PERFORMANCE IMPLICATION OF LEADERSHIP INNOVATION STRATEGY AND LOCAL TELECOMMUNICATIONS REGULATIONS ON MAJOR US TELECOMMUNICATIONS CARRIERS

by

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ABSTRACT

The purpose of this quantitative descriptive correlations study was to examine the relationship between regulations, innovations, and the combined influence on the performance of telecommunication firms. The heightened need for organizational leaders to find new operating modalities and strategies that can enhance organizational prosperity in a world characterized by growing global competition, outsourcing, corporate downsizing, rapid innovations in information technology, and regulations acted as an incentive for the study. Innovation is known to enable firms to compete. In innovating, leadership needs to understand how the innovation strategies implemented and the business regulations in local markets influence performance. Using an ANOVA test, a regression analysis, and a Chi square test of independence on six research hypotheses, the study demonstrated that variations in regulations within states does not relate to the service quality of firms in a statistically significant manner. Investigations on the degree of association between regulations and return on investments of operating firms indicated mixed results. The regression analysis supported the commonly held view that regulations were correlated to performance in the Schumpeterian process of creative destruction at the core of the growth engine in market economies. The ANOVA and chi square tests reflected no significant association between regulations and the ROI of participating firms. Innovation strategy was strongly correlated to performances and a fit between innovation strategy and regulatory framework will produce optimal performances. To arrive at the optimum choice of innovation strategy and regulations, leaders will need to possess a combination of artistry and engineering with a vision to imagine a new process or system. The leaders will also need to have the ability to make the innovation process come to life.

DEDICATION

This dissertation is dedicated to the honor and glory of God Almighty who made it possible for me to be born of parents from Esu, Cameroon and to my parents Batum Chu Endjim and Natum Ewie Enseng of blessed memory who taught me to be patient and steadfast in the face of any arduous challenge. The study is dedicated to my mother, Natum Ewie Enseng, for all the sacrifices she made for me in her life so that I would obtain the best education possible. It is my mother's unconditional love, motherly actions, and words of encouragement pointing at education as the source of truth and wealth that have really been a tonic to me. The dissertation is dedicated to my father, Batum Chu Enjim, who consistently led me in the right direction in order to better myself, who taught me how to make informed decisions, and who never, ever stopped encouraging me to keep looking forward. Looking back at the humble beginnings and the difficult journey I have been through, my parent's patience and serenity have always given me the innate ability to persevere. The study is also dedicated to my wife, Veronica, who has been that silent leader and major inspiration I needed to balance family, work, and education. The unrelenting support from my children, Chu, Geh, Buh, Ndjuoh, Enseng and Zuh encouraged me to embrace this change as a great accomplishment, to stick to as speedy an accomplishment as possible, and to celebrate the win!

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CHAPTER 1: INTRODUCTION

Growing global competition, outsourcing, corporate downsizing, rapid innovations in information technology, regulations, and many other factors have heightened the need for organizational leaders to find new operating modalities and strategies that can enhance firm performance and prosperity (Dess, Lumpkin, & McGee, 1999). Businesses, such as telecommunications, multimedia, and information technology, that foresee rapid technological changes and uncertainty in future operations, must find fresh orientation in the 21st century for increasing performance and gaining a competitive advantage (Kodama, 2004). Firm leaders seeking a competitive advantage have to innovate (Haag, Cummings, & McCubbrey, 2005). In the process of innovation, firm leadership needs to understand how the innovative strategies they implement and business regulations in local markets influence performance (Kabadayi, Eyubogli, & Thomas, 2007).

The investigator examined the relationship between firm innovation strategy, local telecommunications regulations, and performance in the U.S. telecommunications industry. Specific emphasis was placed on matching regulation and innovation strategy and correlating the variables with firm performance. Regulation-innovation fit conceptualized the match between regulations and innovation strategy. The research was premised on the assumption that a firm's performance in a dynamic industry varies as a result of a misfit between leadership innovation strategy and business regulations.

Though institutional theorists visualized a firm in terms of "regulative, normative and cultural forces working to constrain and constitute organizations" (Scott & Davis, 2007, p. 258), a limited number of quantitative non-experimental studies exist on the performance implications of regulatory forces and the firm's innovation strategy on the competitive advantage of a firm.

This dissertation study bridged the gap by examining the impact of regulation-innovation fit on firm performance. The conceptual framework drew from strategic management, complexity theory, and Schumpeterian dynamics to analyze the performance implications of a fit between telecommunications business regulations and innovation strategies employed by U.S. telecommunications carriers.

The objectives of chapter 1 were to identify the research problem and the research hypotheses and discuss the significance of the study to academia and practitioners. A succinct introduction of the research design, research variables, conceptual assumptions, and scope of the study is provided. The chapter begins with a contextual background of the research problem.

Background of the Problem

Many factors including federal and state regulations and the technological innovations implemented by firm leadership have continued to influence the U.S. telecommunications industry in the past two decades. Evidence from broadband markets suggested productivity gains from deregulation (Hazlett & Caliskan, 2008). As the leader innovates, a concern arises regarding the extent to which existing business regulations were associated with the results of managerial actions. Failure to address the issue aligning regulations and innovation (regulation-innovation fit) can result in wasted organizational resources and poor use of technologies that have relatively short life cycles. Any misalignment may adversely impact firms wishing to produce an adequate return on investment and quality of service (Adomavicius, Bockstedt, Gupta, & Kauffman, 2008).

Innovation strategy, business regulations, and a fit between the two pose challenges to both scholars and managers who seek business success. Nowhere is the need for finding an appropriate fit between innovation strategy and regulation more urgent than in the U.S. local

telecommunications industry of early 21st century (Crandall, 2008). An introduction of the regulatory context of the study, the technological evolution of the industry, the leadership concerns, and the rational for the study follow.

Regulatory Changes

The divestiture of AT&T Corp. (AT&T) in 1984, orchestrated after the Modification of Final Judgment court decision of 1982, was a turning point event that unleashed new competitive forces in the evolution of the U.S. telecommunications industry (Eunni, Post, & Berger, 2005). Following the divestiture, many regional bell operating companies (RBOC) provided local switched telephone services (Flaherty & Zimmerman, 2005). The Divestiture brought about a separation of local and long distance providers. The RBOCs served as monopoly providers of local telephone service in their respective local switching areas. New regulations prevented RBOCs from offering long-distance service to their in-region subscribers. Long distance, the next building block in the telecommunications value creation chain became the core competence of long distance companies.

The two complementary services, local and long distance, worked on two core technologies. One was a local loop with termination at the telephone central office and the other formed the backbone of the entire circuit switched telephone network (Khader & Barnes, 2000). The divestiture brought about innovation and competition in the long distance marketplace where market forces largely influenced competition between AT&T and WorldCom. AT&T's market shares and revenues declined steadily to 52% by 1996 (FCC, 2003). The decline gave the United States Congress an overture to legislate a new act.

The 1996 landmark telecommunications regulations (LTR) reviewed the constraints of the divestiture by allowing an RBOC to provide long distance phone services whenever a firm

demonstrated that its local telephone exchange market was open to competitive entry (Flaherty & Zimmerman, 2005). The purpose of the LTR was to reduce regulation and enhance rapid growth of innovative telecommunications technologies (Telecommunications Act, 1996). The LTR once again abridged the traditional value creating chain of long distance and local services. The LTR replaced the former monopoly's divestiture agreement with a social contract that enabled the RBOCs to provide long distance in exchange for accepting to make their local networks open on a wholesale basis to competing carriers (FCC, 2003).

Local and long distance telephone services were again provided by one carrier in what could be called a vertical integration of local and long distance communications services. Whereas before the divestiture, one company operated all services, after the LTR, several firms with specific regional networks competed in offering bundled services. The old format was challenged by technological innovation as the new sought to displace the old.

Technological Innovations

New technology continued to revolutionize the communications landscape and pulled together under one bill the services that were previously provided separately by phone companies, internet service providers, and cable or satellite television providers (Robinson & Weisman, 2008). These forces rapidly transformed an industry that was hitherto very stable and strongly regulated to one with enormous opportunities, uncertainty, and risks (Crandall, 2008). Vertical integration became fashionable for major U.S. telecommunications carriers who clamored for new business regulation to match the innovativeness of the industry and level the playing field. Yet, no empirical studies suggested any adverse effects of the existing regulations on the performance of competing carriers.

Leadership Challenges

Hazlett and Caliskan (2008) observed that competition in an industry with legacy regulation and rapid technological innovation was likely to create new customer concerns and influence participating firm's performance. The observation appeared to be factual given that telecommunications innovation had grown exponentially, while regulation for a converging technology seemed not to follow at the same exponential pace (NJ Telecommunications Summit, 2006).Voice over internet protocol (VoIP) and wireless technologies transformed the traditional Incumbent-Competitor characteristics that formed the basis for legacy regulations. VoIP providers knew no local switching areas.

Leading firms rejected being bound by legacy regulation, while unregulated emergent firms with innovative and sometimes disruptive technology continued to influence the incumbents' operations of the public switched telephone network (PSTN). The unprecedented level of competition, and a strong desire to move rapidly to winning market positions, motivated firm leaders to pressure state regulatory commissions to make a paradigm shift to regulatory frameworks that foster entrepreneurial initiatives. A firm's survival in the sea of uncertainty hinged on its leader's ability to combine mechanical approaches focusing on efficiencies and process improvements with creative approaches emphasizing quality and effectiveness (Scotts & Davis, 2007). Regulators and business leaders clamored for new regulations that fit with technological innovation in order to enhance higher service quality and increase financial performances in today's telecommunications firms.

Rational for the Study

The three challenges pressed leading telecommunications organizations to put a premium on dynamic innovation-regulation responsiveness (Mintzberg et al., 2003). Absent efforts to

understand and redress the situation, competition and firm performance may be adversely affected. The situation appeared to be causing a loss of competitive advantage for some and a gain for others (NJ Telecommunications Summit, 2006).

Mintzberg et al (2003) noted that a firm's survival in situations of the sort will depend on the existence of a fit between firm strategies and environmental threats, such as business regulations. Responding to an environmental threat when bound by legacy rules and regulations may result in inertia for both incumbent and emerging firms. Understanding the relationship between innovation strategy, business regulations and their interactions on firm performance becomes imperative in order to gain insight on how this complex couple was related to firm performance in the telecommunications industry.

Statement of the Problem

In the dynamic telecommunications marketplace, asymmetries between local telecommunications regulation and firm innovation strategies seem to adversely influence the performance of competing firms (Crandall, 2008; Robinson, & Weisman, 2008). The asymmetries originated from the inabilities of leaders to fit innovation strategies to local business regulation. The problem is that scholars and leaders do not understand the relationship between firm innovation strategies, local business regulation, and the performance of firms operating in a dynamic industry such as telecommunications. Resolving this problem may establish the appropriate level of regulation in the telecommunications industry. Understanding the association between the variables also enables decision makers adopt measures that will benefit firms and consumers.

A quantitative non-experimental research method was employed to examine the relationships between innovation strategies, local business regulations and telecommunications

firm performance. The research design associated with the quantitative method was a descriptive, correlational type set at the major telecommunications companies operating in three US states. Each sample state employed a local telecommunications regulation which was different from that of the other sample state. Descriptive correlational design was appropriate for the study because survey methods and document review were used to obtain hard data describing the relationships between the various characteristics of the study population (Salkind, 2006).

Purpose of the Study

The purpose of the quantitative, descriptive, correlational study was to examine the relationships between local telecommunications regulations, leadership innovation strategies, and the performance of sample US telecommunications firms. A quantitative, descriptive, correlational research design involves collecting and analyzing numerical data for a study that is not a case study (Creswell, 2005; Hsu, 2005). Statistical data and other data sources enabled the testing of the hypotheses to support or refute theory that may be generalizable to all US telecommunications firms (Hart, 2007).

The study did not determine conclusively that any variations in firm performance were caused by the variations in local telecommunications regulations and leadership innovation strategy, given the non-experimental nature of the study (Salkind, 2006). A quantitative, descriptive, correlational design was needed because the method provided insight into the relationship between the independent variables of local telecommunications regulations, leadership innovation strategy and the dependent variables of how well the firm is performing without firm causal implications (Cook & Cook, 2008). Survey data on innovation strategy and document review data on performance and local telecommunications regulations for US telecommunications firms in three sample states were obtained in the study. The use of a survey

instrument with consumers as a measure of performance was avoided, given the overall need to compare service quality and profits of firms with varying innovation strategy in three US states implementing different local telecommunications regulations.

Service quality was identified as an important basis for winning customers and keeping the competitive advantage in the telecommunications sector (Slack et al., 2003). Return on investment (ROI) was a leading financial performance indicator that measured a firm's ability to generate revenue in relation to the cost of generating the revenue (Kumar & Petersen, 2004). Fit supported increased efficiency and ROI (Geiger, Ritchie, & Marlin, 2006). A statistical analysis of the data enabled a determination of the performance implications of regulation-innovation fit on U.S. telecommunications firms operating in three sample states.

Significance of the Problem

From the seminal work of Chandler (1962), who suggested an alignment between firm diversification and the administrative system to increase performance, researchers have been exploring how a fit between two or more individual, organizational, or environmental variables may be related to firm performance. Geiger, Ritchie and Marlin (2006) investigated the relationship between a fit of strategy and structure on performance. Other scholars added meaning to the fit concept by analyzing the fit between human resource management and organizational life cycles (Liao, 2006), fit between organizational risks and capital investments (Bhattacharya & Whealey, 2006), and fit between outsourcing strategy and business strategy on firm performance (Lee, 2006).

