entertnmnt & Recreation Index	0.056	0.428	no correlation
Three Yr Avg Profit	Primary Secondary School Quality Index	0.065	0.362	no correlation
Three Yr Avg Profit	Quality of Life	0.069	0.328	no correlation

Table 24 reveals that ICT performance (profitability (P)), is not correlated to any of the linear factors used to construct the variables, including total revenues. However, a different picture emerges when examining total revenue (a top line element of ICT performance). The analysis shows that these factors: of number of employees, actual R&D spending, home ownership, and primary/secondary education quality (PEQI), are positively correlated. Total revenues were not a targeted measure of this study; however, in an attempt to uncover all potential causalities of the results, multiple examination paths were pursued.

In an effort to conduct a complete analysis, and to identify the relationships among the ordinal variables, Spearman's rho correlations are listed in Table 25 below:

Table 25

Spearman's rho Correlations of Ordinal Variables

		Correlation	Sig (2-tailed)
Environmental Turbulence	Strategic Aggressiveness	0.092	0.192
Environmental Turbulence	Capability Response	-0.078	0.274
Environmental Turbulence	Strategic Investment	0.001	0.994
Strategic Investment	Strategic Aggressiveness	0.267	0.000*
Strategic Investment	Capability Response	0.104	0.141
Capability Response	Strategic Aggressiveness	0.272	0.000*
SA / CR Gap	ETL / SA Gap	-0.083	0.243
SA / CR Gap	CR / SI Gap	-0.313	0.000*
CR / SI Gap	ETL / SA Gap	0.270	0.000*

N = 201 * Significant

As the table indicates, even though four variable relationships produced significant correlational results, the degree of significance was insufficient to draw any meaningful conclusions.

Aggregate ICT Analysis - Findings and Observations

The findings of each hypothesis test are analyzed below.

ETL – SA G

Ansoff's Strategic Success Hypothesis states that *for optimum potential performance, three conditions must be met.* One of those three is that *aggressiveness of the firm's strategy must match the turbulence of the environment.* In RQ1, Hypothesis 1 suggests that the environmental turbulence/strategic aggressiveness gap in urban geographies will be larger than those found in suburban locations. In other words, that for any number of reasons, environmental turbulence is higher in urban locations than suburban. If true, it would suggest one potential causality for ICTs moving into suburban areas at a higher frequency than urban.

The hypothesis was not supported because while the observed ETL – SA G difference between U and SU is highly significant ($p < .001$, $U = 23.5$, $Z < -1.96$). The U G is less than the SU G. Therefore, the null hypothesis is accepted. This finding is consistent with Ansoff and the literature, which argue that ETL is a function of industry sector and the characteristics of that sector's environmental factors, rather than location. And while strategic aggressiveness can be influenced by multiple factors, including location, it would appear that in this research sample, ETL influenced the equation the most. Further, a simple deduction can be made that the NAICs (industry sectors) represented in the urban sample population happen to be less turbulent than those represented in the suburban sample.

SA-CR G

The Ansoff Hypothesis also states that the responsiveness of the firm's capability match the aggressiveness of its strategy. In RQ.2, Hypothesis 1 suggests that the strategic aggressiveness/capability response gap in urban geographies will be larger than those found in suburban locations. It suggests that a strategic misalignment is more likely to be found in urban ICTs than suburban. Again, this could convey a potential causality of an expectation that urban ICTs are more likely to under-perform. In this instance, the statistical analysis supports that theory.

The measurement did show significance. The Mann-Whitney *U* test showed significance between U and SU ($p < 0.05$, $U = 4177$, $Z = -2.116$). What the finding suggests is that urban ICTS are more likely to insufficiently develop or possess capability response that matches the strategic portfolio they are attempting to advance in their given environment. Possible causes for this insufficiency have multiple potential explanations, some of which will be explained in greater detail in Chapter 5. However, one path of reasoning might include research that shows variations in the scale of resources to which urban ICTs might have access, from which sufficient capability response can be developed. That potential is particularly possible with those on the smaller side of the small-to-medium-sized enterprises (SMEs) sector. The empirical research of Kipley and Lewis, confirmed both implicit as well as explicit value emerging from the application of Ansoffian principles in a range of enterprise types and sizes, including SMEs (Kipley & Lewis, 2009).

Other reasons for the significance are suggested in analysis of the raw data. For example, when analyzing specific elements of aggressiveness and capability response measures in urban ICTs, misalignments are identified that contribute to potential capability response dysfunctions or inadequacies.

CR – SI G

The third condition that must be met to achieve optimal performance, e.g. *profitability*, is that the components of capability must be supportive of one another. What that means is that the strategic investment level must be sufficient to achieve profitability for the enterprise. If the CR – SI G is too large, the enterprise is unable to achieve optimal performance. In RQ.3, Hypothesis 1, like the previous two hypotheses, suggests that urban ICTs are likely to experience performance levels below their suburban counterparts. That is, the U CR – SI G will be larger than the SU CR – SI G

Again, the Mann-Whitney *U* test was used to determine the relationship. The measurement showed the median for U-(CR – SI G), 0.32, is smaller than the median for SU-(CR – SI G), 1.17. The test confirmed that there is a significant difference between U and SU ($p \leq .001$) The U G is less than the SU G Therefore, the null hypothesis is accepted.

The data did not reveal any substantive reasons that sufficiently explain why the U-(CR – SI G) was smaller than the SU-(CR – SI G). However, there were anecdotal inferences that merit mention regarding the strategic conditions found in both groups.

Analysis of numerous individual ICTs, revealed that many 1) generated insufficient revenue to apply the appropriate level of strategic investment to optimize performance; 2) some firms made the strategic choice to heavily invest in marketing to shore up deficiencies in strategic aggressiveness, at the expense of appropriate strategic investment; and 3) other firms were making solid strategic investments in raw dollar amounts, but not at appropriate levels as a percent of total revenue, compared to leading ICTs in their industry. As a result, performance lagged.

U-IQI < SU-IQI

The Innovation Quality Index or IQI, is a measure of selected components strongly supported in the literature as influencing ICT performance. The two primary elements, Workforce Availability (WA), and Quality of Life (QOL), have significant bearing on strategic location choice, because of their impact on the ICT's ability to attract the requisite executive talent, and strategic skill sets necessary for optimal performance.

In RQ.4, Hypothesis 1 suggests that innovation quality will be better in suburban geographies than urban, which would be one potential causality for ICTs moving into suburban areas at a higher frequency than urban.

The Mann-Whitney *U* test showed a statistically significant difference ($p < .001$) in the Innovation Quality Index (IQI), between the urban, and suburban areas. Both the median and the mean values of the IQI were higher in the urban areas, than the suburban.

These results suggest that IQI is better in urban areas. The U IQI is greater than the SU IQI. Thus, the null hypothesis is accepted. Given common perception that exists within tech sector industry circles, this finding, which will be discussed in greater detail in Chapter 5, was rather surprising. However, as explained above, results of high standard deviation values in both mitigate the ability to make solid conclusions.

U-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI < SU-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI

In RQ5, H1 suggests that the combined strategic posture (SA-G, CR-G, SI-G), and Innovation Quality Index (IQI), will deliver a higher degree of optimal ICT performance (net profitability (P)), in suburban geographies than urban. Of course, if this aggregate theory is found to be true, it would provide significant understanding for the foundations underneath ICT location choice. However, the results of this research do not support that theory.

As indicated above, only the CR-SI G variable proved to be significant. There is insufficient evidence to draw any meaningful conclusions from this finding. Perhaps if other factors are added to the research, which will be addressed in the discussion regarding opportunities for future research below, they may shed further light on potential relationships that might emerge.

Chapter Summary

It was rather surprising that several findings were discovered that defied conventional thinking about ICT location choice. First, when considering ETL – SA G, significance was found, however, the urban gap was less than the suburban.

The CR – SI G, also defied conventional perceptions, registering lower measures for urban than suburban. And, the Innovation Quality Index (IQI), perhaps one of the most conventionally embedded presumptions among ICT business executives, was found to be higher in urban areas than in suburban. These are all findings that may merit additional research.

Consistent with the research assumptions, the gaps between capability response aligning with strategic aggressiveness (SA-CR G), was found to be higher in urban areas than suburban, There are numerous reasons that might explain this outcome, that will be discussed in Chapter 5.

The level of strategic investment (CR – SI G) sufficiently supporting capability response, also defied expectations. It showed gaps that were lower in urban areas than suburban. This finding also, will be discussed in the next chapter.

Although clouding the finding a bit, were high standard deviation values, the Innovation Quality Index (IQI), challenged conventional perceptions, by registering a higher IQI in urban areas than suburban. This finding will be discussed further in Chapter 5.

Finally, the aggregate strategic posture variable set (intervening), combined with the Innovation Quality Index (IQI) (moderating), did not show significance when measured as a function of the dependent variable, profit (P). As previously indicated, there is ample literature supporting the Ansoff Success Hypothesis, that argues an affirmative relationship between the strategic posture variables, and performance (profitability). In this research, it is not clear if the addition of a moderating variable (IQI), influenced the outcome or not. Again, this may be an issue upon which to isolate additional research.

Chapter 5

SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

This chapter presents the Research Summary, and Conclusions and Discussion. Further analysis and discussion of the findings presented in Chapter 4 are detailed. The Research Implications, relative to strategic management, business development, and public policy are discussed. Finally Recommendations for Future Research are presented.

Research Summary

The Research Summary includes the Problem, Assumptions, and Limitations. It also includes the Literature Review Summary. That is followed by the Methodology Summary, Findings Summary, Contributions to the Academic Field of Strategic Management, and Contributions to the Practice of Management.

Problem, Assumptions, and Limitations

The purpose of this research has been to analyze the underlying factors that drive location choice by decision makers leading U.S. technology firms (ICTs). The specific focus targets the distinctions in strategic behavior, relative to environmental conditions that exist within urban centers compared to suburban areas. The impetus for the research is an awareness of the presence of chronically high unemployment, caused by a severe lack of economic activity leading to job creation in urban areas. It is coupled with recognition of the stark reality, that there is a rather glaring absence of urban companies involved in modern technology development. The key assumption underlying the research is that if ICTs were to locate in these urban centers, their mere presence could ignite significant economic development that has the potential to mitigate the current challenges facing those communities.