The driving force for investigating the relationship between leadership innovation strategy, local telecommunications regulations, and firm performance in the telecommunications industry was buttressed by an assessment of the relationships between performance measurement

and strategy, corporate social responsibility and corporate reputation, and their relationship with financial performance (Brammer & Pavelin, 2006; Van der Stede, Chow, & Lin, 2006). These investigators found an inconclusive result on the fit influence on performance. In certain industries, fit was strongly related to firm performances. On other situations, the relationships were found to be negative or even nonlinear.

Huang and Hu (2007) and Lan (2005) expanded on the existing body of knowledge by examining the relationship between information technology (IT) strategy and business strategy fit on performance. Yet, no research was specifically dedicated to examining how regulation, innovation strategy, and a fit between the two independent variables were related to firm performances in the telecommunications industry. This dissertation study specifically extends knowledge on the relationship between firm performances, regulations, and innovation strategies to telecommunications firms. The present study combined regulations and innovation in an attempt to comprehend the relationship between the regulations, innovation and firm performance.

In another context, Amit and Schoemaker (1993) used a dynamic capability framework (DCF) of strategy to propose a connection between internal firm resources, leadership, and the competitive situation of a firm at industry level. The DCF study did not provide insight into the connection between regulation-innovation fit and performance. According to the DCF model, continuous innovation is placed at the core of strategy, and no emphasis was placed on the importance of aligning innovation strategies with specific environmental demands in an attempt to enhance performance (Boccardelli & Magnusson, 2006).

The present dissertation contributes towards an understanding of how regulation-innovation fit influences firm performance in a dynamic industry. This study bridges other

literary gaps as shown on Table 1 and adds insight into the already rich literature on the dynamic nature of firm innovation strategies, leadership, and performance (Huang & Liu, 2005; Marques & Simon, 2006). The study adds value to existing literature on regulations and firm performance (Lau, Law, & Wiederhold, 2006; Qu, 2007).

Table 1: *Extant Literature and Nature of Research Gaps*

Gaps in Existing Research	This Study Will Address the Gap
The literature provided empirical knowledge on innovation, and cognitive diversity (Taylor & Greve, 2006); cross-national knowledge and innovativeness of large firms (Dunlap-Hinkler, 2006); and innovation and organizational structure (Sine, Mitsuhashi, & Kirsch, 2006). An analysis of the influence of these factors has not been done.	By examining regulations, innovation strategies, and a fit between the two variables in an attempt to understand the effects on performance.
Sorensen and Stuart (2000) examined the effects of aging from the perspective of fitting firm competencies (i.e. innovation) with environmental factors (i.e., regulation).	By examining the influence of fit between a specific firm competence and a specific environmental factor on performance.
Caballero, Engel, and Micco (2004) suggested excessive regulation leads to micro-economic inflexibility and acts as barriers attenuating output fluctuations. The impact of innovation-regulation fit on firm performance remains unstudied.	By introducing the concept of regulation-innovation fit in the telecommunications industry and examining the influence on firm leadership performance.

Further research found a relationship between destructive innovation and incumbent firm performance but failed find any causal relationship on the innovating firm's performance. (Hill & Rothaermel, 2003; Sampson, 2007). This dissertation study analyzed the association between regulation and innovation strategy on the performance of innovators, new entrants, and incumbents. Insights obtained set the ground work for establishing a more flexible and symmetrical regulatory framework that will promote innovation, increase firm performance, and enhance consumer satisfaction.

Significance of the Study to Leadership

Faced with disparate goals and a competitive environment, regulators and corporate leaders have little orientation from existing literature providing directions for enhancing performance in the complex and dynamic environment in which firms operate (Scott & Davis, 2007). Regulators and corporate leaders interested in achieving a fit between environmental factors, such as regulations and internal production activities like innovation strategy can find insights from the findings (Fiss, 2007; Scott & Davis, 2007; Shillings, 2004). An understanding of the relationship between telecommunications business regulations, firm innovation strategies and firm performance provide telecommunications leaders with better tools with which to shape the direction of the industry. Understanding the depth and complexity of the inter-relationships between innovation strategies and regulations developed by telecommunications company leaders and regulators since the Telecommunications Act of 1996 will enable regulators to use facts and theory rather than emotions and special interest politics to make decisions.

The study provides policy makers, corporate leaders, and management leaders the tools and insight to redirect the telecommunications industry. The findings set a ground work for formulating a more symmetrical regulatory framework. In so doing, the study may enable business leaders and regulators to balance public interests with firm concerns.

Nature of the Study

This quantitative, descriptive and correlational study used online survey instruments and document review to collect numerical data on local telecommunications regulatory frameworks, leadership innovation strategies, and performance of telecommunications firms operating in sample US states. The design quantified the innovation strategy characteristics of telecommunications firms. Data on service quality and return on investments of firms were from document reviews. The data were compared and analyzed to find meaningful relationships between innovation strategy, local business regulation, and the performance of telecommunications firms operating within sample US states.

The survey instrument was a seven point Likert scale based on Tidd, Bessant and Pavitt (2005) shown in appendix A. The instrument was used to collect data for determining the level of innovation strategy of sample firms. Publicly available data on telecommunications firms' performance and local telecommunications regulations was collected through a document review. The collection and analysis of data at a single point in time enabled the description of the variations in dependent variables as a function of changes in the independent variables (Hart, 2008). For the sample firms, an analysis of variance was performed to investigate the association of a firm's performances with its innovation strategy and the regulatory framework in which the firm operates.

The focus on telecommunications firms was necessary, given the dynamic changes and the relatively short life cycles of technology brought about in the industry since the Divestiture in 1984 and the Telecommunications Act of 1996. These landmark changes stirred the emergence of new voice technology, new products, and a new battle for market dominance in which new

products were displacing old ones, exemplifying the process of creative destruction (Robinson & Weisman, 2008; Schumpeter, 1976).

Appropriateness of the Research Method

A quantitative descriptive and correlational method was appropriate for the study since quantitative analysis seeks to discover which independent events are true reflections of the dependent variables (Hart, 2008). The methods helped determine which events were simply due to chance, and which could be predicted from knowledge of one variable (Newman, 2006). Data for the dependent performance variables were quantitative values given as percentages. Data for the independent variables of innovation strategy and local telecommunications regulations represented quantitative levels of regulation and innovation strategy. Lower values obtained from the data collection instrument represented low strategy and higher values were a reflection of very innovative firms.

In the descriptive aspect of the study, values of the dependent variable for a given innovation strategy and a given regulatory framework were compared with those of the subsequent levels of the independent variables (Hsu, 2008). A regression analysis between innovation strategy levels and firm performance provided insight on the relationship between variables (Salkind, 2006). Performance indicators were limited to the sample firm's service quality indicators and return on investments. The indicators were correlated with innovation strategy levels and regulatory types to find the association of the independent variable with the dependent variables.

A descriptive quantitative non-experimental design was appropriate for the study because quantitative data form the core of the analysis in which no control group and no variables were manipulated (Creswell, 2005; Hart, 2008). The survey instrument was based on a seven point

Likert scale in which planning and regulatory officials of major US telecommunications firms were required to respond to 40 quantitative survey questions. The respondent provided answers on a basis of one to seven for questions such as, "Your innovation projects are usually completed on time and within budgets." A score of one indicated very low innovation strategy level and a score of seven showed the firm had a high propensity to innovate (see appendix A).

A qualitative method was avoided since such methods employ soft data in the form of feelings, impressions, or symbols (Hart, 2008; Newman, 2006). Soft data may be used to explain patterns but do no lend credence in a hard data quantitative study. Qualitative methods apply a non linear research path that is incongruent with a correlations study using a linear path (Newman, 2006).

Qualitative methods fit investigations in which instruments collect data using participants own words and the contents are analyzed by themes (Creswell, 2005). Qualitative methods are "best suited for research in which you do not know the variables and need to explore" (Creswell, 2005; Salkind, 2006). Qualitative methods would be inappropriate for the present study in which the variables were specific, quantifiable, and the study does not use respondents own words.

Appropriateness of Research Design

A true experimental design requires a control group, manipulation of variables and randomization of the population (Hart, 2008, Salkind, 2006). An experimental method must have a control group against which the results of the subjects manipulated in an experimental group will be compared (Creswell, 2005; Hart, 2008; Newman, 2006). In this study, no variables were controlled or manipulated.

The study focused on describing the relationship between the variables rather than using an experimental design to determine the cause and effect relationships between the variables.

Quantitative, descriptive and correlational designs omit at least one characteristic of an experimental research (Hart, 2007). Salkind (2006) noted that a descriptive correlational design was used to obtain knowledge on variations of performances as a function of innovative strategy and regulatory framework. Descriptive designs indicate dependence or independence of research variables. Interdependent variables share a lot in common and are said to correlate with one another (Hart, 2008). A test of independence was performed.

The relationship between innovation strategy, local telecommunications regulations and firm performance is not one of causation. The variables were not manipulated. Dependence or correlation existed when an increase in the level of innovation strategy increased or decreased the return on investment or service quality of the telecommunications firms in a given local regulation in a predictable manner (Salkind, 2006).

Quantitative descriptive and non-experimental survey designs were appropriate to the study, which was guided by hypotheses and sought evidence to support or refute theory on the relationship between performance and a fit between innovation strategy and telecommunications business regulations (Creswell, 2005). Quantitative descriptive design was needed for this study which does not seek to find causes of the variations in performance, if any, but seeks to establish an accurate description of the relationship between the variables. Regulations, innovation strategy, and the fit, a concept derived from the joint effects of innovation and regulation, were analyzed, using regression analysis, analysis of variance and test of independence to accept or refute relationships with performance.

Correlational research focuses on the unique contribution of one variable on other variables in an open system (Neuman, 2006). Neuman (2006) noted that, unlike in an experimental study where the researcher has the possibility of manipulating variables,

investigating the relationships among variables involves collecting data within a short period and does not require direct manipulation of variables. The study collected data on existing conditions in 2009 in three sample geographic markets.

The variables were analyzed by statistical tools to determine if the observed variations in firm performance could be correlated to changes in the regulatory framework or innovation strategy. The results of the analysis may provide policy makers, corporate leaders, and management scholars with insight on the level of innovation strategies (prospector, analyzer, defender or reactor) and regulatory framework (full regulation, partial, or no regulations) that is most appropriate for attaining operational excellence and competitive advantage when operating in a dynamic industry.

Although firms were grouped in terms of the regulatory schemes in which they operate, no group was considered control or experimental. The ANOVA test examined the relationship between the variables as well as helped determine how the interactions between variables were associated with another variable (Creswell, 2005). An ANOVA analysis provided insight on an appropriate mix of regulation and innovation necessary for enhanced leadership performance in a dynamic industry (Newman, 2006).

Another tendency would be to consider the use of a qualitative case study design to investigate the performance implications of a fit between telecommunications regulatory framework and firm innovative strategy. What distinguishes this research from that of a qualitative case study was that in order to find a relationship between regulation, innovation and firm performance, the researcher compared the telecommunications performance of leading companies in one regulatory framework with that of firms in another regulatory framework.

Variations in performance were observed as the investigation moved from one regulatory framework to the other.

Qualitative designs employ narrative data to investigate the telecommunications firm's performance within their local regulatory context in an intense and detailed manner as possible (Salkind, 2006). Qualitative study follows a nonlinear research path (Newman, 2006). The present study was grounded on a survey approach and used quantitative data. Extensive open ended questions were not required and were not appropriate for a study that examined the relationship between innovation strategy, local regulations and the performance of firms.

Research Questions and Hypotheses

New technology is enabling single use traditional circuit switching networks (phone) and packets switched networks (data) to serve as multiuse networks. The situation calls for significant changes in the way telecommunications services are served to the customers (Joseph, Justl, Magee, Mukhopadhyay, & Sun, 2005). In this quantitative, descriptive correlational study, the investigator compared the variations in firm performance as the innovation strategy and local telecommunications regulation in which the sample firms function. The relationship between the innovation strategy of the firm and the firm's performances was equally examined. The findings provided answers to two research questions.

R1: Are telecommunications firms performance related to variations in local telecommunications regulations and leadership innovation strategy firms?

R2: Do best or worst cases of regulation exist in an innovative industry?

RQ1 emphasized the need to examine the extent to which performance is related to innovation strategy and local telecommunications regulations, and if innovation strategies can be a predictor of firm performances in the telecommunications industry. Examining the association

of firm innovation strategies and business regulations on service quality and profits in an innovative telecommunications marketplace becomes an imperative. RQ2 examined the level of innovation strategy that results in competitive performance in a specific regulatory condition. The findings provided insight on a telecommunication firm's ability to remain competitive in spite of changing regulatory conditions. RQ1 leads to four null and four alternate hypotheses while RQ2 leads to two null and two alternate hypotheses.

Hypotheses

To provide insight on research question one, four hypotheses have been formulated. Each hypothesis led to an identification of regulatory frameworks and innovation strategies that enhanced firm performance. The research was consistent with classical strategic management theorists' assumptions that government regulations and leadership innovation strategies have independent and interactive actions on the firms' performance. The hypotheses were based on a synthesis of three strategic management literature lines of thought that established linkages between fit and performance, innovation and performance, and regulations and firm performance.

H_o1: A correlation does not exist between telecommunications firm's service quality performance and firm innovation strategy.

H_a1: A correlation exists between telecommunications firm's service quality performance and firm innovation strategy.

H_o2: A correlation does not exist between telecommunications firm's return on investment and firm innovation strategy.

H_a2: A correlation exists between telecommunications firm's return on investments and firm innovation strategy.

H_o3: A correlation does not exist between a telecommunications firm's service quality performance and the regulatory framework in which the firm does business.

H_a3: A correlation exists between a telecommunications firm's service quality performance and the regulatory framework in which the firm does business.

H_o4: A correlation does not exist between a telecommunications firm's return on investments and the regulatory framework in which the firm does business.

H_a4: A correlation exists between a telecommunications firm's return on investment and the regulatory framework in which the firm does business.

To determine which combination of regulation and innovation strategy for which the performances of the firms were highest, the proposed research study tested the following two hypotheses relating to RQ2.

H_o5: The service quality performance of telecommunications firms is the same, irrespective of the interaction between business regulation and innovation strategy.

H_a5: The service quality performance of telecommunications firms is not the same, irrespective of the interaction between business regulation and innovation strategy.

H_o6: The return on investment of telecommunications firms is the same, irrespective of the interaction between business regulation and innovation strategy.

H_a6: The return on investment of telecommunications firms is not the same, irrespective of the interaction between business regulation and innovation strategy.

Conceptual or Theoretical Framework

The theoretical framework blended three literature flows anchored in strategic management theory. Each flow provided partial insight into the research question and hypotheses to be tested. The three streams were theory on innovation and performance; institutions,

regulations, and performance; and fit and organizational performance. Strategic management research demonstrated that the environment differentially selects organizations for survival based on a fit between organizational forms and environmental characteristics (Scott & Davis, 2007). Fit between different organizational attributes such as leadership innovation strategy and the environment such as the regulatory framework enhances firm performance (Grant, 2007; Mintzberg et al., 2003; Shilling, 2004).

During a time of open market diversity triggered by information technology innovation, many firms are driving towards a specific strategy orientation in the hope of finding a competitive advantage. The core ingredients of the leadership strategies should reflect the dynamic process of creating a successful innovation and its implementation (Shillings, 2004). In the process, some firm leaders seem to ignore the need to fit innovation strategy to regulatory considerations. Low and Mohr (2001) noted that to maintain a competitive advantage, firms must uphold a culture of organizational learning that opens a path for innovation. "Innovation isn't just the new strategy; it's the only strategy for businesses that want to thrive in the new millennium" (Regan & O'Connor, 2002, p. 47).

Configurations theorists posited that a fit between multidimensional constellations of the strategic and organizational characteristics of a business is needed for performance enhancement (Vorhies & Morgan, 2003). Complexity theory enhanced strategic management theories and postulated that performance is enhanced as strategic and organizational characteristics approach the edge of chaos (Mintzberg et al., 2003). Chaos was depicted in Schumpeterian dynamics by new technologies replacing the old by undercutting the processes of the old through a competitive market selection process (Day & Schoemaker, 2000).

The regulation-innovation-performance paradigm developed in the present research portrayed regulation and firm adaptation through innovation as a dualism in which the two are separate and distinct concepts that are also related to each other. The dualism suggested that firms do not exist apart from their institutional environment (Tan & Tan, 2005). Investigating their performance as a function of innovation strategies without also considering the effect of regulation fails to capture the true behavior of the firms. A comparison of the performance of firms in three regulatory clusters validated or refuted the agreement of the theories in the telecommunications industry. Where the results agreed with existing theories, the research established a relationship between the variables in the telecommunications sector. Where the contrary was exhibited, the general theory of fit as adaptation and enhancement of firm individual performance applied only in specific conditions and in specific industries (Tan & Tan, 2005). The conceptual model is shown in Figure 1.

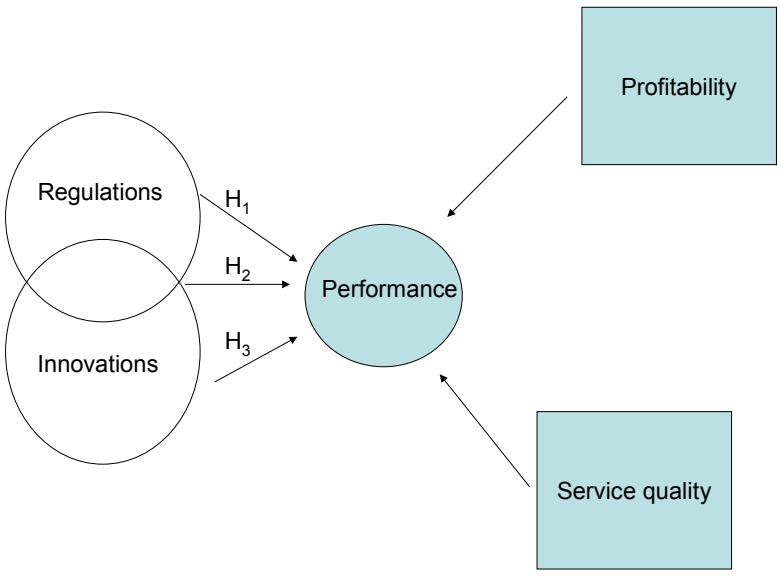

Figure 1. *Conceptual Model*

Definition of Terms

Words may convey similar meanings but assuming that the readers interpret the words in the same manner may be erroneous (Primeaux, & Veness, 2009). Terms used in this research may have unique or multiple meanings if undefined. Throughout the text, terms such as incumbents, local telephone regulations, innovation strategy, service quality performance, return on investment and fit were used. To avoid a misinterpretation of the terms, a definition of the terms was appropriate.

Incumbents

A shift in the telecommunications industry from monopoly to competition in the past decades tells a story of what technological innovation can do. Prior to the appearance of new technology, the monopoly firm that provided local telephone services before the telecommunications act of 1996 is called the incumbent telephone company (incumbent) (Robinson & Weisman, 2008). Firms that seek to displace the incumbent in what can be seen as the Schumpeterian dynamics are the competitors. Incumbents and competitors vie for the same customers and firm performance may be vary as a function of firm innovation strategies and local telecommunications regulations.

Regulations

In the Economic Freedom of the World (EFW) report, Gwartney and Lawson (2005) found 15 components of regulation which can be grouped under credit market, labor market, and business regulations. This research concentrates on business regulations. The departing conceptual view of regulation was that business regulation stems from firm dynamics and consumer concerns (Tan & Tan, 2005). The regulator seeks to protect the interest of competing firms, the consumer, and the overall good of the industry. The study envisions regulation from

the viewpoint of product or service regulation having as a background the suggestion by Caballero, Engel, and Micco (2004) that excessive regulation can lead to microeconomic inflexibility while certain product market regulations, such as those on entry and exit, act as barriers attenuating output fluctuations.

Business regulations serve specific social purposes and obey a more complex political economic process where legitimate social goals intertwine with the interests of specific social groups. Business regulations, unlike labor regulations, influence a firm's entry, growth, and exit in a market. The research focused on the product regulations of three services in the telecommunications market: basic local services, non competitive services, and competitive services. Basic local service involves providing customers access to the public-switched networks for local and long distance calling. The service is restricted to individual residential customers for voice use only and includes an access line, dial tone, and access to emergency 911 services in a local exchange area (Perez-Chavolla, 2006). Competitive services refer to any telecommunications services provider exempt from regulations of a state commission. Non competitive service refers to all regulated retail telecommunications services provided to a residential or business customer with the exception of basic local services.

Innovation Strategy

Researchers use several paradigms to view innovation. Some have studied innovation in terms of inventions as seen in patent-based studies and research and development expenditures (Sorensen & Stuart, 2000). Patent based innovation measure the number of registered inventions of the firm. Simple process or product changes were not measured.

Taylor and Greve (2006) saw innovation as a creative development of novelty and its application to generate a new product and ideas. This view concentrated on the process

development of the firm. Other investigators viewed innovation in terms of the ratio of new product sales to total sales (Hambrick, 1983; Shapiro, 2006). Johansen, Olsen, and Lumpkin (2001) extended the definition of innovation to incorporate objects, practices, and ideas that practicing leaders perceived as new. For the purpose of this investigation, innovation was conceived as a strategy that measured a firm's leadership ideas, practices, knowledge and connections needed to enhance firm performance (Tidd, Bessant & Pivott, 2007).

Regulation-Innovation Fit

The term regulation-innovation fit (RIF) appears extensively through out the research study in relation to an appropriate match between regulatory framework and innovation strategy. Fit, as matching, measures the congruence or agreement between regulation and leadership innovation strategies (Geiger, Ritchie, & Marlin, 2006). Fit provides the means to determine whether government telecommunications regulations and firm leadership innovation strategies were complementary or conflicting and if the variations in performance occur as a result of mismatches. The best fit of innovation strategy and regulations produced the best firm performance within a regulatory framework.

From a complexity theory viewpoint, a change in the regulatory framework causes important innovative responses from firms which relate to the firms' performance (Grobman, 2005). The choice of an innovation strategy for optimal performance depended on the local business regulation. The best fit represented an optimal working telecommunications market wherein innovation and new regulations continue to drive the Schumpeterian dynamics of creative destruction as regulation or innovation follow or lead each other.

Performance

One cannot view firm performance from a generic standpoint. Performance has individual, social, and organizational paradigms and determinants (Hannum, Martineau, & Reinelt, 2007; Scott, 2003). Seen from an organizational paradigm, firms attain high performance when innovation and regulation align (Scott & Davis, 2007). Although several organizational performance indicators were possible, only the service quality and the profitability index of the sample firms were examined.

Service quality was chosen in order to relate performance with satisfaction in the industry. The service quality of a telephone provider may represent indicators that range from a measure of a telephone service provider's response to customer perception and expectation to the average number of customer trouble reports per 100 telephones per month. Only the trouble reports formed part of the analysis. Emphasis on trouble reports was needed to eliminate subjectivity in measuring the concept.

The profitability index was limited to the ROI expressed as a ratio of profits and investments as reported by the firms (Shiu, 2006). When financial data posed a problem, the knowledge based view of the firm in which learning represents the time it takes a firm to execute a process change was used to obtain ROI (Pavlou, Housel, Rodgers & Jansen, 2005). Learning was measured in the survey instrument.

Assumptions

Several assumptions formed the basis of the investigation. The first assumption was the belief that, given the inter-regional nature of the firms employing similar innovative technologies across the board, state regulations become a key driver of the regulation-innovation fit dynamics. The study did not involve the unrealistic assumption that the sample population has been selected

randomly. The cluster of firms from a regulatory framework was chosen so that their combined market share approximated 80% or better of the population share. This choice was made from Pareto's assumption that 80% of solution come from 20% of the sources (Wren, 2004).

Another core assumption was that an industry with strong innovativeness and flexible regulations engendered firms with high service quality and ROI. The fit should act as a strong attractor of market incentives that leads to high performance and leadership in telecommunications. A market where innovation and regulation are not in harmony will form a distorted and maladaptive fit, thereby stifling performance. A perfect blend of innovation and regulation was reflected in the firm's performance.

The investigator further assumed from complexity theory that fit occurs when firms re-establish routines; deal with contingencies, breakdowns, and opportunities daily; and match the firm's innovation strategies with the regulatory framework (Weick, 2000). When regulation and innovation lead or lag one another, a firm's performance may suffer. This drift was noted as regulation-innovation misfit. With too little innovation observed as a defensive or reactive innovation strategy, the system becomes predictable and responds only through tried and established methods in specific regulatory frameworks.

Scope and Limitations

The scope was limited to the examination of the performance implications of a fit between a U.S. telecommunications firm innovation strategy and local telecommunications regulations. Although both incremental and disruptive innovations are covered in the literature review, the innovation strategies of sample telecommunications firms and the local telecommunications regulations affecting firms in sample US states were considered. This view brought together both the incremental and disruptive aspects of the firm's innovation activities.

Using analysis of variance and regression inferential statistics, the quantitative, descriptive correlational study investigated the relationship between the independent variables and the fit or lack of fit on the performance of telecommunications firms. The correlations and regression analysis provided insight on the relationship between independent variables and dependent variables. The analysis of variance test investigated the equivalences of performance means with respective regulations. The study did not involve an analysis of the synergistic relationships between regulation and innovation strategy, nor did it capture this element in measurement fit.

A quantitative, descriptive study associates the unique effects of one variable as a function of other variables (Salkind, 2006). In doing so, the researcher sought to answer the question relating to the net contribution of innovation strategy and local telecommunications regulation on the performance of existing and new telecommunications firms (Fiss, 2006). A cluster analysis was used to match the involvement of more than three variables in the study (regulation, innovation, and performance). Clustering brings together distinct groups of firms within sample states. An analysis of variance (ANOVA) test was used to verify sample groups' variances in their performance (Lim, Acito, & Russetski, 2006).

Limitations

Validating research findings depends on findings that can stand up to rigorous scientific scrutiny (Salkind, 2006). As a quantitative descriptive study in which control variables were not manipulated, the most conspicuous threat to internal validity stemmed from the nonrandom selection of the states and firms studied. The nonrandom selection may result in performance and innovation strategies that are not representative of the entire population of firms studied. The non-experimental nature of the study and the absence of randomness in the choice of US states

and telecommunications firms negate any chance of interpreting the variations and correlations as causal relationships (Jaekyung, 2008). In which case, the investigator may not attribute variations in firm performance solely to variations in innovation strategy and local telecommunications regulations.