Ample research has been conducted on the factors that drive technology clustering in the U.S., i.e. Feldman, and Florida, 1994; Devol, 1999, Boschma, 2005; Onsager, Isaksen, Fraas and Johnstad, 2006; and Wennberg and Lindqvist, 2010; to highlight some of the more notable work that has been done. However, little research has been focused on the combined impact of strategic behavior and location choice on economic development potential in areas with chronic high unemployment.

Using *Ansoff's Strategic Diagnosis* methodology (Ansoff, 1990) as the primary lens through which an examination of this dynamic was made, the essential questions being asked are: *do key strategic behavioral factors widely reported in the literature, that either influence or are determinant of enterprise performance, manifest differently between these two geographic environments?*

Additionally, and beyond conventional strategic factors, the research also asks: *do newly emerging dynamics, like those found to help enhance the potential for strategic innovation, such as workforce availability and development, and quality of life issues, have any bearing on executive decision making regarding ICT location choice?* These questions were measured by examining the relationship between specific strategic factors and their impact on enterprise performance, as defined by net profitability. The over-arching assumption applied to the research questions were that generally, these strategic behavioral factors render a poorer performance in urban areas than suburban, because of widely *perceived* inherent environmental deficiencies found in urban centers. That assumption was expanded to also include that this *perceived,* but consistent outcome tendency is the reason why so many ICTs locate in suburban rather than urban areas.

Literature Review Summary

An extensive review of the literature was conducted in order to develop a comprehensive understanding of the theory supporting the foundation for each of the research variables. That review included multi-directional analysis of the literature, relative to any potential relationships among the research variables and their implications. The goal was to determine how previous research might impinge upon the unique considerations targeted in this model.

A literature review was conducted on classical strategic management theory, strategic aggressiveness, strategic aggressiveness in ICTs, and strategic aggressiveness and location.

The literature was reviewed on classical management capability theory, capability response in ICTs, and the relationship between capability response and innovation.

The literature was reviewed on strategic investment, strategic investment and innovation, and strategic investment in ICTs.

The literature was also reviewed on environmental turbulence, strategic aggressiveness and environmental turbulence, and environmental turbulence among ICTs.

The literature was reviewed on classical location choice theory, and location choice and ICTs. Included as subsets of that literature review were innovation quality and quality of life elements.

And finally, a literature review of profitability and profitability in ICTs was conducted.

Methodology Summary

In order to draw a sufficient sample population for statistical analysis, a sampling of firms characterized as small-caps, ranging in size from $25 million in annual revenue to $500 million, were randomly selected from a public company database (Mergent Online). After further analysis, that sampling was reduced to a total of 201 companies, of which a total of 98 were located in urban areas, and 203 were located in suburban areas, each category with specific geographic definitions (as defined in Chapter 1).

Research was conducted relying almost entirely on secondary data readily available in numerous databases that focus on public companies, public filings, targeted enterprise websites, and a range of other information and media sources.

Statistical analysis using the Kolmogorov-Smirnov test for normalcy, non-parametric Mann-Whitney test, General Linear Model Regression (GLM), Spearman's rho correlations, and Pearson Correlations, were all included in the research.

Findings Summary

The results of the research yielded varied outcomes. Some aligned with expectations; however, others were rather surprising. When measuring the relationships between environmental turbulence and strategic aggressiveness, two factors that should align, according *to Ansoff's Strategic Hypothesis*, the identified gaps reflecting imbalance were higher in suburban areas than urban. The relationship between ICT strategic aggressiveness and response capability, another key factor in the Ansoff Success Hypothesis, one that should also reflect alignment, found that indeed, the gaps were higher in urban areas than suburban as expected.

Given the widely documented challenges facing small-to-medium-sized enterprises (SMEs), and particularly those located in urban centers, relative to access to capital, the measure of strategic investment aligning with capability response was somewhat of a surprise. It revealed that the gaps in urban ICTs were lower than those in suburban locations.

Perhaps the most surprising finding was the linear measure of innovation quality, as reflected in the Innovation Quality Index (IQI). It is a measure of workforce availability in each geographic location, combined with quality of life factors. Each element in these measures has been found in the research to have a bearing on ICT performance, specifically, strategic innovation thrust, which can result in enterprise competitive advantage. Since ICTs have consistently located in areas around urban centers, but clearly outside them, the general consensus has long been that workforce quality, and quality of life elements such as K-12 reading comprehension and math proficiency, and housing, are far better in these suburban areas. However, in this research, to be discussed more in this chapter, the IQI was found to be better in urban areas than suburban.

The final hypothesis positioned an aggregate measure of strategic posture variables plus the IQI, as a function of the dependent variable, net profitability (P), defined as the three-year average in the research. No relationship between these strategic behavior factors, with IQI added, and strategic enterprise performance (P), could be found in this research. There are a number of explanations that can be offered for this finding, which will be discussed in further detail below.

The strategic thinking that results when considering the entirety of the research is that, contrary to conventional perceptions, there is not a preponderance of evidence that supports the proposition that urban ICTs perform worse than suburban. Rather, the research points to a range of factors that might help explain some of the findings. It suggests that enterprise performance is influenced by environmental conditions, industry dynamics, and elements inherent to the strategic portfolio possessed by an ICT in and of itself. Greater detail on these divergent realities is provided in this chapter.

Contributions to the Academic Field of Strategic Management

The expected contributions of this research to academic knowledge, were to provide empirical evidence about the relationships among specific strategic behavior variables, environmental turbulence, and innovation quality, relative to enterprise performance, as represented by profit (P). It also sought to determine the relationship among those outcomes and location choice of high-technology firms discriminating based on geography.

Contributions to the Practice of Management

The expected contributions and applications to the practice of management, focused on providing additional clarity, relative to strategic enterprise location choice, and the factors that lead to optimal performance, and competitive advantage.

Conclusions and Discussion

In discussing the conclusions associated with the findings of this research, it begins with the results of hypotheses that aligned with the basic assumptions presented.

Predicted Results

There was only one hypothesis that, after statistical analysis, produced expected results:

RQ.2 What is the relationship among strategic aggressiveness (SA) and capability response (CR) for ICTs located in or near urban centers (U).

H.1: U-(SA – CR G) > SU-(SA – CR G)

The Hypothesis suggests that a strategic misalignment is more likely to be found in urban ICTs than suburban. This finding could convey a potential causality of an expectation that urban ICTs are more likely to under-perform. In this instance, the statistical analysis supports that theory. The measurement did show significance. The Mann-Whitney U test showed significance between U and SU ($p < 0.05$, $U = 4177$, $Z = -$

2.116). What the finding suggests is that urban ICTS are more likely to insufficiently develop or possess capability response that matches the strategic portfolio they are attempting to execute in their given environment.

It is widely accepted from the literature and amongst business leaders and policy-makers, that small businesses have significantly high failure rates. According to the U.S. Census Bureau's Business Dynamics Statistics, the five year enterprise survival rates in three sectors that contain high ICT concentration are reported as follows: services 47.6 percent, communications 39.4 percent, and manufacturing 49.4 percent. The official definition of small businesses, used by the U.S. federal government and most state governments, is any enterprise with 500 or less employees (U.S. Census Small Business Data).

In this research, an analysis of the urban and suburban ICT sampled, reveals that not a single suburban ICT (0 percent) had an employee population less than 500 employees out of 103 companies; most had considerably more. By contrast, there were 31 out of 98 urban ICTs, or 31.6 percent, that had 500 or more employees. So, in this sampling, more than two thirds of urban ICTs qualify as small businesses. This would also suggest that they are more than two thirds as likely to reside in a high failure rate sector, than suburban ICTs.

To explain this dynamic a bit further, all ICTs are compelled to execute intense strategic aggressiveness behavior in order to be competitive, because the industry sectors and environments in which they participate are change intense. However, as this finding reflects, urban firms are less likely to have the resources required to develop sufficient response capability, that appropriately aligns with their strategic aggressiveness measure.

Much has been written about urban small businesses generally, being subject to high early failure due to a lack of capital. This is an area not targeted in this research, and can be explored in the literature. However, the strategic enterprise profiles found in this sampling, provides additional evidence that supports some of the reasons urban ICTs do not perform at the same level as their suburban counterparts.

Further, and more specifically, as discussed in the literature, Onsager, Isaksen, Fraas, and Johnstad, conducted research specifically targeting innovation capability, and its relationship to ICT clustering. What they found, in a study of technology firm clustering in four Norwegian cities, is that several conditions should be present in order for firms to optimize their own internal development of innovation capability. They found that the conditions for innovation knowledge flow sharing, are more optimally encouraged and motivated. when firms are in the same or similar industries, surrounding similar technologies (Onsager, Isaksen, Fraas and Johnstad, 2006). Considering earlier research, that identified the need for the building of trust and reciprocity (Boschma, 2005), they found that low knowledge sharing flows within the clusters, caused by enterprise industry differentiation, or a lack of trust and reciprocity, resulted in lower, or less optimal innovation capability development within the firms.

Also in the literature review, it was noted that just about all of the major clustering in the U.S., has occurred near major urban areas, but clearly in the suburbs outside of them. Examples of major U.S. clusters would include the Boston-Cambridge cluster, which is driven in large part by its close proximity to Harvard University, and the Massachusetts Institute of Technology (MIT). Note that the real clustering dynamic is anchored outside of Boston and not in it. A recent Boston Globe report covered a new initiative launched by the Boston mayor, in an effort to stimulate economic energy, that targets cluster development within the city of Boston itself (Boston Globe, 2011). The report indicates that it has been a slow process because of the shadow impact of the Cambridge cluster, which is widely considered the most attractive location in the greater Boston area for such work.

This example illustrates the challenge that urban ICTs have when competing for talent, as just one element of innovation capability response. There is very little clustering activity occurring in urban centers, and clustering enhances ICT capability response development. Similar efforts are present in Los Angeles, and San Francisco, which, like the Boston initiative and its subordinate status to Cambridge, is overshadowed by the significant, and globally dominating presence of Silicon Valley.

Wennberg and Lindqvist, found that agglomeration by sector, otherwise known as "clustering," was responsible for strong enterprise performance (2010). They amplified existing literature, regarding the theory that clustering enhances capability response, as a result of the formation of *agglomeration economies.*

A raw data analysis of two key elements of the capability response assessment conducted in the research, *Managerial Skill Set Alignment Quality*, and *Executive Team Tenure*, showed only marginal differences between ICTs in urban, and suburban locations. Absent a significant difference in these two key elements of capability response, the analysis would appear to elevate the causality weighting of the lack of urban clustering, as a key consideration in understanding why the capability response gap (SA – CR G) was higher in urban areas than suburban. And, if access to capital is added to that dynamic, urban ICTs are unable to leverage what little capital they do control, due to the absence of agglomeration economies that result from tech clustering.