Another limitation springs from the clustering of states into three regulatory frameworks. A number of states fall at the edge of two regulatory frameworks. Firms continue to be influenced by local business regulation while enjoying pricing flexibilities (Perez-Chavolla, 2006). Future research may refine the groups into more regulatory types in an attempt to improve upon the internal validity of the study.

Delimitations

Though the study is limited to voice telecommunications firms in three sample states, the findings may apply to more than just these states and firms. The trade off to the relatively weak randomization which created some limitations to internal validity was the likely generalizability of the results from the cases studied to the family of firms bound by a specific type of regulation and applying a specific type of innovation strategy. Most of the firms operate nationally and are affected differently by local regulations. The results will enable the leaders to understand the impact on performance and what type of innovation strategy works best within a set of regulatory conditions.

Summary

The emergence of the networked economy implies that telecommunications firms can no longer rely on traditional management approaches in addressing the challenges of enhanced firm performance and the complexity resulting from innovation and telecommunications regulations (Fontannaz, & Oosthuizen, 2007). This is compounded by concerns expressed by

telecommunications leaders in the U.S. telecommunications market about finding an appropriate regulatory framework that matches the rapid innovation in the industry (NJ Telecommunications Summit, 2007). Understanding the relationship between performances, regulations and innovation strategy remains unclear to both practitioners and academia in the telecommunications industry.

Research in the last five years pertaining to core organizational and environmental factors suggested that ties existed between innovation strategy and regulation such that for a given environmental condition, only certain firm innovative strategies were recommended for optimal firm performance (Geiger, Ritchie, & Marlin, 2006; Robinson, & Weisman, 2008). Few researchers explicitly concentrated on explaining the relationships between regulation, innovation, and firm performance and on capturing the effects of the potential complex interaction between regulation and innovation termed regulation-innovation fit on firm performance. The previous approaches implied that regulation and innovation independently influence firm performance, leaving no interaction between them. If an interaction results, the argument was that fitting the two variables produced a new concept that equally had a relationship with the outcome of a U.S. telecommunications firm. No analysis of it was known.

The research problem identified necessitated investigating the influence of innovation strategy and local telecommunications regulations on firm service quality and return on investment using a quantitative non-experimental descriptive correlational research design. In the design, variables were neither manipulated nor compared against a control group and justified the avoidance of an experimental design (Salkind, 2006). Neither was a qualitative design used since the researcher did not "utilize narrative data gathered in a variety of ways to provide meaning, insight and understanding" (Hart, 2008, p22) on the research problem.

The conceptual framework for the investigation focused on a fit or alignment as set forth in strategic management and complexity theories (Houchin & MacLean, 2005), and elements of evolutionary growth seen in Schumpeterian dynamics (Robinson & Weisman, 2008). Strategic management provided insights on how firms behave in environmentally different conditions. The purpose was to determine which type of regulatory framework and innovation strategies resulted in enhanced performances in a dynamic industry such as telecommunications.

Chapter one presented the significance of the research to corporate leaders, regulators, and scholars in understanding how innovation and regulation may jointly influence firms in a dynamic industry. The research problem was introduced after a succinct presentation of regulatory, innovative, and leadership challenges facing the U.S. telecommunications industry. Investigating the problem provides tools and insight with which policy makers, corporate leaders, and management leaders can redirect the telecommunications industry and set a ground work for formulating a more symmetrical regulatory framework.

Given the relatively modest internal validity of the study, practitioners and academia stand to benefit from the characteristic generalizability of the quantitative descriptive research study. The study had an underlying assumption that an industry with strong innovativeness and flexible regulations will harbor firms that operate with enhanced service quality and return on investment (Hazlett & Caliskan, 2008). The unit of analysis was firms in a sample number of US states. The firms employed traditional telecommunications techniques or sought to displace the old through innovative technologies.

Chapter two will review the current literature on innovation, regulations and firm performances. The review will exhume the research gaps between existing studies on innovation strategy and firm performance, regulation and firm performance, and the need for aligning

innovation strategy and regulations. Innovation strategy was viewed as a firm's leadership ideas, practices and connections needed to enhance firm performance (Tidd, Bessant & Pavitt, 2006). Regulation was seen as a rule imposed on local telephone companies providing service to customers (Hazlett & Caliskan, 2008). Performance was limited to MacPherson and Pabari's (2004) two elements for financial viability and relevance to stakeholders' changing needs; service quality and return on investment.

CHAPTER 2: REVIEW OF THE LITERATURE

The purpose of this quantitative, descriptive, and correlational study was to investigate the relationship between firm performance, local telecommunications regulation and leadership innovation strategy. The study also determined if telecommunications firm's performance was improved when operating within certain regulatory frameworks and applying specific innovation strategies. Strategy requires looking into the future and predicting change (Mintzberg, Lampel, Quinn, & Ghoshal, 2003). An accurate prediction is rare especially in today's rapid pace of technological evolution in US telecommunications, requiring that leaders systematically confront innovation strategies with regulatory frameworks in industries, markets, and organizations under their watch.

Complex industry situations of the sort have generated interest in strategic management, complexity theory, and many related fields. The objective of these researchers was to understand the relationship between firm parameters and how firms fit and cope with environmental changes, consolidate growth, and meet performance and competitive challenges (Hopman, 2005). "Organizations whose internal features best fit the demands of their environments will achieve the best adaptation" (Scott, 2003, p. 96).

In this chapter, a review of existing research related to the research variables is presented. The core theoretical frameworks related to the study (strategic management theory, institutional theory, complexity theory, and Schumpeterian dynamics) are examined. Each theoretical framework provides partial insight on the relationships between innovation strategy, local telecommunications regulations, and firm performance. The chapter also includes summaries of findings and areas needing further investigations on (a) innovation and performance; (b) institutions, regulations, and performance; (c) the fit and organizational performances; and (d)

Schumpeterian dynamics and complexity theory. Recent telecommunications industry trends aimed at contextualizing the study and a presentation of documentation used in the literature review follow.

Documentation

The underlying rational for the literature review was to examine scholarly sources pertaining to firm performances, business regulations and leadership innovation strategies. The research questions guided the investigation leading to the historical background, theoretical framework, and scholarly works on the relationships between the research variables. The search for relevant information and research articles were obtained from archival documents in state and federal telecommunications offices, library and online databases.

The library and online databases consulted included Proquest, Infotrac, EBSCOHost, University of Phoenix e-book library, and other internet search engines. Bibliographies and reference listings from pertinent titles helped to locate other sources. Content searches for key words helped in identifying titles relating to the research variables and research design. Key words and phrases used included "regulations and performances," "innovation and performances," "telecommunications regulations," "descriptive and correlations studies," "fit and performances," "strategy and performances," "service quality measurements," "measuring return on investments," and "fit and complexity theory."

A total of 135 peer-reviewed articles, books and publicly available collaborative documents were consulted. Documentation from 2004 to 2009 made up 75% of the sources consulted and constituted the bulk of the material. More than 90% of all sources were peer-reviewed articles from *Administrative Science Quarterly*, *Academy of Management Journal*, *Academy of Management Review* and other major Journals on Management and Economics.

Some articles were from technical reviews such as *Bell Labs Technical Journal* and *Information Systems Review*, and books. Sources before 2004 and Government Acts were used to provide a historical perspective to the study and concepts.

Historical Review

The U.S. telecommunications industry is characterized by innovativeness, competition and a strong desire for higher profits and better service quality (Robinson & Weisman, 2008). Sorensen and Stuart (2000) identified innovativeness as a fundamental factor in increasing performance, achieving profit, and bringing about profound social and economic change. Innovation shapes a firm's ability to produce influential ideas. As emerging telecommunications firms increasingly employ innovative technologies to provide substitute voice communications services, competing firms continue to operate under lagging and varying state rules.

Sine, Mitsuhashi, and Kirsch (2006), asserted that incumbent firms were often impeded from achieving higher performances by intensive internal administration and structural inertia of legacy bureaucracy. New and competing firms employing new technology are on their part hampered by a lack of extensive managerial resources and a structural framework that helps to reduce uncertainty and increase organizational efficiencies and responsiveness (Sine et al., 2006). Within an industry where regulations and innovation compete, the need for an examination of the behavior of firms under a dual influence was in place. Innovations within new technological fields are often the initiatives of small firms with an entrepreneurial structure. Innovations of large incumbent firms were directed towards incremental innovations along core competencies of the firm (Mintzberg et al, 2003).

Since Congress passed the Telecommunications Act of 1996 (TA96), the TA96 has brought about changes that would affect forever the legal and regulatory framework that governs

the U.S. telecommunications industry. The TA96 changed fundamental economics that drive growth, and spurred technological innovation (Powell, 1998). The lynchpin of the TA96, introducing a challenge to incumbents, comprised regulations on network sharing through the use of Unbundled Network Elements (UNEs) (FCC Triennial Review Order, 2003). Network-sharing regulations removed some barriers to entry in the local exchange and access telecommunications services (Hazlett & Caliskan, 2008). Regulations in such dynamic environments may influence the competitiveness of the market, should a fit or a lack of fit exist between innovation strategy and regulations.

Innovation shapes a firm's ability to produce influential ideas (Khalifa, Yu, & Shen, 2008; Sorensen & Stuart, 2000). Firm innovativeness is a fundamental growth factor in increasing firm profits and bringing about profound social and economic change. Telecommunications leaders of firms that own existing networks (incumbents) have argued that in an innovative telecommunications market, legacy regulations were negatively influencing their firm's performances (NJ Telecommunications Summit, 2006). Emerging telecommunications firms increasingly employed innovative technologies to provide near substitute voice communications services and decry the anti-competitive practices of incumbents.

The regulatory framework relate differently to incumbents and emerging firms since wire-line, wireless, and IP services have been historically regulated differently (FCC, 2006). Incumbents and emergent firms were subject to different, lagging, and varying state regulations. Existing telecommunications regulations provided evidence of government insistence that a business should be socially desirable as well as economically sound. Asymmetries in existing

telecommunications regulations created a need for finding a fit between innovation and regulation in voice telecommunications business.

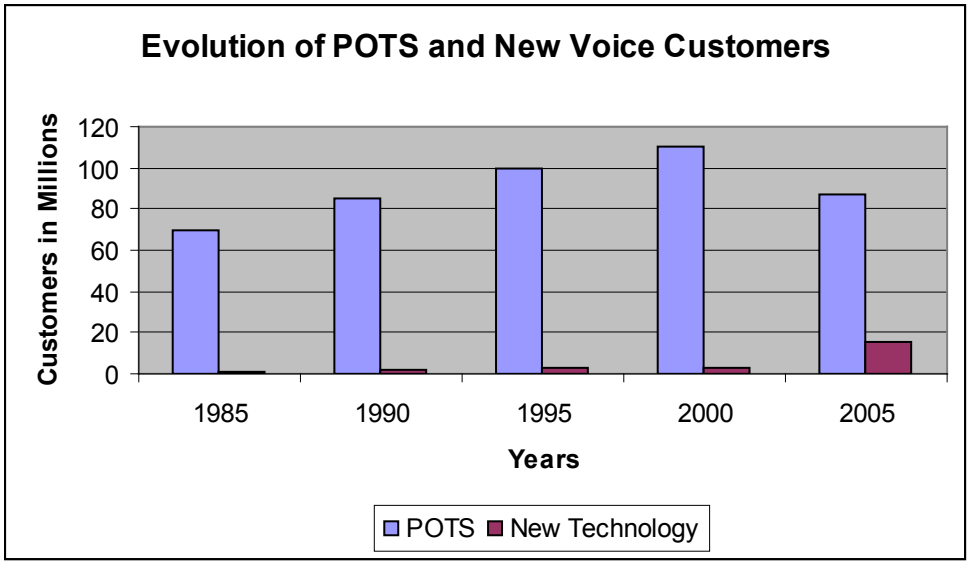

Figure 2: *U.S. Evolution of POTS and new voice telephone customers. Figure created by researcher with public data from FCC local telephone competition: status report as of December 31, 2007.*

Since the TA96 was passed more than a decade ago, data from the FCC competitive bureau shown in figure 2 indicated considerable growth in "plain old telephone system" (POTS) customers of the incumbent phone companies. The growth peaked in the year 2000. Thereafter, POTS communications business began to dwindle steadily with the emergence of new products such as cable voice, wireless and Voice over Internet Protocol (VoIP).

VoIP is the delivery of classical real-time voice communication over internet protocol (IP) (Hari, Hilt & Hofmann, 2005). The internet is a web-like service model using network access points that enhance the creation of less expensive and flexible service options (Haag, Cummings, McCubbrey, 2005). VoIP, unlike wireless, is capable of running free of public-

switched telephone networks (PSTN). Due to consumer habits, VoIP signals must inter-network between IP networks and PSTN.

A gateway links the PSTN and the IP networks (Haag, Cummings, McCubbrey, 2005). The gateway either translates VoIP messages into corresponding PSTN messages and vice versa or assembles IP packetized media or render it as PSTN media and vice versa. VoIP features are built into endpoints, following the core internet architectural principles, and work the same way no matter how one obtains IP access (Frey & Zenner, 2004; Ramakrishnan, Rao & Nagaraja, 2008).

The technology derived from the use of IP, seem to be displacing the old as convergence continues to exert pressure in the industry (Joseph, Justl, Magee, Mukhopadhyay, & Sun, 2005). Convergence is motivated by regulations and by today's sophisticated telecommunications subscribers who firms must attract with innovative strategies such as integrated services and service bundling (Joseph et al., 2005). The strategies give rise to displacement and substitution of traditional services, a situation which mirrors the Schumpeterian dynamics of creative destruction. A need to find a fit between innovations that spur the growth of emergent products and government regulations that protect consumers arises.

Telecommunications industry leaders and researchers need to understand how a fit or failure to find a fit between innovation and regulation connect with the performances of both incumbents and emergent firms in the U.S. telecommunications industry. Government regulations and technological innovation exert significant competitive pressure on the leader's ability to create competitive advantage and enhance performance (Scott & Davis, 2007). Performance outcomes are enhanced when an appropriate fit among strategy, structure, and

context exists (Greguras & Diefendorff, 2009). One can extrapolate that innovation strategy-regulation fit may account for variations in telecommunication firm performances.

Literature on the fit traditionally falls in the domain of strategic management. Emerging views extend the strategic management theory using systems dynamics into complexity and chaos theory (Scott & Davis, 2007). Two perspectives are examined on the fit and performance: complexity theory and strategic management perspectives.

Theoretical Framework

In the systems view of organizations, firms are conceived in terms of an external environment partially consisting of regulations, an internal organizational and technological context that leads to firm performances, and an innovative leadership strategy that predicts the efficient use of company resources (Scott & Davis, 2007). Innovation strategy, performances and regulations are variables pertaining to a firm and its environment (Scott, 2003) and are reviewed within the context of strategic management, complexity theory and Schumpeterian dynamics. Each framework provides partial insight into the research question and hypotheses to be tested.

Complexity View of Organizational Performance

The complexity approach provided a framework for understanding how there has to be a firm with innovative orientation and a regulatory environment in the first place (Grobman, 2005; Scott & Davis, 2007). Environmental factors such as the national economy, the politico-administrative conditions, the demographic mix, the ecology, and regulations do influence the organization. The more turbulent the environment, the more resources are needed by the firm to perform its functions and strive to be competitive (Scott & Davis, 2007). Resources enter the organization through a multitude of feedback loops with internal screening done at the resource recipient end (Grobman, 2005).

A change in an environmental factor like new technology will cause a response from the stakeholders who need to seize the opportunity. The web of feedback loops link the environment to the firm and between firms so that any change of regulation or innovation causes the system to adjust its strategic and operational initiatives to avoid tipping over into chaos (Grobman, 2005). Certain changes do not dynamically maintaining optimal performance and some may completely collapse. Weick (1989) called the latter a collapse of sense-making which must be avoided if firms or economic growth systems such as telecommunications firms must survive.

The firm exerted a reverse pressure on the regulatory environmental actors through the implementation of innovative strategies. Striker (1980) found that the influences depend on the various social roles - regulators, consumers, promoters, or suppliers- in which the actors were engaged. Firm performance was optimal when a symbiotic relationship existed between regulation and innovation such that regulation is in dynamic congruency with innovation strategies. No studies examined the effects of dynamic congruence between regulations and innovation strategy and the relationships to the performance of telecommunication firms. The gap provided a rational for studying variations in service quality and profitability in order to find the fit or congruence between regulation and innovation in different telecommunications markets.

The Fit, Performance, and Strategic Management

The focus of numerous research studies in strategic management has been on the fit between different organizational attributes and the environment as critical to a firm's performance (Grant, 2007; Mintzberg et al., 2003; Shilling, 2004). During a time of open market diversity triggered by information technology innovations, many firms are driving towards a specific strategy orientation in the hope of finding competitive advantage. The core ingredients

of strategy should reflect the dynamic process of creating a successful innovation and its implementation (Shillings, 2004). In the process, some firm leaders seem to ignore the need to fit innovation strategy to an industry context. Regulators are also caught between legacy regulation and complete deregulation in an attempt to enhance performances in a competitive telecommunications marketplace.

Low and Mohr (2001) noted that to maintain a competitive advantage, firms must uphold a culture of organizational learning that opens a pathway for innovation. Regan and O'Connor (2002) stated, "Innovation isn't just the new strategy; it's the only strategy for businesses that want to thrive in the new millennium" (p. 47). Innovation has become synonymous with strategy (Lo & Wang, 2007) and companies in the new global society are required to invest adequately in innovation. Lo and Wang (2007) stated that firms operating within an innovative industry setting will perform better if they adopt a prospector strategy while those in non-innovative industry will do best with defender strategies. The statement suggested that certain distinct ties exist between innovation strategy and regulation.

To find the ties between fit and organizational performance, strategic management views required researchers to measure a dependent attribute keeping the other element of the fit constant so as to observe the relationships with firm performance (Mintzberg et al, 2003). When performance increases or decreases as both the innovation strategy and regulations change, variables are said to correlate with one another. An analysis of three currents of literature on the fit concepts will allow a postulation of the main research interest in the proposed research study.

Schumpeterian Dynamics

Industries and firms evolve over time. In this dynamic evolutionary process, strategy, regulations, knowledge, technology, and other industry conditions constrain innovations,

sometimes smoothly and sometimes radically, changing organizational performance (Malerba & Cantner, 2006). Miles and Snow (2003) envisaged three perspectives from which organizations can evolve: stable, dynamic, and internal network organizations. Stable network organizations appear in mature industries where a large core of firms creates relatively long-term ties with upstream and downstream partners as in the power industry (Scott & Davis, 2007). Dynamic network organizations exist in industries with short product cycles such as telecommunications. Alliances between firms in such environments are temporary.

Scott and Davis (2007) saw strategy as "the determination of the basic long-range goals and objectives of an enterprise, the adoption of courses of action, and the allocation of resources necessary for carrying out these goals" (p. 317). The primary concerns on strategy were to link the organization to its environment. Miles and Snow (2003) determined that strategy, structure, technology, and people were critical components for bringing about innovation and in shaping industry competition. Innovation strategy had a business strategy component. A firm's strategy or physiology was that which enables the firm to learn and adapt to its changing environment (Haag, Cummings, & McCubbrey, 2005). Based on this view, Miles and Snow (1994 as cited in Scott and Davis, 2007) identified four types of firms in terms of their dominant strategy. Reactor firms react to a given environmental condition.

> Prospector firms anticipate and shape the development of the market through their own research and development efforts, focusing on innovative products and services. Defender firms wait until technologies and products designs have stabilized and focus on the development of process efficiencies. Analyzer firms combine the prospector and defender strategies, creating a base of established products to which they add selected new products and services (Scott & Davis, 2007, p. 318).

Faced with new constraints and with a willingness to take risks and try new ideas in the hope of better performances, each firm unleashes the forces of creative destruction (Alcouffe & Kuhn, 2004). New technologies, new products, and new types of organizations compete against older ones, and the less successful go extinct (Schumpeter, 1976). Such is the classical growth model in market economies.

Alcouffe and Kuhn (2004) asserted that in the Schumpeterian growth model, the blueprints for innovation were generated by the productivity of research enhanced by the public stock of knowledge that accumulated along previous innovations. Before the next innovator replaced a firm, each innovating firm had temporary monopoly power in providing the respective intermediate products. By making a previous innovation obsolete, a successful innovator captured a part of the surplus which his predecessor would have appropriated, assuming the firms operated free of government regulations. Some firms in today's telecommunications market are subject to local telecommunications regulations while others are not. The Schumpeterian dynamics needed in a competitive market seemed to be distorted.

Current Literature on Fit and Performances

Regulations influence firm performances as well as innovations (Kropp & Zolin, 2005; Lee & Carlson, 2007; Qu, 2007; Stel, Storey, & Thurik, 2007). Organizational performance comes from a synthesis of individual and many organizational factors. The study integrates and builds upon a fit of innovation strategy and regulatory framework as an essential ingredient for firm performances. The review explores literature on the complex interaction between regulation-innovation fit and telecommunication firm performances.

Individual-Organizational Fit on Performance

Individual-organizational fit relates to the ability to match a group or groups of organizational characteristics with patterns of personal values (Li, 2006). Several researchers have shown interest in this kind of fit. The findings indicated that individual-organization fit plays a key role in employee motivation, commitment, and performance (Alstine, 2005; Levesque, 2005; Taris, Feij, & van Vianen, 2005). Recruits whose values match those of their employment firms adapt faster, exhibit higher satisfaction and motivation, and remain longer with the firm (Levesque, 2005). The congruence of individual and firm values created the satisfaction that generally translates into more productive performance (Alstine, 2005).

A disadvantage in hiring people whose values match organizational values was that high levels of conformity within a firm created a high propensity to stagnate levels of firm innovativeness. Denison (1990) found that firm employees who fall within a closed temperament type and perspective perform more effectively. In the long run, such firms perform poorly due to the absence of "out of the box" thinking which resulted in low organizational adaptation.

Results of this nature stimulate the need for further research in this area. Li (2006) extended the individual-organizational fit to include leadership behavior. Li (2006) found that leader behavior strongly affects individual-organizational value fit. The findings on individual-organizational fit may in no way come close to the concerns of regulation-innovation fit on performance. Yet they allow one to understand the depths at which the concept of fit has been studied and the role that matching individual and firm characteristics may have on organizational performance.

Organization-Organizational Fit on Performance

Studies on organization-organizational fit examined the interactions between two or more firm attributes and shifted the fit discussions from individuals to groups or organizations. From the seminal work of Chandler (1962) who suggested a fit between firm diversification and administrative system, researchers have been exploring how the relationship between two or more organizational variables connect with firm performances. Rumelt (1974) suggested that a firm's performance and competitive advantage resulted from a fit of firm strategy and structure. Strategy is a complex concept encompassing many different aspects of a firm.

Miles and Snow's (2003) configuration theory identified three ideal strategy types which uniquely represent contextual, structural, and strategic factors influencing firms: prospector, defender, and analyzer. Defender firms thrive in narrower and stable markets, devoting energies towards cost control and efficiency improvements or incremental innovation (Lo & Wang, 2007). Prospector firms have flexible structures, wide and uncertain markets, and concentrate on radical innovations that push competitors to react quickly to change (Lo & Wang, 2007). Analyzer firms fall between these two extremes. They act as radical innovators in unstable markets and as defenders and incremental change agents in stable markets.

Adding on to the strategy/structure fit concept, Liao (2006) analyzed the relationship between human resource management and organizational life cycles and found that a match between the two enhanced the firm's performances. Organizational risks and capital investments fit also enhanced performances (Bhattacharya & Whealey, 2006) just as much as does outsourcing strategy and business strategy fit (Lee, 2006). In a like manner Van der Stede, Chow and Lin (2006) demonstrated that matching strategy with an appropriate performance measurement tool was related to the financial performance of the firm.

In spite of all the above that added little to the literature on innovation strategy and regulations fit and their relationships to firm performances, Congden (2005) provided empirical support that good strategy-technology fit impacts profitability, thus furthering the understanding of strategy-technology linkages. The next step was to broaden technology to include soft technologies such as human processes and regulations. Government regulations fall within the broader environment of the firm and continue to influence firm behavior (van Stel, Storey, & Thurik, 2007). In a complex and interdependent industry such as telecommunications, competitive advantage will come from bridging functions within the organization with those outside the boundaries of the firm. A review of the organization-environment fit literature becomes an imperative.

Organization-Environmental Fit and Performances

Lo and Wang (2007) identified how firms choose business strategy in innovative and non-innovative industry environments to achieve organizational performance. Using an ANOVA test to research business strategy and firm performance relationships in two types of industries, Lo and Wang concluded that the difference in the product quality for defender firms in a non-innovative industry and prospector firms in an innovative industry was not significant. The results supported the view that firms must review the industry environment and analyze both the competition and the variety of products before selecting a strategy.

The researchers did not concentrate on how the fitness of environmental factors (such as federal, state, and local regulations) and business strategies defined in terms of innovation strategies relate to organizational performance. Part of Lo and Wang's (2007) work was based on a Taiwanese high technology industry characterized by a high rate of research and development

to sales ratio and a high rate of increase of automated facilities. High risks and uncertainty was ushered by a shorter product life and an emphasis on technological innovation.

The innovative U.S. telecommunications industry displays some of these characteristics. The increasing penetration of service bundles from innovative competitors offers customers a wide variety of new service options to choose from. Old firms make way for new ones and trigger a debate on the creative destruction of the old by the new and the role of regulation or deregulation on firm performance (Day, Gunther, & Schoemaker, 2000). No studies were found that investigated the relationship between innovation strategy, local telecommunications regulations and telecommunication firms' performances.

Current Literature on Research Variables

Research linking innovation strategy, regulations and firm performances are few and reveal mixed results about the relationship between the variables. The studies examined two of the variables at a time. On the one hand, the studies focused on predicting performances as regulations change. On the other hand, some studies examined the influence of innovation on firm performances. The findings and limitations are discussed.

Regulations

Government regulations are an important societal asset for influencing corporate behavior (Lau, Law, & Wiederhold, 2006; Qu, 2007). In the United States, regulations are typically enacted by federal, state, and local governmental institutions. The multiplicity of regulatory sources complements and sometimes modifies each other. These massive volumes of documents, each with its format, terminology, and contextual framework influence the performance of firms operating within a regulatory context (Lau et al., 2006). Research on the relationship between the determinants of corporate social responsibility, a form of regulation, on firm performance has

shown mixed results (Auperle et al., 1985). Earlier studies postulated a negative or no relationship between regulation and performance while empirical evidence from more recent studies indicated a positive relationship between regulations and performance (Qu, 2007; Waddock & Graves, 1997).