Unexpected Results

These results are somewhat surprising because in some cases, even though significance was found, it was pointed in the opposite direction of the hypothesis, suggesting unique realities.

RQ.1 What is the relationship among environmental turbulence level (ETL) and strategic aggressiveness (SA) for ICTs located in or near urban centers (U) and suburban locations (SU)?

H.1: U-(ETL –SA G) > SU-(ETL –SA G)

The observed difference between U and SU is highly significant ($p < .001$, $U = 23.5$, $Z < -1.96$). The U G is less than the SU G. The Hypothesis suggests that a strategic misalignment between the environmental turbulence level and strategic aggressiveness is more likely to be found in urban ICTs than suburban. This finding could convey a potential causality of an expectation that urban ICTs are more likely to under-perform. In this instance, the measurement did show significance. However, it was contrary to the anticipated hypothesis. The gap between the environmental turbulence level and strategic aggressiveness was higher (ETL –SA G) in suburban areas than urban.

It should first be noted that environmental turbulence levels (ETL) are not correlated to location. As previously indicated, the Ansoff Strategic Hypothesis defines environmental turbulence (ETL) as the combined measure of the *changeability,* and *predictability,* of the firm's environment (Ansoff, 1990). These two dimensions are each divided into two sub-level characteristics. Changeability is divided into 1) *complexity* of the firm's environment; and 2) relative *novelty* of the successive challenges the firm encounters in its environment. Predictability is divided into 1) *rapidity of change*-speed of the evolution of challenges in the environment and the firm's response time; and 2) *visibility* of the future-an assessment of the adequacy and timeliness of information about the future. The measurement of each of those elements is combined and averaged. The measure is then plotted on a five-level turbulence scale that ranges from the low turbulence level of repetitive, to the high turbulence level of surpriseful.

More specifically, as stated in the literature review: The literature widely and consistently advances analysis that strongly suggests environmental turbulence levels in the technology sector tend to be higher than in most other industries. High turbulence in this sector is triggered by the constant pace of change which, in and of itself, is driven by a high degree of product innovation as the basic nature of the industry. This high innovation intensity, contributes to high market uncertainty, and environmental complexity, two key characteristics of turbulence. Further, distinctions between technological turbulence, and market turbulence, can add even more complexity to an already complicated environment. So, the finding that the urban ETL was lower than the suburban is not driven by the geographic location.

It should also be noted that analysis of the raw data on environmental turbulence – strategic aggressiveness gaps (ETL – SA G), reveal only a small number of ICTs having gaps that exceed 1.75, which is the threshold suggested in Ansoff theory to begin having a negative impact on strategic enterprise performance (Ansoff, 1990). Most of the gaps were fractional (under 1.0), and thus relatively insignificant. So, though significance was found between urban ICTs and suburban ICTs, even with the unanticipated finding that the gaps were lower for the urban sample, the gap level intensity does not promote significant causal findings.

RQ.3 What is the relationship among capability response (CR) and strategic investment (Budget) (SI) for ICTs located in urban areas (U) and suburban locations (SU)?

H.1: U-(CR – SI G) > SU- (CR – SI G)

The measurement showed the median for U-(CR – SI G): 0.32 is smaller than the median for SU-(CR – SI G): 1.17. The test confirmed that there is a significant difference between U and SU ($p \leq .001$) The U G is less than the SU G. In this instance, the most plausible explanation for these outcomes is an issue of scale.

Analysis of the raw data, revealed some interesting dynamics, relative to strategic investment (SI). In the suburban sample, the average strategic investment was 9.8 percent of total revenue. In the urban sample, the average strategic investment was 14.9 percent of total revenue, or approximately 52 percent higher, a significant difference. However, even though the urban average strategic investment ratio was higher, which would account for smaller gaps when compared to capability response (CR), the average amount of actual investment capital made by suburban ICTs was equal or higher in volume.

This difference can be attributed to analysis of urban ICTs, which were found in the research to often be compelled to utilize nearly all available capital in their operating budget for strategic investment, merely to keep pace in a fast-paced, highly competitive environment. And, just as in the case of the capability response measure, the pattern has been that the scale of dollars available to urban firms (mostly small businesses), is less than suburban.

The research also found that in many cases, again due to scale, suburban firms may have made low percentage strategic investments, but in high dollar volumes, and leverage the luxury of being able to divert significant capital to aggressive marketing, a component of the strategic aggressiveness measure. So, while the urban percentages of strategic investment were higher, making them more optimally align with the capability response measure and limiting gap exposure, the capital outlays of suburban ICT strategic investment were in reality, just as high, and often much higher, but less as a percent of total revenue, thus creating larger gap exposure.

RQ.4 What is the relationship among the Innovation Quality Index (IQI) and Location for urban (U) and suburban areas (SU)?

H.1: U-IQI < SU-IQI

The results show there is a statistically significant difference ($p < .001$) in the Innovation Quality Index (IQI) between the urban and suburban area samples included in the research. Both the median, and the mean values of the IQI, were higher in the urban areas than suburban. These results suggest that IQI is better in urban areas. The U IQI is greater than the SU IQI. Thus, the null hypothesis is accepted. However, it should be noted that mitigating any potential meaning of these measures, is a finding of high standard deviation values in both.

It should be noted that the Innovation Quality Index (IQI) was developed by combining a series of validated factors in each element, to craft a customized variable measure. The factors have been validated in previous research discussed in the literature review. And by no means is the IQI intended to be an exhaustive measure characterizing all of the factors that might determine the worthiness of selection choice bias. This variable measure focused on two key factors validated to contribute to innovation capacity, which, according to the literature, play a significant role in the location selection choices of ICT decision makers.

The first key element of innovation quality contained in the IQI is the Workforce Availability Index (WAI), which is a measure of two key sub-elements: the availability of Workers With Requisite Skills (WRS), and the Technology Education Accessibility Index (TEAI). These measures assess whether or not some of the fundamental conditions and resources needed to optimize innovation development and execution are present in a given location.

The second key element of innovation quality contained in the IQI is the Quality of Life Index (QLI), which is a measure of three key sub-elements: the Home Ownership Index (HOI), Arts, Entertainment & Recreation Index (also referred to as so-called *third places*) (AERI), and the Primary/Secondary Education Quality Index (K-12) PEQI.

To understand the differences in IQI between urban and suburban ICTs, the raw data for each was analyzed. That analysis shows that while the overall IQI for urban areas is higher than suburban, the majority of the variable component measures favor suburban areas. However, there are two significant and important variable component measures that favor urban areas, and merit further consideration beyond the scope of this research relative to ICT location choice.

Table 26 below reflects the raw data scores of the two key elements and also the sub-elements. A combination of means and in some cases mean variance factor computations, of each variable component comprises the Innovation Quality Index.

Table 26

Components of Innovation Quality Index

	Urban	Suburban
	Mean	
IQI Score	50.44	33.82
Workforce Availability Index (WAI)	39.41	9.61
Tech Employment % Population	7.96	9.64
Accessible Tech Schools and Universities	19.72	9.28
Quality of Life Index (QLI)	61.46	58.04
Home Ownership Percent	46.53	64.75
Arts, Entertainment & Rec. Estab.	1203.15	797.97
Reading Comprehension	60.62	74.73
Math Comprehension	61.39	69.75

Workforce Availability Index (WAI). This index measures two key variable components that enhance innovation creation and development: Workers With Requisite Skills (WRS) and the Technology Education Accessibility Index (TEAI). The indexes used in the research are a measure of mean variance computation. However, here, the raw mean scores are considered.

WRS is represented in the raw data as Tech. Employment as a percent of Population for the geographic area. Table 26 indicates that the mean scores are 7.96 for urban areas and 9.64 for suburban locations in the samples taken for this research. Those mean scores are consistent with the basic assumptions that serve as the research foundation, namely, that there is an ICT suburban location choice bias that would consequently yield a higher population percentage of tech workers. It was also noted in the capability response hypothesis discussion, that the average number of employees in the suburban sample was higher than the urban sample, a relationship consistent with the tech employment finding.

The Technology Education Accessibility Index (TEAI) is represented in the raw data as the number of accessible technical schools and universities in the given geographic area. Table 26 indicates that the mean scores are 19.76 for urban areas and 9.28 for suburban locations in the research samples. This is a significant finding because research provides substantive evidence that science, technology, engineering, and math education, now commonly referred to as STEM (STEM Education Coalition, 2012), is considered a vital component of ICT workforce development.

Currently, and a trend that has existed for a rather long time, is the consistent concern heard from ICT executives that they struggle to find sufficient tech employees with the requisite skills necessary to carry out their respective strategic business models. And while an examination of clustering throughout the U.S. does show that some, if not many of the most prestigious universities and research institutions are located in suburban geographies, this sampling data suggests that the dense concentration of technical schools and universities in urban locations exceeds that of suburban. Put another way, this research, which does include virtually all major technology centers and clusters in the U.S. nationwide, shows that there are simply more STEM institutions in urban areas than suburban. This is a factor worthy of significant consideration from ICT decision makers relative to strategic location choice. It will be discussed further in the Implications section of this thesis.

The significant difference in the Technology Education Accessibility Index (TEAI) between urban and suburban areas appears to skew the WAI toward an urban bias. That result would suggest that perhaps a higher level of consideration should be applied to technology education when considering ICT location choice, because it is an essential building block of technology eco-infrastructure development. Of course, and as previously indicated, there are factors that influence ICT location choice that are not targeted in this research, that may have the effect of mitigating the urban TEAI advantage, i.e., crime rates, insurance and other enterprise operating costs, etc..

Quality of Life Index (QLI). This index measures three key variable components that enhance innovation creation and development: the Home Ownership Index (HOI), Arts, Enter. & Rec. Index (AERI), and the Primary/Secondary Education Quality Index (K-12) PEQI. Two of the three indexes used in the research are a measure of mean variance computation. However, here, the raw mean scores are considered.

Home Ownership (HOI) is represented in the raw data as a percent of the population owning homes for the geographic area. Table 26 indicates that the mean scores are 46.53 for urban areas and 64.75 for suburban locations in the samples taken for this research. Those mean scores are consistent with the basic assumptions that serve as the research foundation, namely, that there is an ICT suburban location choice bias that perhaps is bi-directional in its evolution. From one perspective, an argument might be made that it is easier for ICTs to attract high quality talent when located in or near neighborhoods that are composed of higher-income individuals and families that results in a higher population percent that own homes. Characteristics such as safe, stable, and more aesthetically attractive, are just some of the features commonly associated with high percentage home ownership suburban neighborhoods. A counter-intuitive perspective could also be offered as foundation for a higher percent of suburban homeowners: that the presence of higher income producing, job creating ICTs fosters both attraction and presence of higher income earners-thus, a richer talent pool from which ICTs can draw.

Arts, Enter. & Rec. Index (also referred to as so-called *third places*) (AERI), is represented in the raw data as the average number of arts, entertainment, and recreation establishments for the geographic area. Table 26 indicates that the mean scores are 1,203.15 for urban areas and 797.97 for suburban locations in the samples taken for this research. This is perhaps the most significant finding in the IQI index and has important implications. One reason the finding is important is because even though the research samples are modest in size, just about every urban location with a population of a million or more people is included. Further, all of the major tech cluster regions located in suburbs are included. So, this analysis is a real assessment of what's actually occurring in these notable tech areas.

There has been a good deal of research on life quality and whether or not it has any linkage to enterprise and strategic behavior, previously discussed in the literature review of this thesis. An example is Hofstede's research that found that work and life quality are not separate and distinct concepts, but directly linked to each other in part, because they are value driven and that values are a matter of personal choice that affect just about everyone (Hofstede, 1984).

Jeffries, Horowitz, and Bracken conducted research through surveys, to examine their guiding hypothesis, that quality of life (QOL) perceptions correlate with the number of so-called "Third Places" individuals could identify in their respective communities. Their research defined such third places as quality schools, proximity to shopping and entertainment locations, churches, and a host of other destinations. They found their hypothesis did show significance suggesting that when people perceived that there were sufficient so-called *third places* in their community, their "perceived quality of life" ratio increased (Jeffries, Horowitz, and Bracken, 2011).

The Gallup-Healthways Well-Being Index (given a common title of *Happiest Cities In America: 2010 Well-Being Index*), which surveyed more than 350,000 people across the U.S., found that "Residents of large cities — those with a population of 1 million or more — generally report higher levels of well-being and more optimism about the future than those in small or medium-sized cities. In small cities, at 250,000 or less, people are more likely to feel safe walking alone at night and have enough money for housing" (Gallup-Healthways Well-Being Index, 2009).

Additionally, there is a significant amount of research now emerging that reflects similar findings. This quality of life dynamic is the basis of annual/periodical lists by media and other major research firms such as *Global Livability Report* (The Economist), *Best Cities Report,* (Kiplinger), and *Best Places For Business and Careers* (Forbes/CNN Money Magazine) to name just a few. They all examine quality of life issues and include a component on *third places* as a key indicator.

That is why, in the view of this researcher, the finding that the AERI in urban areas is approximately 51 percent higher than suburban is one clearly worth additional examination relative to ICT location choice.

The third key variable component measure in the QLI is the Primary/Secondary Education Quality Index (K-12) PEQI. The index is represented in the raw data as Reading at Grade Level (RGLI) – the percentage of students reading at grade level for the geographic area compared to the national average, and Math Comprehension (MCI) - also the percentage of students meeting math comprehension standards for the geographic area compared to the national average. Table 26 indicates that the mean scores for RGLI is 60.62 for urban areas and 74.73 for suburban locations in the samples taken for this research. Both of these index scores compare to a national RGL average of just 31.

Those mean scores are consistent with the basic assumptions that serve as the research foundation, namely, that there is an ICT suburban location choice bias that is supported by K-12 school quality. Given the widely published reports of significant challenges in urban school districts, it is expected that suburban schools would out-perform them. However, it is not expected that both urban and suburban samples are more than twice the national average. That suggests that not all urban school districts perform poorly, and are perhaps worthy of examination within the context of a comprehensive set of factors influencing ICT location choice.

The same structural relationship is found when comparing K-12 math comprehension scores. Table 26 indicates that the MCI mean scores for urban areas is 61.39 and is 69.75 for suburban locations in the samples taken for this research. Both of these index scores compare to a national MCI average of just 32.

Just as in RGLI, the MCI mean scores are consistent with the basic assumptions that serve as the research foundation, namely, that there is an ICT suburban location choice bias that is supported by K-12 school quality. Also again, given the widely published reports of significant challenges in urban school districts, it is expected that suburban schools would out-perform them. However, it is not expected that both urban and suburban samples are more than twice the national average. Once again, the previous consideration is supported, that not all urban school districts perform poorly and are perhaps worthy of examination within the context of a comprehensive set of factors influencing ICT location choice.

When the mean variances of RGLI and MCI are combined and divided, they comprise the Primary/Secondary Education Quality Index (K-12) (PEQI). That index is 128.51 for suburban areas and 93.70 for urban locations in the samples taken for this research. The same reasoned consideration can be expressed about this result as well. It is expected that suburban schools, K-12, will out-perform urban schools. However, as indicated in the respective variable component measures, urban schools in this sample, still perform competitively compared to national averages.

While specific data on charter schools was not included in this research, anecdotal evidence gives considerable credence to the fact that an increasing number of these high performing institutions are locating in urban centers, and thus, may have some affirmative impact on overall urban K-12 achievement scores.

So, when these three variable component measures are combined, the Quality of Life Index (QLI) is 61.46 for urban areas, and 58.04 for suburban locations in the samples taken for this research. The urban QLI is being skewed favorably by the significant difference in the AERI. And even though suburban home ownership was significantly superior to the urban measure, the relative competitiveness of urban schools mitigates slightly, the impact of the difference.

To summarize the key elements of the IQI finding, urban locations taken in the research sample scored higher in both the Workforce Availability Index (WAI) and the Quality of Life Index (QLI). The WAI appeared to be skewed by the significant difference in the Technology Education Accessibility Index (TEAI). The QLI appeared to be skewed by the significant difference in the Arts, Enter. & Rec. Index (AERI). The two key measures and the entirety of the IQI merit further research within a broader context of variable measures. However, as previously indicated, the findings in this research showed high mean standard deviations that may lower the potential significance.

RQ.5 What are the relationships among strategic posture (ETL–SA G, SA-CR G, CR-SI-G), Innovation Quality Index (IQI) and Profitability (P) for ICTs located in urban areas (U) and suburban areas (SU)?

H.1: U-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI < SU-P: f(ETL–SA G, SA-CR G, CR-SI G), IQI

Finally, the aggregate strategic posture variable set (intervening), combined with the Innovation Quality Index (IQI) (moderating), did not show significance when measured as a function of the dependent variable, profit (P). While there is ample literature supporting the Ansoff Success Hypothesis that argues an affirmative relationship between the strategic posture variables and performance (profitability), it is not clear in this research, if the addition of a moderating variable (IQI) influenced the outcome or not. Again, this may be an area upon which to isolate additional research.

The research also was unable to determine if the high number of ICTs with negative net profit may have influenced the lack of significance in the relationships.

The only variable that proved to be significant at the 95% confidence level was the CR-SI G in suburban areas. As previously reflected, given this finding, it is hard to draw substantive conclusions from the analysis.

Other Findings, Conclusions, Observations.

After a closer examination of the raw data for all the ICTs, the lack of a relationship between the variables and profit is actually not surprising. A significant number of the firms suffer from negative net profit performance, resulting from many factors, not the least of which was the Fall, 2008 drop in the stock markets. Triggered initially by the failure of Congress to pass bank bailout legislation, the event set off an unprecedented chain of events. It was the catalyst for an immediate global seizure of credit and liquidity, and essentially brought the world's economy to a virtual standstill. The economic damage that resulted in the months that followed, hit small cap firms like those targeted in this research the hardest, and can easily explain the consistent net-negative profit performance of these ICTs.

Analyzing both the firms and the industries in which they participate, there were three dominant reasons that emerged to explained many of the outcomes. The severe economic downturn not only impacted the U.S, but the global economy at-large. Beyond the financial damage rendered by the event to the banking sector, this key factor also ignited a ripple effect throughout the entire tech sector. For example, both enterprise and consumer purchases of technology equipment, particularly personal computers, have been delayed beyond the normal re-purchase cycle of 2-3 years (Forrester Research, 2012). The slowing of computer equipment demand creates downstream coupling throughout the entire tech value chain. Manufacturing of all of the electronic components that go into making these devices, i.e. semi-conductors, printed circuit boards, storage devices (hard drives), other peripheral equipment manufacturers, software publishers, etc., realized significant slowdowns in their own business cycle. This dynamic was very apparent in the actual ICT firm analysis over the last three years.

The second most significant reason for the ICT net negative profit performance, was the advancement in production processes that had the effect of cheapening costs, and also creating downward pricing pressure on the products produced, thus commoditizing them, and reducing net profit potential.

The third most significant reason for the high level of negative net profits performance was the rapid pace of technological advancement in the product development cycle, thus rendering existing product markets obsolete before they reach both their product demand saturation peak (the high point on the technology life cycle curve). That meant that ICTs are straddled with inventories of products with low market demand, while under severe pressure to make all of the required strategic investments to keep pace with competition relative to new product development and release-to-market.

As a result of these downward pressures, there were a number of ICTs that chose to retreat from the U.S. market altogether, and all of its corresponding economic drag, and aim their strategic sights on what is viewed as a key emerging market with huge upside potential, namely, China.

Even ICTs that did not make wholesale strategic shifts toward developing the Chinese market, many just the same, diverted significant portions of what would be focused strategic investment here in the U.S. on product development in highly competitive technology sectors. These moves toward a market development focus, were aimed at establishing so-called “beachheads” in that Asian geographic territory, and positioning for potential strategic alliances, as opportunities emerge.

It was apparent that these economic pressures triggered a refocus on the potential value and in some cases, actual competitive survival positioning qualities, that offshoring might provide. A pronounced demonstration of Dunning’s Eclectic Paradigm (Dunning, 2001), was apparent in the ICT analysis of this offshoring dynamic. It is worth repeating the key principles of what is referred to as the “OLI-Model”, to highlight the relevance of this strategic behavior in the sector.

To reiterate, the model aims to explain what are essentially the natural physics of location choice and strategic investment based on the potential for the creation of competitive advantage by defining three factors that are either determinant, or strong decision influencers. They are: 1) Ownership advantages (trademark, production technique, entrepreneurial skills, return to scale); 2) Location advantages (existence of raw materials, low wages, special taxes or tariffs); and 3) Internationalization advantages

(advantages by producing through a partnership arrangement such as licensing or a joint venture).