The enactment of the 2002 Sarbanes-Oxley Act prescribed stricter regulations concerning Boards of Directors (Lee & Carlson, 2007). The effect was an increase of independent boards and a reduction of the size of the Boards. Lee and Carlson (2007) found that entrepreneurial firms with the most independent Boards have better firm performance and lower insider ownerships. Entrepreneurs enhanced growth by introducing new products or methods and driving modern economies (Schumpeter, 1976). The conceptual role that government regulations play in a firm's structure and performance generally showed a positive correlation (Kropp & Zolin, 2005). Entrepreneurial business ventures generated innovations through constant review of performance and continuous improvements, creative destruction, and creative transformation (Terziovski, 2002; Ventkantaraman, 2004).

Regulation influenced firm's innovation strategies and performance (Kropp & Zolin, 2005; Lee & Carlson, 2007; Qu, 2007; Stel, Storey, & Thurik, 2007). The complex interaction between them was not without interest to policy makers, entrepreneurs, practitioners, and scholars in the U.S. telecommunications industry. Regulatory obligations and the influence of performance underscored the urgency to provide insights on the impact of regulation on the U.S. telecommunications industry and to understand how the interaction between innovation and regulation jointly affects firm leadership performances.

This research study investigated the fit between regulation and innovation as hypothesized in H_o5 and H_o6 as well as the relationship, if any, between innovation strategy and

performance (H_o1 and H_o2) and local regulations and performances (H_o3 and H_o4) in the telecommunications industry. Each pair of hypotheses investigated one independent variable as a function of two performance variables, service quality and return on investments. A model with all proposed relationships is shown in Figure 3.

Between October 2005 and December 2006, nine U.S. states adopted new laws concerning the regulatory regimes of the local carriers and a majority of states now apply some form of regulations on one or more voice communications providers (Perez-Chavolla, 2006). Based on Perez-Chavolla's findings, state telecommunications regulatory frameworks fell into four clusters: (a) complete deregulation of all telephone services, (b) complete regulation of all traditional phone services, (c) regulation of basic telephone service only, and (d) regulation of basic and non-competitive services. A critical challenge facing scholars, practitioners, and regulators was to organize and manage a well-planned regulatory framework that matches the direction of the industry innovation and vice-versa and reap optimal benefits for firms and consumers.

Fit

Strategic management theory maintains that firm performance will be positively influenced only if a fit existed between firm innovation strategy and industry environment (Van der Sted, Chow, & Lin, 2007). Literature provided little or no insights on the interactions between innovation strategy and regulation on a firm's performance. More difficult is the task of imagining how variations in regulations across states in an innovative U.S. telecommunications industry influence firms in the industry. The challenge is highlighted in the last two research hypotheses relating firm performance as a function of geographic markets and industry concentration. Testing H_o5 and H_o6 will enable the researcher determine the enabling effects or

not of regulatory frameworks on firms operating within the innovative telecommunications industry.

Innovation Strategy

Innovation is a critical ingredient in knowledge management (Regan & O'Connor, 2002). Marques and Simon (2006) saw knowledge management (KM) in terms of an organizational innovation involving changes in firm strategy and practice with the hope of developing an innovative culture and best management practices. Intellectual capital, a key ingredient in KM processes, is made of innovation, human, and process capital. The three mutually influence each other (Huang & Liu, 2005).

Marques and Simon (2006) observed the absence of models that provide insight on the correlation between practices in knowledge management or innovation and performance of firms in the biotechnology and telecommunications industry. Empirical investigation led to results reflecting a strong positive correlation between the adoption of innovation practices and firm performance (Marques & Simon, 2006). The result suggested that a firm's capacity to create and use knowledge leads to improved performance and competitive advantage.

Youndt et al. (2004) supported the finding with studies positing the existence of a mutual correlation among components of intellectual capital and the collective display of intelligence within a firm. The interactions of the various components of intellectual capital and subsequent synergetic effect on firm performance remained unclear. This lack of clarity prompted Huang and Liu (2005) to expand prior research conducted by Canibano, Garcia-Ayuso, and Sachez (2000) wherein the investigators found that intellectual capital investment has a nonlinear effect on performance. The interactions between intellectual capital components also influence performance as Huang and Liu (2005) demonstrated using accounting data on rate of return.

The researchers concluded that innovation positively affects a firm's performance while its square term was negatively associated with a firm's performance. In other words, innovation was positively correlated to performance at the initial stages of research and development interventions. Performance improves to an optimal level of sales revenue before falling. The interaction between innovation capital and information technology (IT) capital was also found to relate to firm performance positively. Darroch (2005) using structural equations modeling found no correlations between innovation and performance, contradicting earlier research reported in this area.

The seeming contradictions urged the formulation of two new hypotheses relating innovation strategy and firm performances in the telecommunications industry. The hypotheses H_{o1} and H_o2, relating innovation and performance within a specific regulatory framework complemented the other two hypotheses seeking to find a relationship linking innovation, regulation and firm performance, H_o1 and H_o2. The result adds insight on the innovation-regulation-performance debate.

Institutions

Institutions, unlike regulations are mechanisms that coordinate people and group processes to create economic value (Potts, 2007). Contrary to ecological theorists who see the role of the general social process originating from competition for scarce resources as factors affecting the fate of organizations, "institutional theorists broaden the framework to comprehend the role of regulative, normative, and cultural forces working to constrain and constitute organizations" (Scott & Davis, 2007, p. 258). These process-structures of coordination explain economic activity.

An institution involves people who are subjected to rules, regulations, and a governance system (Scott & Davis, 2007). Institutions are analogous to a social technology in a competitive game and an institutional analysis reviews the most efficient ways of using these social technologies (Potts, 2007). Regulations may not be entirely subjective or objective, but they provide the rules for coordinating the economic actions of humans, firms and the material environment (Potts, 2007). Regulations exclude the normative and cultural aspects of institutions.

Conceptual Framework with Study Variables

The emergence of the network economy has increased complexity, facilitated connectivity and transformed business systems (Fontannaz & Oosthuizen, 2007). The implication is that traditional management approaches may not resolve the challenges of complexity inherent in organizational variables like innovation strategy, local telecommunications regulations and firm performance. Strategic management framework and complexity theory link a fit of two or more variables with firm performance. Strategic management theory, complexity theory and Schumpeterian dynamics provide an overall framework with which the dependent and independent research variables and the interrelationships sought in the research hypotheses are analyzed. Literature review on the dependent and independent variables follow.

Dependent Variable Literature

The dependent variables are components of organizational performance. Organizational theory literature is not consistent in defining organizational performance or effectiveness due to multiple paradigms from which an organization can be viewed: a rational, natural, open, or complex systems paradigm (Scott & Davis, 2007). Each view culminates on a different set of

performance measuring criteria. Divergent views on organizations and their performance may urge one to refrain from asking about how well an organization is doing. Evaluating organizational performance is essential and necessary because the performance evaluation provides learning to individual, groups and organizational leaders.

People use performance measurement to provide insights on the state of affairs, value, importance, and quality of a program, proposal, person, or policy (Hannum, Martineau, & Reinelt, 2007). Assessing performance provides an opportunity for organizations to identify problems early enough and take corrective measures before problems are amplified or escalate. Given the benefits, measuring organizational performance should find a stronghold among researchers and practitioners. Kueng (2000) found that performance is not measured by a common indicator, but by the degree of investor satisfaction, employee satisfaction, customer satisfaction, societal satisfaction, and continuous improvements or innovation.

Traditional methods used output-oriented dimensions of systems performance, information effectiveness, and service performance (Cha-Jan Chang & King, 2005). Service performance assessed the user's experience with the service provided such as quality and flexibility. Information effectiveness assessed the ratio of attainment of organizational goals (Scott, 2003). Goals may be evaluated in terms of design, operations, use, and the effects of information on the user's job. Emerging views were based on system performance and assess systems reliability, response time, ease of use, and the effects on the user's work.

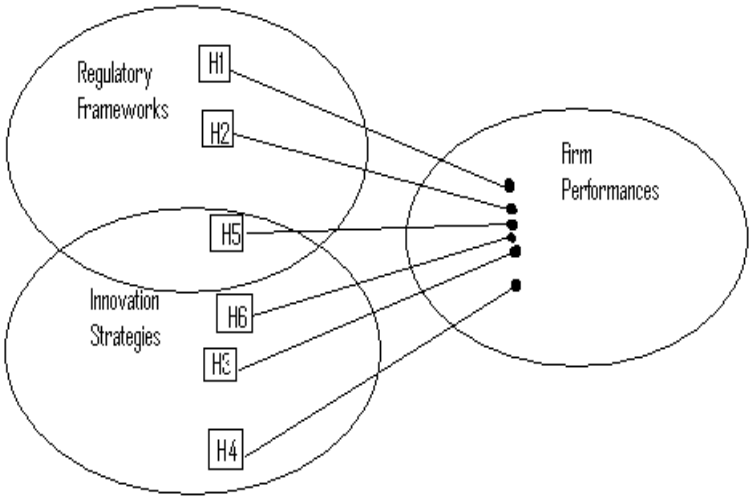

Figure 3: *Conceptual model by researcher with all research hypotheses*

MacPherson and Pabari (2004) found that "in order for an organization to remain viable over time, it must be both financially viable and relevant to its stakeholders and their changing needs" (p. 232). The assertion was more appropriate in a dynamic industry like the telecommunications industry where firms must continue to produce superior quality services to remain relevant to the consumers and stay profitable. Rather than analyze all aspects of a firm's performance, the proposed research study concentrated on service quality and the financial profitability indicator of return on investments (ROI) as reported by the U.S. telecommunications firms. The use of survey instruments on consumers as a measure of service quality was avoided, given the overall need of comparing quality and profits as a function of regulatory frameworks of firms with varying strategies. Relevance was measured by service quality, and financial viability was measured by a profitability indicator.

Service Quality. An organization can gain a competitive advantage by providing high quality goods and services (Crosby, 1979; Deming, 1986; Juran, 1988). Good quality may

influence cost and create satisfied customers (Slack et al., 2003). Research on service quality concentrated on the satisfaction of users and paid little attention to the role and efforts of the service provider (Schofield & Breen, 2006). Svensson (2002) asserted that both perspectives should be considered in service quality measurements. Supplier perceptions were related to internal and external performance indicators used in creating a satisfied customer who helped in creating a competitive advantage for the organization (Schofield & Breen, 2006).

Faced with a climate of fierce competition, U.S. telecommunications firms cannot overlook service quality as a source of competitive advantage. The present research study involved measuring a telephone service provider's response to customer perception and expectations within various regulatory frameworks. Service quality was viewed in terms of customer complaints and service response time as reported in public and official databases. Mathematically, this could be modeled in the following way:

Service quality (SQ) = f (regulation, innovations) ……. (1)

Financial Profitability. To measure a firm's financial profitability, some researchers have used industry-adjusted net profit margins, return on investments (ROI), or return on equity (ROE) (Agle, Nagarajan, Sonnenfeld, & Srinivasan, 2006; Tosi, Misangyi, Fanelli, Waldam, & Yumarino, 2004). Others used stock-market-based (stock returns), resource based views and subjective indicators (Agle et al., 2006). In this study, the profitability index was limited to ROI expressed as the ratio of net income and the firm's reported total assets (Shiu, 2006). The ROI compares net annual benefits to the annual cost of doing business. The ROI was calculated from the difference between annual net benefits and annual costs as a ratio of the annual cost.

Independent Variables Literature

The model presented in figure three conceptualized the relationship between the independent variables and the dependent variables. Innovations strategy, regulations, and the interactions between them were three independent variables. For each variable, the investigation reviewed the definition, the concerns, and the conceptual view most appropriate for the study.

Innovation Strategy. The innovation system's literature offered a number of prisms with a different framework and focus through which to examine an innovation system (Rasmussen, 2007). Innovation is good business and relates to technology management (Davila, Epstein, & Shelton, 2006). Sorensen and Stuart (2000) studied innovation from the prism of patent-based inventions and research and development expenditures. Taylor and Greve (2006) saw innovation as a creative development of novelty and its application to generate a new product, while others viewed innovation as a ratio of new product sales to total sales (Shapiro, 2006). Davila, Epson, and Shelton (2006) extended the definition of innovation to include the incorporation of ideas, practices, and objects that the firms practicing them perceive as new.

The view of innovation as specific to a firm was relevant and appropriate to the present study because one can assume that a substantial inter-firm difference existed in the willingness to introduce innovation and change. The willingness to innovate was embedded in the initial resource endowment at a firm's conception and in the richness or leanness of the environment (Scott & Davis, 2007; Zyglidopoulis, 1999). The perceived differences in the embedded resource endowments of firms were the starting point for any substantial differences in innovation strategies of the individual firms.

Bhaskaran (2006) defined innovation as a strategic experimentation entailing risk-taking and change. Peter Drucker, on his part, saw innovation as an effort that creates change and a

clearly defined innovation strategy becomes a driver of change (Hoopes, 2003). The change perspective portrays innovation as something new to the world. New products, improvements, or revisions to existing products from a social network of the firms contribute to change and market mechanisms mediate the relationship between the firms operating within an institutional framework (Darroch, 2005).