Entry into the Chinese market for many of these firms, even those categorized as SMEs, is made easier through the unofficial requirement that firms create joint-ventures with local firms in order to be allowed to do business in the country. China might be described as a tightly held-quasi-market driven economy with central planning. That may appear to be an oxymoron; however, it actually does describe the unique hybrid nature of the Chinese economy, one that has become the fastest growing in the world.

So, even though some of the perceived barriers that have stood in the way of affirmative location choice decisions being made in the U.S. to develop presence in urban centers were significantly challenged in this research, the confluence of a struggling U.S. economy, OLI-Model factors, and the potential of China as an emerging consumer market, bring significant resistance to a shift in the dynamic that was the focus of the research.

Research Implications

There are several implications emerging from this research that merit both additional research consideration, and public debate amongst policy makers and leaders. Some are stated below.

Strategic and Innovation Implications

ICTs both in urban and suburban areas have to aggressively compete in order to become successful and sustain it, however, in urban areas, the competitive intensity can be so high, that survival too often becomes the goal. Thus, implementing high strategic aggressiveness is not a choice, but an imperative.

Urban ICT performance was found to be hindered by the propensity to not develop sufficient capability response. As hypothesized, the strategic aggressiveness gap in urban ICTs was higher than suburban. Lack of access to capital has been widely reported to impact small businesses more than medium to large. Severely high five-year failure rates present an even larger strategic challenge. However, beyond those known obstacles, when analyzing the raw data on urban ICTs, miss-alignments were frequently found to have been created by firms being too aggressive in marketing innovation, not sufficiently active in innovation aggressiveness, and having insufficient management capability across the three CR dimensions of competence, climate, and capacity measures.

And while the IQI measure suggests a more level "playing field" between these two geographies than is conventionally believed, there is little doubt that lasting perceptions of urban centers creates challenges relative to executive talent attraction that might help close the capability response element of the gap.

Workforce Development

Globally, while there is intense development in India particularly, and an emerging development current in China, there are not enough engineers and computer scientists to support the intense future demands that no doubt be will placed on the tech sector, especially when the global economy realizes a full recovery. It is one reason why tech firms throughout the U.S. are actively petitioning Congress to expand the H-1B visa limit to allow a higher number of knowledge workers to enter the country for work.

Congress is evaluating various proposals. One would allow foreign students that come to the U.S. to study math, science and engineering, to be granted visas to remain in the country to work at American tech firms. And while many such foreign workers have gravitated to some of the major and larger suburban tech firms to offer their talents, they could be one potential source of high-tech urban talent, if the right location circumstances were created.

However, beyond aiming to tap into that known talent pool, there is an interesting finding in the data that was collected for the IQI in urban locations that does offer some level of promise. It has to be matched with the kind of initiative discussed further below in this chapter. Several urban centers studied, for example, Los Angeles, Dallas, Orlando, Chicago, Atlanta, and an unlikely location, Indianapolis, Indiana, had either very low or modest tech employed workforces (as a percent of the total workforce). However, in terms of the education infrastructure, a key building block for tech workforce development, each of those cities ranked high in the number of universities, community colleges and tech schools (STEMS), located within accessible range (as defined by the TEAI) compared to industry sector averages (NAICs). This strong presence of tech-enabled education capability could be an engine of workforce development that has the potential to trigger a surge leading to competitive advantage in various tech sectors located in urban centers.

Focused initiative on workforce development that results in a major push toward science, math, computer science, and engineering education, has the potential to facilitate the equivalent of a geographic comparative advantage that could emerge as a superior sector dynamic when compared to foreign markets currently engaged in similar initiative.

If urban centers are positioned to develop labor markets that are more attractive than foreign markets in terms of knowledge capability, and human intellectual capital, even with cheap labor as a competitive challenge, the potential result is huge economic development and the corresponding benefits. The education infrastructure is present in these urban geographies, but as discussed below, it will require significant public/private initiative to create what is a paradigmatic strategic shift. Currently, these knowledge resources are being under-leveraged and thus, not fully deployed to either benefit local communities, or the national interest. According to the Organization for Economic Cooperation and Development (OECD), as of 2009, engineering and science graduate rates were as follows:

Table 27

OECD: Engineering and Science Graduates

for Selected Countries, 2009

	Engineering		Science	
	Undergraduate	Graduate	Undergraduate	Graduate
India	440,000	N/A	520,000	N/A
China	164,000	131,000	52,000	42,000
U.S.	95,000	53,000	157,000	54,000
Japan	94,000	35,000	19,000	12,000

Source: OECD: Engineering and science graduates for selected countries, 2009

So clearly, there are national interest incentives to pursue this important strategic path.

Implications For Education K-12

Another building block of technology sector development infrastructure starts at the very beginning of the human education cycle. It begins with K-12. What have been reported as the deficiencies and failures of primary education nationwide, has been and is being widely debated in public policy and industry circles alike and do not need to be cataloged for purposes of this discussion. However, it is important to note that a driving force intensifying the discussion is the recognition that increasing the quality of primary education is an essential platform from which national innovation potential will be launched.

This research showed a surprising number of bright spots in the primary education profile. What it reveals is that urban centers at-large frequently registered very good or excellent performance scores in the key benchmarks measured: reading-at-grade level (RGLI), and math comprehension (MCI), which comprised the Primary Education Quality Index (PEQI). However, beneath those achievement scores, a more dismal story is uncovered. As widely reported, schools in the deepest pockets of inner-cities are the weak performers, the failures of which set the table for perpetual cycles of chronic unemployment, high crime, and all of the social ills that accompany urban blight.

This failure is perhaps the most challenging element of future urban innovation potential, because in the last decade, the preponderance of public policy discussion focused on it has largely been relatively hollow.

The result is the reality that a lack of political and public will, exacerbated by a continuing trend of diminished federal, state, and local resources devoted to this sector of education, leaves little optimism that the condition will change in the near future. However, if it does not, the prospects for urban innovation cultivation will be severely handicapped. It is a public policy challenge, vital to urban innovation potential, that warrants significant attention.

Third Places Impact On Quality of Life (QOL)

Basic analysis of the Quality of Life data (QLI) revealed that high concentrations of "third places" (the number of arts, entertainment, and recreation establishments (AERI)), appeared to push overall Innovation Quality scores (IQI) higher. The preliminary data finding suggests that cultural planning should be a key component of urban planning as it relates to the attraction of innovation industry sectors.

Tech firm development and Implications For Outsourcing and Insourcing

U.S. firms still hold significant advantage in leading edge technologies, due in large part to what is still a highly educated workforce, and a solid economic infrastructure that supports development. However, as advances in process become more efficient, i.e. nano-technology applications, potentially commoditizing labor, once again, the temptation to ignite a whole new round of offshoring will be very high. Therefore and particularly as it relates to urban innovation potential, an emphasis should be focused on areas that have natural domestic applications that do not easily accommodate off-shoring.

Two key areas that offer domestic and urban innovation potential are energy and healthcare. In first discussing energy, according to the American Energy Institute, large scale alternative energy development, driven by so-called “green energy” strategic thrust, is quite likely to spawn significant economic activity. However, a sector ideally suited for urban concentration and development, is the build-out of so-called “smart grid” technology that is designed to facilitate more efficient local energy flows, create energy exchange infrastructure, an economic activity that will be robust in the near future (Rifkin, 2011), and advance strategies to conserve and protect precious environmental resources.

In the field of healthcare, an unprecedented demographic shift from middle-age to senior by baby-boomers is already intensifying national healthcare needs. The cost challenge will compel the need for innovation to keep costs lower. To take advantage of newly emerging health technologies, multiple levels of technology trained workers are required to service this large demographic. There will be plenty of employment and career opportunities at many levels of the technical training hierarchy.

Healthcare is an industry sector that cannot be outsourced, so it does have some levels of national proprietary protection. There is already a significant healthcare infrastructure in place in urban centers, such that tech development in such enterprises is a natural evolution of effective healthcare delivery systems, spawning robust economic activity.

Research and development

Technology firms are perhaps more inclined than other industry sectors, to have a natural inclusion of research and development components built into their strategic plans. However, history reveals time, and time again, that private enterprise is incentivized by parochial stakeholder interests, and motivations, to largely engage in research and development that leads to the most rapid conversion to commercialization possible

What is also well established, is that in terms of creating innovation, not only is commercial research and development essential to economic vitality, but applied research, generally not commercially viable in its early stages, is also a critical innovation building block, because it serves as the launching platform for future commercial activity. Public policy attention to resourcing this important activity is needed.

Institutional – incubation – commercialization

public-private partnership initiative

In addition to public, and quasi-public research and development, and particularly as it relates to urban innovation creation, it is vitally important that institutional support, i.e. universities, technical training schools, and community colleges, not just advance their respective education missions, but also foster community development. Promise has already demonstrated with results, by participation in tech start-up – to – incubation - to - commercialization initiatives, and have the potential to help intensify innovation cultivation environments. Such institutional-public-private partnership initiatives are capable of replicating the growth fertilizer that results in technology clustering.

Recommendations for Future Research

The following recommendations are made as focus points for potential future research, that either builds upon the findings contained here, or fills gaps that may shed additional insight on the issues targeted.

Research Anomalies and Challenges

Several anomalies and/or challenges emerged during the research phase – data collection and statistical analysis. They are briefly explained below:

Measuring Ordinal and Linear Variables. Measuring ordinal and linear variables presented a challenge, and may have accounted for the lack of higher relationship significance and/or correlation measures. In conventional, primary research models on Ansoff, what became linear data in this mode- net profit, is captured as primary data, and presented in some sort of nominal or ordinal structure, i.e. Likert Scale rating.

Negative Net Profit Sampling. As previously referenced, the sample population selected, contained a significant number of ICTs with negative net profit (3 yr. avg.). The preponderance of negative net profit performance may have yielded unique relationship and/or correlational findings.

Non-Correlational Findings With Ansoff. It is not clear as to the causality, however, this specific sampling model encountered difficulty in uncovering strong cause and effect relationships between Ansoff factors and ICT performance. It raises questions if the theory actually holds up for this sector, if the urban/suburban analysis was too narrow, or, if other elements of the methodology were incompatible with the Ansoff diagnosis process.

Expert ETL Panel Assessments. In securing the participation of well-qualified industry professionals to serve as ETL Expert Panel participants, the assessment results they provided were rather widely divergent from the assessments conducted by the principal researcher (not included in the research data). It is reasoned that this divergence is a result of these industry experts not being familiar with the texture and complexity of the Ansoff diagnostic process and thus, relied solely on their own largely instinctual sense of the NAIC sectors being assessed. This finding is confirmed from the post assessment interviews of the experts conducted by the researcher. compared to data driven assessments.

Opportunities for future research

In the view of the researcher, there are multiple opportunities for further research. Some would further develop the current research herein. Others would be directed differently, in order to confirm or disconfirm findings found in this research. They are listed below:

1) IQI scores utilized a small set of targeted variables. While a sound and usable assessment was produced, the research would benefit from expansion. Future research, should build upon the IQI data in this research, and add key elements of

urban cost-of-doing business such as rents, insurance, transportation costs, and crime rates (by type).

2) Conduct research in period that more closely reflects normal economic cycle (findings in this research may have been influenced by current economic conditions that depart from normal cycles)
3) Select research sample with only positive net profits
4) Research using only primary data and compare to these findings
5) Researching another industry and comparing the data to this one to isolate tech industry anomalies

Unique Secondary Research Methodology. A clear, and significantly positive development, arising from this research methodology, is the discovery of robust access to secondary data that provides a higher quality profile measure in both qualitative dimensions (by converting qualitative data into quantitative measures, e.g., strategic aggressiveness, and capability response) and quantitative data. In primary surveys, respondents are generally asked to apply a nominal rating or ordinal ranking, based on their assessment perspective as an enterprise insider. However, such data is often fraught with the biases driven by the respondent's frame of reference, and enterprise internal motivations including some that might possess political orientation. Thus, future research, either relying on secondary data, or utilizing it as a substantive integration component, is encouraged in models that accommodate such analysis.

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Appendix

Attachments:

1. **Dissertation Models**
   Exhibit A: Global Model
   Exhibit B: Research Model

2. **Environmental Turbulence Level Assessment Tool**

3. **Strategic Aggressiveness Assessment Tool and Capability Response**

   Assessment Tool

Environmental Turbulence Level Assessment (1-5)						Enter Number Here
Industry	1	2	3	4	5	
1. Frequency of New Products in Industry	Infrequent 5 or More Years	Low	Moderate	High	Very High: Several Per Year	
2. Length of Product Life Cycle in Industry	Very long: 10 yrs or more	Long (7-10)	Moderate (3-7)	Short (1-3)	Short: Less Than One Per Year	
3. Number of Competing Technologies in Industry	None	1	2 > 3	4 > 5	5+	
4. Industry Technology Intensity	Low	Low Increasing	Moderate	High	Very High	
5. Rate of Technological Obsolescence	Low	Low	High	High	Very High	
6. Level of Product Performance Differentiation in Industry	None	Low	Moderate	High	Drastic (based on Discontinuous Technology)	
7. Industry Societal Pressures	None	Moderate	Strong	Very Strong	Strong and Novel	
8. Visibility of Future Change Events in Industry	Complete Visibility	Future Visibility is Extrapolative	Future Visibility is Predictable	Future Visibility is Partially Predictable	Future Visibility is Completely Unpredictable	
9. Industry's Demand for Growth Capital	Low	Moderate	High	Very High	Very High	
10. Rate of Change in Technology in Industry	Very slow	Slow	Fast	Discontinuous Familiar	Discontinuous Novel	
11. Barriers to Entry of New Competitors in Industry	None	Low	Moderate	High	Very High	
				Future Industry Innovation Turbulence (2A)		
Marketing	1	2	3	4	5	
1. Industry Market Structure	Monopoly	Duopoly	Oligopoly	Multi-Competitor	Many with Major New Entrants	
2. Consumer Pressure in Industry	None	Weak	Strong	Demanding	Threatening	
3. Pressure by Government	None	Weak	Strong	Demanding	Threatening	
4. Industry Growth Rate	Slow & Stable	Increasing but Stable	Declining/Oscillating	Fast/Oscillating	Discontinuous	
5. Level of Capital Intensity	Low	Moderate	Moderate	High	Very High	
6. Pressure by Environmental Groups	None	Weak	Strong	Demanding	Threatening	
7. Frequency of New Marketing Strategies	None	Low	Moderate	High	Revolutionary	
8. Level of Product Image Differentiation Found in Industry	None	Low	Moderate	High	Drastic	
9. Critical Industry Marketing Success Factors	Control of the market	Dominate Market Share/Low Production Costs	Product Appeal/Rapid Response to Customer Needs/Customer Satisfaction	Anticipation of Change in Needs/Responsiveness to Changing Values	Identification of Latent/Underdeveloped Customer Needs	
10. Demand / Industry Capacity	>>IC	>IC	~IC	<IC	<<IC	
11. Diversity of Competing Techniques	None	None	None	Several	Several	
				Future Market Turbulence (2B)		
	Future Environmental Turbulence Level (Figure 1A/1B Environmental Turbulence Level)					

Capability Response (1-5)						Enter Number Here
Competence Responsiveness > half executive team	1	2	3	4	5	
1. Managerial Skill set Alignment Quality	Very Low - experience and backgrounds unaligned	Low - experience and backgrounds - Low Alignment	Modest - experience and backgrounds align with industry/Less firm specific	High - experience and backgrounds align with specific firm business	Very High - experience and backgrounds enables industry innovation leadership	
2. Executive Team Tenure	Very Low - < 2 Yrs. With Firm	Low - > 2 - 4 Yrs. With Firm	Moderate - > 4 - 5 Yrs. With Firm	High - > 5 - 7 Yrs. With Firm	Very High - > 7 Yrs. With Firm	
3. Time Orientation	Based on Past Precedents	Historical	Historical Extrapolated Future	New Future Opportunities	Invent Future Opportunities	
					Competence Rating	
Climate Responsiveness	1	2	3	4	5	
1. Enterprise Values and Attitudes (corporate statement analysis: as expressed in mission and value statements/Annual Report Comments)	Stability	Reactionary	Seek Familiar Change	Anticipatory	Seek Novel Change	
2. Enterprise Change Catalysts	Crisis	Poor Performance	Market Response	Change Seeking	Change Leadership	
3. Employee Growth - 1 yr.	Very Low - No growth	Low -> (1% to 5%)	Moderate - (> 5 % - 10%)	High - > (10% - 15%)	Very High - > 15%	
					Climate Rating	
Capacity Responsiveness	1	2	3	4	5	
1. Functional Distribution Quality (FDQ)	Very Low - Funictional Capacity Insufficient	Low - Functional Capacity Barely Sufficient/Needs Improvement	Moderate - Funictional Capacity sufficient/Meets Fundamental Enterprise Needs	Good - Funictional Capacity Positions Firm For Opportunity	Very Good - Funcitional Capacity capable of Industry Leadership	
2. Staffing Sufficiency (Manager and Staff Headcount)	Very Low - Staffing Sufficiency/Insufficient - < 3%: mean var.	Low - Staffing Sufficiency/Barely Sufficient-Needs Strengthening -> (3% to 5%): mean var.	Moderate -Staffing Sufficiency/Meets Fundamental Enterprise Needs - (> 5 % - 10%): mean var.	Good - Staffing Sufficiency/Positions Firm For Opportunity - > (10% - 15%): mean var.	Very Good - Staffing Sufficiency/capable of Industry Leadership >20%: mean var.	
					Capacity Rating	
					Enterprise Capability Response	

Strategic Aggressiveness Assessment (1-5)						Enter Number Here
Innovation Aggressiveness	**1**	**2**	**3**	**4**	**5**	
1. New Product Dev. Strategic Focus	Process Efficiency	Product Imitation	Incremental Product Improvement	Product Innovation	Product Pioneering	
2. New Product Introduction Frequency	Very Low (none last 3 yrs)	Low (1-2 last 3 yrs.)	Moderate (3 last 3 yrs.)	High (4-5 last 3 yrs.)	Very High (5 or more last 3 yrs.)	
3. M&A Activity	Very Low (none last 3 yrs)	Low (1 last 3 yrs.)	Moderate (2 last 3 yrs.)	High (3-5 last 3 yrs.)	Very High (> 5 last 3 yrs.)	
4. R&D Intensity	Very Low (< 2%/TR	Low (>2% - 10%/TR)	Moderate (>10% - 15%/TR)	High (>15% - 20%/TR)	Very High (> 20%/TR)	
5. Future Industry Critical Innovation Trend	Cost Reduction	Reactive Improvement	Aggressive Improvement	Incremental Improvement Innovation	Radical Innovation	
					Innovation Aggressiveness Score	
Marketing Aggressiveness	**1**	**2**	**3**	**4**	**5**	
1. Market Development Intensity	Very Low (< 2%/TR	Low (>2% - 10%/TR)	Moderate (>10% - 15%/TR)	High (>15% - 20%/TR)	Very High (> 20%/TR)	
2. Industry Market Structure	Monopoly	Duopoly	Oligopoly	Multicompetitor	High Competitive Intensity Plus Major New Entrant	
3. Industry Growth Rate	Slow & Stable	Increasing But Stable	Decling/Oscillating	Fast/Oscillating	Discontinuous	
					Marketing Aggressiveness Score	
					Enterprise Strategic Aggressiveness	