Innovation includes introducing new products, developing and implementing new strategies to penetrate emerging markets, creating new sales formats, creating new organizational forms, and introducing new technology (Davila, Epson, & Shelton, 2006). New-to-the-world innovation in the telecommunications industry may be characterized as radical innovations, while the other categories may be characterized as incremental (Shillings, 2008). Incremental or radical innovation constitutes a new departure from the firm's existing practices or risk-taking efforts.

Incremental Innovation. Incremental or competency-based innovation is a measure of the extent to which newness builds on and reinforces existing competencies (Tushman & Anderson, 1986). Departure from existing competences is marginal and the risk levels are low and reflect the creative aspect of Schumpeterian growth dynamics. Incremental innovation improves quality, speed and effectiveness and successes in many firms are derived in large part from incremental innovation (Tidd et al, 2005).

Radical Innovation. Radical innovation perturbs the prevailing consumer behavior and firm competences with drastically new products and value propositions and reflects the destructive dynamics (Danneels, 2004). Radical innovation is the destructive part of the Schumpeterian dynamics and presents higher risks to prime movers. Mackides (2006) saw radical innovation as a technology-based, supply-driven market with the power to undermine the

core competencies and enabling technology on which incumbents created their competitive advantage. Radical innovation reflected the extent to which technology advances the performance frontier beyond existing technology potentials (Gratignon, Tushman, Smith, & Anderson, 2002). Danneels (2004) described radical innovation as a replacement of existing competencies with new ones and incumbents with new entrants.

Shillings (2008) visualized radical innovation from a competence-enhancing or competence-destroying perspective. Competence-enhancing discontinuities build on existing technological stocks while competence-destroying ones required the development or acquisition of fundamentally new and complementary technological stock (Zyglidopoulis, 1999). Stock refers to a firm's accumulated technological knowledge and patents. In sum, innovation comprises a broad range of activities ranging from strategy, learning, process improvements, new products or ideas to radical innovation. Tidd, Bessant, and Pavitt's (2005) approach to measuring innovation anchored on the 7-point Likert scale covers these elements and has been modified for the purpose of measuring innovation strategy.

Regulations. Government regulation is generally viewed as a change agent influencing corporate behavior by defining business game rules (Joseph, 2002; Qu, 2007). Gwartney and Lawson's (2005) reported on the Economic Freedom of the World (EFW) that regulations consisted of 15 components which can be grouped under credit market, labor market, or business regulation. The focus of the present study was on telecommunications business regulation and its relationships with a firm's performance.

Researchers have argued that managers lack the ability to subordinate their quest to maximize profit for any social objective (Kolk & Tulder, 2002). Business self-regulation has been the outcry by incumbents in the U.S. telecommunications industry. The lack of

subordination provided a justification for the continued use of regulation in the U.S. telecommunications industry.

When businesses lose sight of the general good of the society, Thompson (1995) concluded that businesses like ENRON and WorldCom would be replete with cases of detrimental trade-offs as a result of emphasizing short-term profits over long-term considerations. Behaviors that run contrary to the public good gives rise to governmental actions that redirect business actions towards collective good. One may expect that the level of business regulation will influence firm performance, yet no well-developed theories exist on how regulation and performance were related (Dawson, 2006). This dissertation explored three kinds of local telecommunications regulations prevalent in three sample U.S. states.

Regulation-Innovation Fit. Telecommunications firms are complex systems in which a very small change in the founding conditions may trigger significant organizational changes in the entire system (Anderson, 1999). Each component of the complex system interacts with other parts through a web of feedback loops such that a change in the regulatory framework may trigger important innovative responses from firms that seek to maintain a competitive advantage. The outcome was reflected at a firm's performance level. Complexity theory and strategic management theory supported optimal performance at an appropriate match of regulation and innovation and less than optimal performance at a misfit. The industry concentration with the optimal performance represented the best regulation-innovation fit.

Moderating Variable. Several moderating or control variables, such as firm sizes, firm ages, performance trends, and industry concentration, can be observed. Rather than monitor all moderating variables, only the extent to which a small number of large firms retain the dominant share of industry sales will be calculated from FCC data. Industry concentration has been argued

to influence levels of firm performance positively and negatively, depending on the industry type (Spanos, Zaralis, & Liouskas, 2004). Greiger, Ritchie, and Marlin (2006) asserted that a relevant measure of effective competition within an industry does not depend on the number of competing firms but on the concentration of sales among leading firms, also known as the Herfindahl-Hirschman Index (HHI) in the industry. The HHI was calculated for the sample states.

Conclusions

The review indicated that the focus of numerous researchers in strategic management was on the fit between different organizational attributes and the organization's environment (Grant, 2007; Mintzberg et al, 2003; Shillings, 2004). Fitting variables was critical to a firm's performance. No study examined fitting regulation and innovation strategy in order to examine their relationship with firm performance.

Recent changes in government telecommunications regulations focused on "unleashing the power of existing markets and the creation of new ones rather than the control of market power" (Robison & Weisman, 2008). The infrastructure supporting end-user communication devices and maintaining market power for incumbents have been changing. Legacy regulation and end-user demands continue to put pressure on telecommunications service providers to find new strategies to satisfy customers and improve financial performance. Innovation has been consistently used as a synonym for strategy (Lo & Wang, 2007).

The seminal work of Chandler et al. (2001) investigating the relationship between a fit between structure and strategy on firm performances led other scholars to examine the relationships between certain aspects of innovation, regulation and performance. Existing literature on the study of these issues in industries other than telecommunication provided mixed

results about the relationship. No study explored these relationships in the US telecommunications industry.

Fitting two or more variables to enhance performances has been studied at individual and organizational levels (Chandler, 1962). Denison (1990) found that firm employees with the same temperament performed better in the short run and the absence of "out of the box" thinking can be detrimental for the firm in the long run. Marque and Simon (2006) observed a strong positive correlation between the adoption of knowledge management practices and firm performances. Youndt et al (2004) posited the existence of mutual correlation between intellectual capital and the intelligence of a firm. Further research by Huang and Liu (2006) demonstrated a nonlinear effect of innovation on performance and the relation between intellectual capital and performance were unclear.

The literature supported a positive, albeit disputed relationship between innovation and performance, regulations and performance and fit and performance. The literature was lacking in identifying how innovation strategy and local business regulation can converge to enhance service quality and return on investments in the US telecommunications industry. The interactions between the changes in the US telecommunications technology and the responses of telecommunication regulators to fit innovation strategy and regulations remain unclear to the practitioners and scholars of the telecommunications industry.

Contradictory results of the like urged researchers to explore the relationships between two or more variables. The lack of research available on the US telecommunications industry and the connection between regulation, innovation strategy and their combined effect on productivity provided an incentive for this descriptive, correlational research. The study added

clarity to the relationships and helped leaders, strategists, and other stakeholders in the telecommunications industry.

Summary

Organizations are unique and so are the key factors affecting firms (Latham & Vinyard, 2006). A review and summary of research relating innovation strategy, regulation and the influence of a fit between these variables on organizational performances has been presented. The underlying theoretical framework was based on strategic management theory, complexity theory and Schumpeterian dynamics. The theories focused on fitting two or more organizational variables and analyzing influences of firm performance and competitiveness (Mintzberg et al, 2003).

Strategic management theories and complexity theory provided the framework for investigating the predictor variables of innovation strategy and local business regulations, and the reactor variable of performance (Minztberg et al, 2003). Miles and Snow (2003) identified four innovation strategy types common in organizations. The innovation strategies and changing regulations continue to influence the performance of U.S. telecommunication industry (Hazzlett & Caliskan, 2008).

The relationships between the variables and the conceptual dimensions of the research variables were presented. Innovation strategy was seen as specific to firms and a measure of a firm's willingness to innovate (Scott & Davis, 2007). Innovation entails a creative as well as a destructive aspect of a business. Creative or incremental innovation reflected the extent to which innovation builds on existing competencies (Tushman & Anderson, 1986). Destructive or radical innovation introduced higher risks to prime movers and undermined the core competencies and enabling technologies on which incumbents created competitive advantage (Makides, 2006).

Regulation was limited to the rules governing business operations (Qu, 2007). Performance was tailored to service quality and return on investments (ROI) (MacPherson & Pabari, 2004). Service quality focuses on firms' response times to solving problems and ROI was calculated from annual net benefits and annual costs (Shiu, 2006).

Geiger et al (2006) found that for a given environmental condition, only certain innovation strategies were recommended if a firm must perform optimally. Innovation and regulations have transformed the telecommunications industry from one that was nearly a perfect monopoly to one in which the Schumpeterian dynamics is actively at play (Hazzlett & Caliskan, 2008). Yet literature linking innovation strategy, regulations, performances and the interaction between the variables is rare.

Chapter three introduces the research method, the research sample, validity and reliability concerns in an effort to find a relationship between the research variables. The rational for the choice of a quantitative, descriptive and correlational design is provided. Finally, a detailed presentation of data collection methods and data analysis tools for the study is developed.

CHAPTER 3: RESEARCH METHOD

This quantitative, descriptive correlational study examined the relationship between innovation strategy, regulations and firm performances in the US telecommunications industry. A firm's innovation strategy enables the organization to adapt to its changing environment (Haag, Cummings, & McCubbery, 2005). Miles and Snow (1994 as cited in Scott and Davis, 2007) identified levels of innovation strategies corresponding to prospector, analyzer, defender, and reactor types. The levels of innovation strategy and the rules guiding the provision of local telecommunications services were examined within the framework of strategic management theories to investigate relationships with performances.

Strategic management theories asserted that using one strategy in a regulatory framework may lead to competitiveness while the use of another may not (Mintzberg, 2003). Strategic management and Schumpeterian dynamics provided a rational for investigating the complex relationship between innovation strategy, regulations and firm performances. Firm performance was viewed from the quality of service and profitability perspectives.

The research questions and the hypotheses were used as the foundation on which to develop the methods and tools needed for investigating the relationship between innovation strategy, regulatory frameworks and firm performance. Discussions on the appropriateness of the method and the design are presented. A description of the unit of analysis, research population and sample, the informed consent and instrumentation follow. The final sections focus on data collection methods, efforts to increase research validity, and the reliability of measuring instruments.

Research Questions and Hypotheses

The research questions sought to enhance an understanding of the relationship between leadership innovation strategies, regulations and firm performances. Answers to the questions provided insight on what innovation strategy generates optimal performance to firms operating within specific regulatory conditions. Both research questions and hypotheses serve to guide and focus the study to test and generate theory regarding firm innovation strategy, regulations and telecommunication firm service quality and return on investments. These were investigated using the following research questions:

RQ1: Are telecommunications firm performances related to variations in local telecommunications regulations and leadership innovation strategy firms?

RQ2: Do best or worst cases of regulations exist in an innovative industry?

The questions aimed at establishing a link between regulation, innovation strategy and the interactive effects of the independent variables on the dependent variables. RQ1 led to an examination of the degree to which telecommunications firm performances were correlated or not with the innovation strategies of firms in the telecommunications industry. Examining the relationship of firm innovation strategies and business regulations on service quality and profits in an innovative telecommunications marketplace becomes an imperative. RQ2 posed a question on the level of innovation strategy that result in competitive performance under specific regulatory conditions. The hypothesis tests provided insight on a telecommunications firm's ability to remain competitive in spite of changing regulatory conditions. Four null and alternate hypotheses emerged from RQ1. RQ2 led to two null and two alternate hypotheses.

Hypotheses

To provide insight on research question one, four hypotheses have been formulated. Each hypothesis identified regulatory frameworks and innovation strategies that enhance firm performance. The research was consistent with classical strategic management theorists' assumptions that government regulations and leadership innovation strategies have independent and interactive actions on the firms' performance. The hypotheses were based on a synthesis of three strategic management lines of thought that have established linkages between fit and performance, innovation and performance, and regulations and firm performance.

H_o1: A correlation does not exist between telecommunications firm's service quality performance and firm innovation strategy.

H_a1: A correlation exists between telecommunications firm's service quality performance and firm innovation strategy.

H_o2: A correlation does not exist between telecommunications firm's return on investment and firm innovation strategy.

H_a2: A correlation exists between telecommunications firm's return on investments and firm innovation strategy.

H_o3: A correlation does not exist between a telecommunications firm's service quality performance and the regulatory framework in which the firm does business.

H_a3: A correlation exists between a telecommunications firm's service quality performance and the regulatory framework in which the firm does business.

H_o4: A correlation does not exist between a telecommunications firm's return on investments and the regulatory framework in which the firm does business.

H_a4: A correlation exists between a telecommunications firm's return on investment and the regulatory framework in which the firm does business.

To determine which combination of regulation and innovation strategy for which the performance of firms are highest, the following two hypotheses in relationship to RQ2 were tested.

H_o5: The service quality performance of telecommunications firms is the same, irrespective of the interaction between business regulation and innovation strategy.

H_a5: The service quality performance of telecommunications firms is not the same, irrespective of the interaction between business regulation and innovation strategy.

H_o6: The return on investment of telecommunications firms is the same, irrespective of the interaction between business regulation and innovation strategy.

H_a6: The return on investment of telecommunications firms is not the same, irrespective of the interaction between business regulation and innovation strategy.