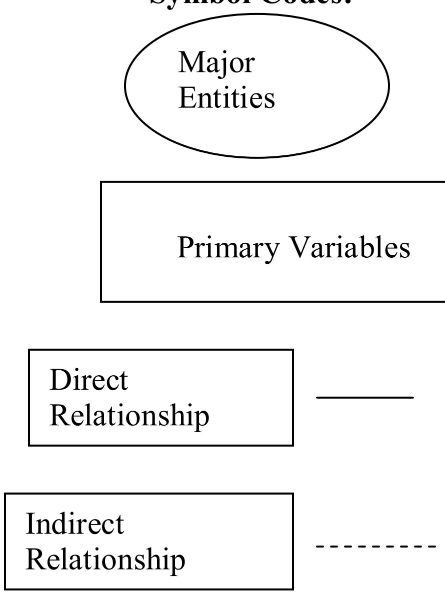
Dissertation Global and Research Models

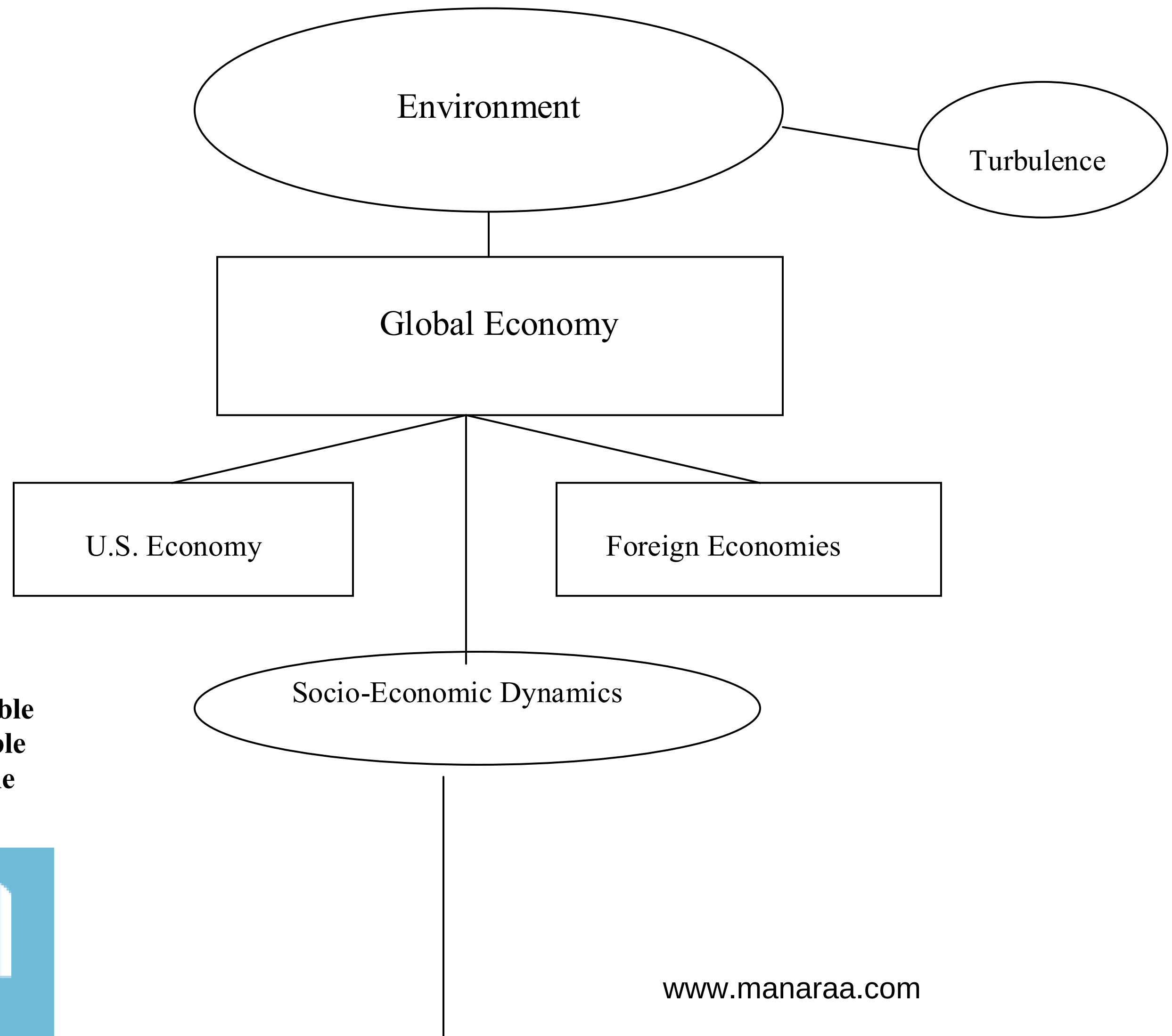
"The Relationship Between Ansoff's Contingent Success Hypothesis, Location, and Profitability, For Technology Firms In Or Near Urban Centers Compared to Technology Firms in Non-Urban (Suburban) Areas"

Appendix

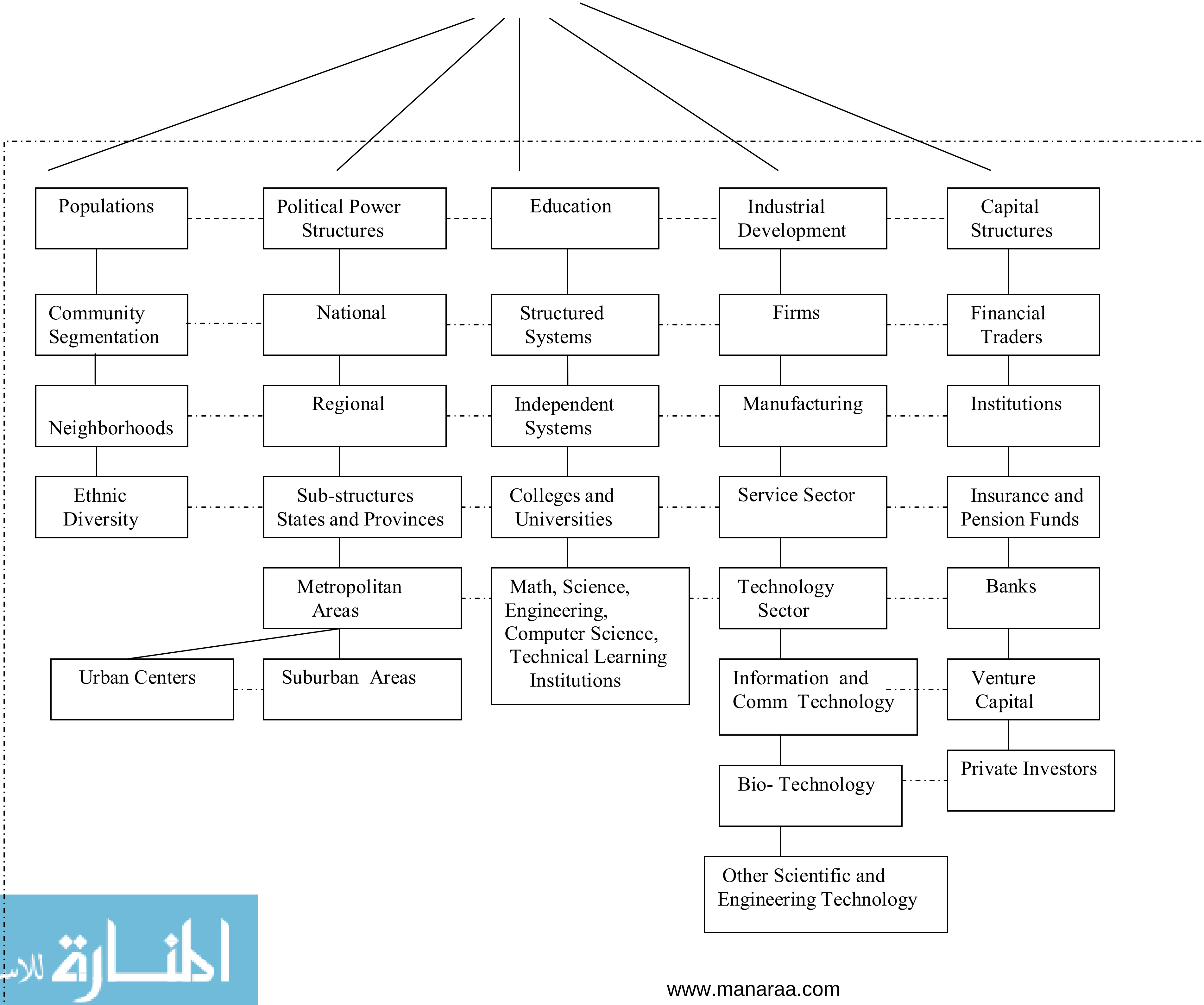
Exhibit A: Global Model

Symbol Codes:



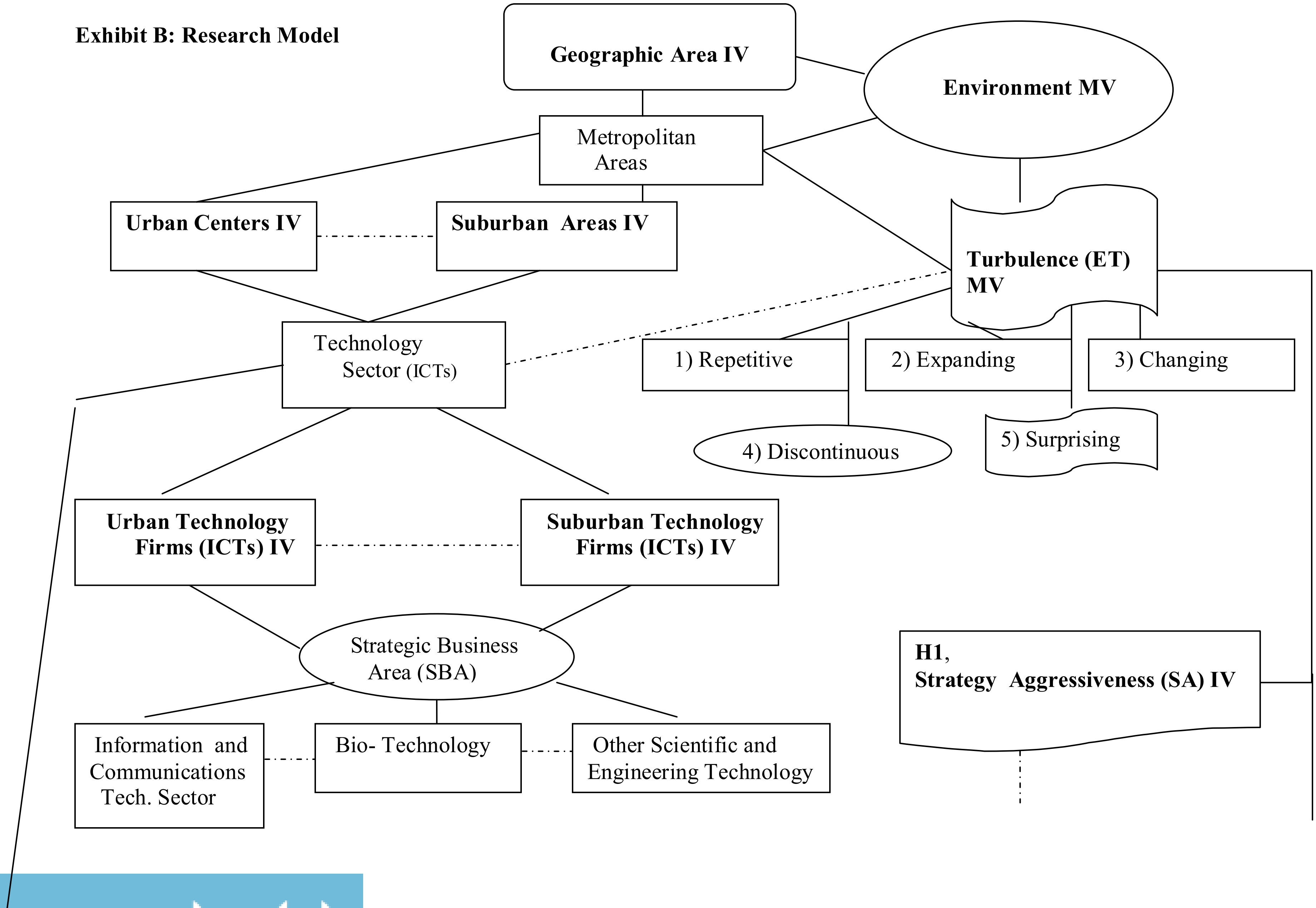


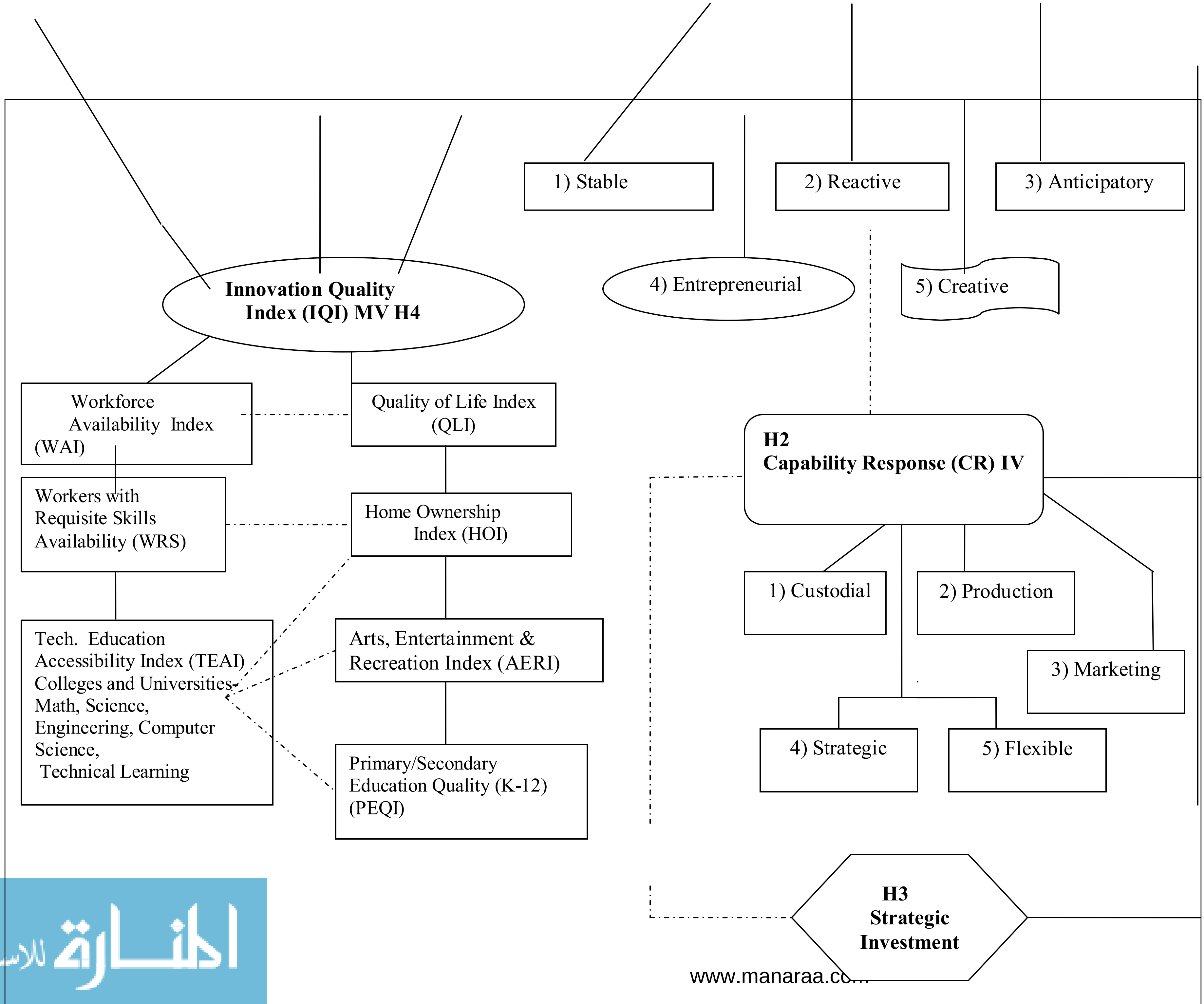
IV – Independent Variable
MV – Moderating Variable
DP -- Dependent Variable



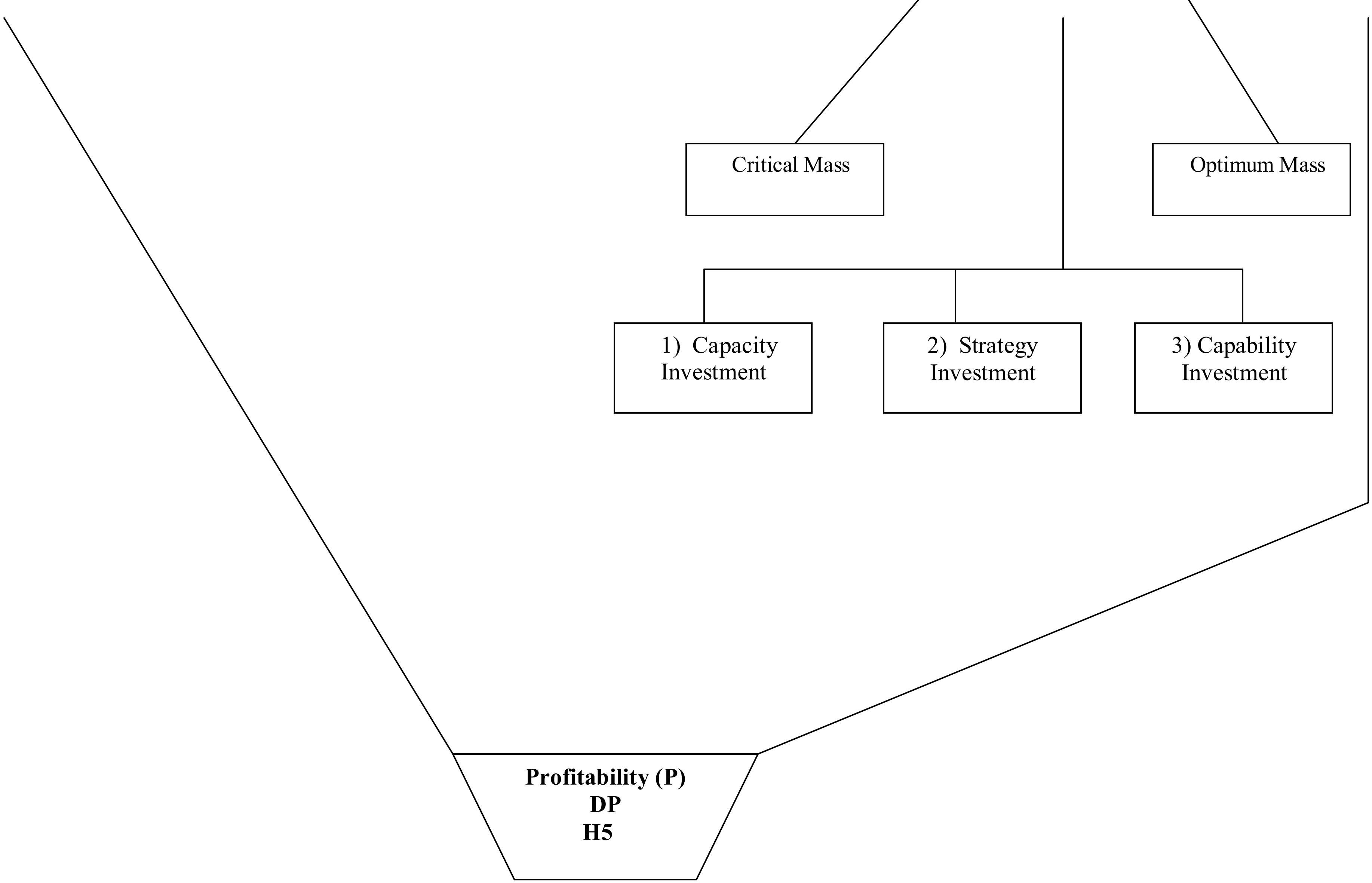
Populations
Political Power Structures
Education
Industrial Development
Capital Structures
Community Segmentation
National
Structured Systems
Firms
Financial Traders
Neighborhoods
Regional
Independent Systems
Manufacturing
Institutions
Ethnic Diversity
Sub-structures States and Provinces
Colleges and Universities
Service Sector
Insurance and Pension Funds
Metropolitan Areas
Math, Science, Engineering, Computer Science, Technical Learning Institutions
Technology Sector
Banks
Urban Centers
Suburban Areas
Information and Comm Technology
Venture Capital
Bio- Technology
Private Investors
Other Scientific and Engineering Technology

Exhibit B: Research Model





1) Stable
2) Reactive
3) Anticipatory
Innovation Quality Index (IQI) MV H4
4) Entrepreneurial
5) Creative
Workforce Availability Index (WAI)
Quality of Life Index (QLI)
H2
Capability Response (CR) IV
Workers with Requisite Skills Availability (WRS)
Home Ownership Index (HOI)
1) Custodial
2) Production
Tech. Education Accessibility Index (TEAI) Colleges and Universities Math, Science, Engineering, Computer Science, Technical Learning
Arts, Entertainment & Recreation Index (AERI)
3) Marketing
4) Strategic
5) Flexible
Primary/Secondary Education Quality (K-12) (PEQI)
H3 Strategic Investment



Critical Mass
Optimum Mass
1) Capacity Investment
2) Strategy Investment
3) Capability Investment
Profitability (P)
DP
H5