Research Method

To examine the association between innovation strategy, local business regulations, and telecommunications firm's performance required a quantitative, descriptive correlations non-experimental approach. Quantitative research approaches placed emphasis on using formalized standard questions and predetermined response options in questionnaires or surveys (Hair, Bush, & Ortinau, 2003). Quantitative methods are usually administered to a large number of respondents whose responses help to describe research variables and their relationships (Cook & Cook, 2008). In quantitative research, describing a trend means that the research problem can be answered best by a study in which the researcher establishes an overall tendency of responses

from individual samples and makes a determination on how this tendency varies among the research population (Creswell, 2005).

The present study focused on variables and the influence of the variables on one another. The research measured objective facts about firm innovation strategies, local business regulations, and their connections with the performance of sample firms. The study did not construct a social reality about the firms or their leaders. Research studies of this nature fall within the realms of quantitative inquiry (Neuman, 2006). Figure 4 presents a graphical illustration of the various activities performed.

Data on federal, state, and local telecommunications regulations, innovation strategies, and performance ratings of telecommunications firms operating in sample state geographic markets were collected and analyzed. The focus on telecommunications firms was necessary, given the dynamic changes brought about in the industry by the Telecommunications Divestiture in 1984 and the Telecommunications Act of 1996. These landmark changes stirred the emergence of new voice technology, new products, and a new battle for market dominance in the process of creative destruction with regulation (Schumpeter, 1954).

The research problem guided the choice of a theoretical foundation for examining the relationships between the research variables. The method and instrument used for measuring innovation strategy centered on the dynamics of innovation and innovation implementation (Shillings, 2004). Strategic management theory provided the guidelines for comprehending the dynamics of the independent variables--innovation and regulations--and how a fit or lack of it was associated with the dependent variables-service quality and rate of return (Mintzburg et al., 2003).

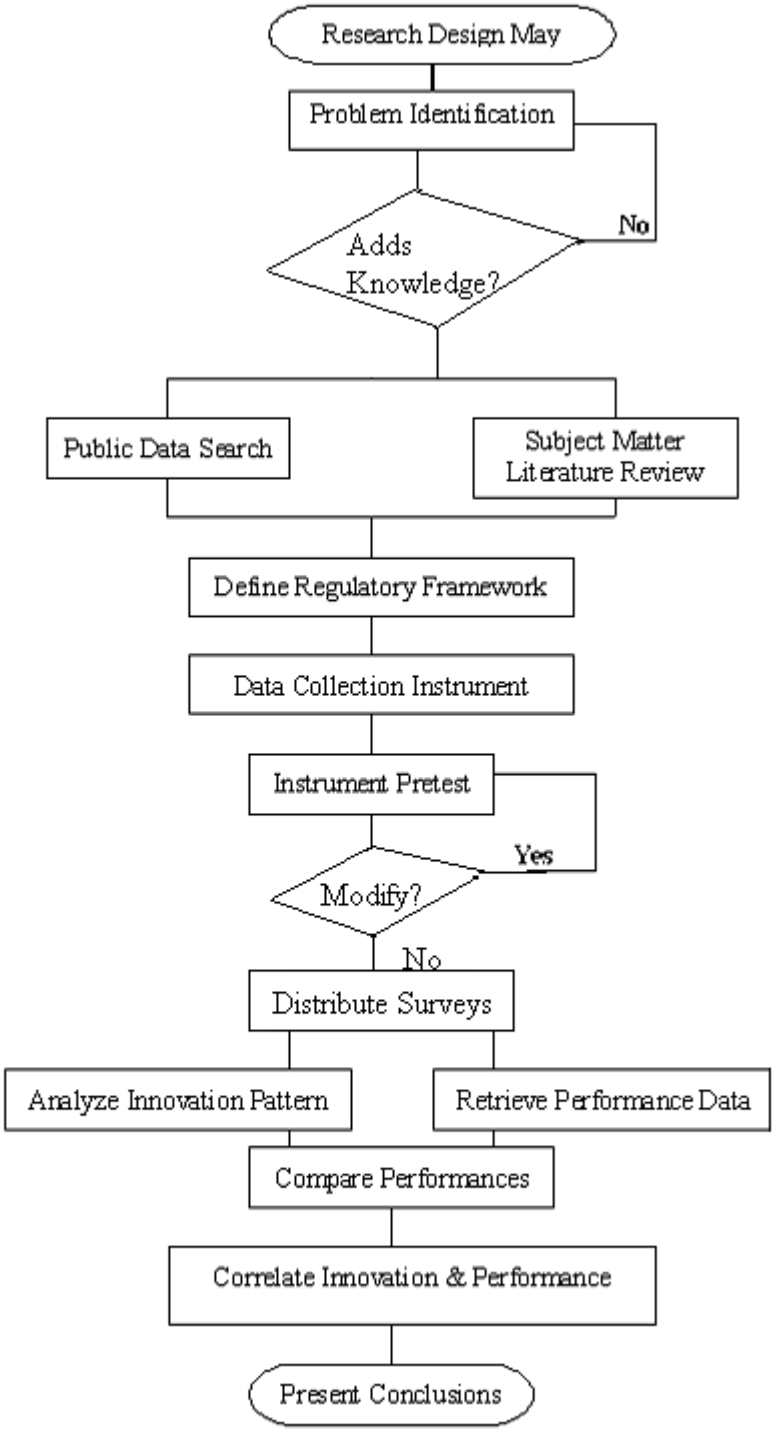

Figure 4: *Conceptual research method*

Fit represented the best adaptation of innovation strategy and local business regulation in the industry and was observed from a maximization of profit and service quality (Geiger et al,

2006). Fit was calculated from the regression equations linking innovation strategy, regulations and performance. Hypotheses H_o5 and H_o6 tested the equivalence of means in regulatory frameworks.

The research hypotheses H_o1 and H_o2 related the firm's innovation strategy to the firm's performance. The data from the study were used to determine and make inferences on the chances that variations in innovation strategy can predict changes in service quality and return on investment observed in various local telecommunications regulation. The next set of hypotheses provided a similar insight between local telecommunications regulations and performances. The final set of hypotheses, H_o5 and H_o6, analyzed the variances in firms' performance to determine the chances that differences in means could be attributed to a fit of innovation strategy and the regulatory framework in which the firm operates.

States and firms were grouped by state regulatory frameworks, and one state was selected out of each cluster for an examination of the relationship between innovation strategy and firm performance. An analysis of variance (ANOVA) was used to test H_o5 and H_o6 for variations in the firms' performances across regulation-innovation fits. A two tailed analysis of variance was used to investigate the relationships between any interactions and performance. Using regression analysis, the investigator analyzed the relationship between innovation strategy and service quality (H_o1), innovation strategy and ROI (H_o2) as well as level of regulations and firm performances (H_o3 and H_o4) in the U.S. telecommunications industry.

Appropriateness of Research Design

Quantitative, descriptive correlations designs were appropriate to the study, which was guided by hypotheses to seek evidence supporting or refuting theory on the relationships between innovation strategy, business regulation, a fit between innovation strategy and

regulations, and firm performance, (Creswell, 2005). Quantitative, descriptive correlational designs focus on the unique contribution of one or more variables on other variables in an open system (Neuman, 2006). Unlike an experimental study in which the researcher is able to manipulate research variables and control certain variables against the effects of the experiment, this cross-sectional quantitative descriptive non-experimental design did not allow any direct manipulation of variables (Salkind, 2006). The quantitative, descriptive correlational design involved "the collection of data to describe the existing conditions of the problem under investigation" (Hsu, 2005, p119).

A quantitative, descriptive correlations design was appropriate for this study aimed at producing results that are generalizable in the US telecommunications industry. The design asked specific questions, collected numerical data from participating firms and used statistics to analyze the data (Hart, 2008). Descriptive research describes the characteristics of an existing phenomenon by analyzing the interrelationship between multiple variables (Salkind, 2006). Correlational research explains an observed phenomenon through examining the relationship between variables (Cook & Cook, 2008).

The quantitative, descriptive correlational research design was set at the major telecommunications companies operating in three states with different local telecommunications regulations. The descriptive correlational study employed a non-experimental data collection technique. Descriptive correlational design was appropriate for the study because survey methods were used to obtain data from a population sample in order to describe the characteristics of the population (Salkind, 2006). The selected instruments had established reliability and validity scores based on previous results from other populations.

"Co-relational research describes the linear relationship between two or more variables without any hint of attributing the effect of one variable on another" (Salkind, 2006, p. 191). As a descriptive technique, the design provided information on whether variables shared anything in common. Creswell (2005) noted that correlational studies provide an opportunity to explain a relationship among variables.

The descriptive aspect of the study was complemented by the correlational aspect which "provide some indications as to how two or more variables are related to one another or in effect what they share or have in common" (Salkind, 2006, p11). Firms in a local telecommunications business area or cluster are viewed as one group and the group performance was compared and related with that of firms in another area with a different set of regulations. For each cluster, an assessment of the innovation strategies of sample firms was analyzed. The data were used to relate an innovation-regulation configuration with firm service quality and profitability.

This descriptive correlational design did not require a control group or an experimental group (Salkind, 2006). Firms were grouped in terms of the regulatory schemes in which they operated but no group was considered control or experimental. An ANOVA test was used to examine the differences in means of the variables and the interactions between variables within specific regulatory frameworks (Creswell, 2005). An ANOVA test provided insight on an appropriate mix of regulation and innovation necessary for leadership performance in a dynamic industry. The researcher had no control over the research variables warranting the use of a non-experimental quantitative descriptive correlations design (Creswell, 2005).

Population

The target population included major incumbent and competing telecommunications firms operating in three states of the United States of America. The local telecommunications

regulations of the selected states were different. Each of the three states was assumed to be within the confines of one of three regulatory frameworks as defined in Perez-Chavolla (2007). The frameworks included states with complete regulation of all basic telecommunications services, states with deregulation on all local telecommunications services, and states where only basic telecommunications services are regulated. Table 2 shows the three local retail regulatory categories as of December 2006 and the states in which they were practiced.

To examine the association between innovation strategy, local telecommunications regulations and performance, the levels of service quality and profitability of leading telecommunications firms in each regulatory framework was collected. The unit of analysis was the telecommunications firm. For each sample state, all incumbents and leading traditional and emergent local competing telecommunications firms were analyzed. Given that each firm operates within a specific regulatory type, the surveyed data on each sample firm's innovation strategy and document review for firm performance were collected.

Table 2: *Regulatory Frameworks (Adapted from National Regulatory Research Institute State Retail Regulation of Local Exchange Providers (2007).*

Regulated Local Telecommunications Services States	Deregulated Local Tele-communications Services States	States where only Basic Telecommunications Services are Regulated
FL	AK	AL, AR, CA, CO, CT, DC,
HI	NE	DE, GA, IA, ID, IN, KS,
MT	OK	SC, KY, LA, MA, MD, NE,
NH	RI	MI, MN, MO, MS, NC, NJ,
OR	SD	NV, NY, PA, SC, TX, UT,
TN	WY	WA, WI, WV.

Sample Criteria

The sample of firms in the proposed study represented 80% or better of the market shares of telecommunication service within a local business regulation area or regulatory framework. The sample was drawn from the incumbents, traditional competitors, and emerging firms in each regulatory framework. The chosen firms represented the largest, economically important, and innovative firms in each regulatory cluster. Incumbents and telecommunications firm leaders in the regulatory framework or firms with extensive programs to improve their activities were part of the survey. A base state such as New Jersey had three incumbents, cable and VoIP providers, and many competing local exchange carriers. Only the major carriers whose combined market shares accounted for 80% or more were considered.

A key criterion for selecting one state from a particular regulatory framework was the geographic similarity with a state in another regulatory framework. Geography, considered from spatial relationships, networks, or physical endowments, is known to matter in a firm's performance (Makino, Isobe, & Chan, 2004; Wan & Hoskisson, 2003). For this reason, a state like New Jersey in the geographic northeast urban market could not be compared with a state in a mountainous, central, regional rural market. The dissimilarities in size, population density, and growth of the telecommunications industry between the two regions may influence and affect the validity of the results, given that large organizations are more effective in shaping their own identities (Katz, 2003). Large organizations "are more able to resist immediate pressure for change and have more time in which to recognize external threats and adapt to meet challenges. "Growth enhances the organization's survival value by providing a cushion, or slack, against organizational failures" (Pfeffer & Salancik, 1978, p. 139).

Sampling Frame

The population included all incumbents and competing firms within a sample state. Surveying to obtain data on firm innovative strategies was an appropriate method for anonymously collecting data from a representative population (Salkind, 2006). New Jersey, Rhode Island, and New Hampshire, all geographical small states in the northeast United States were considered in the sample. The executives of the sample firms were contacted by email to obtain permission for the anonymous use of publicly available data. Respondents were asked questions relating to the firm's innovation strategy, technology and service quality standards. The results from the analysis of the relationship between innovation strategy, regulation and performance may be generalized to the entire population of firms in the North East of the US (Creswell, 2005). In states where less that six firms were present, all firms providing

telecommunications voice services were surveyed. Data on service quality and return on investment for the surveyed firms were retrieved from document reviews in federal, state and firm databases.

Informed Consent

The Code of Federal Regulations requires that respondents in research studies sign an informed consent form that guarantees them certain rights and protects them in the research process (Creswell, 2005). The informed consent form in Appendix B indicated the title of the study, the purpose, the data collection mechanism, the benefits to the respondents and information about the researcher (Creswell, 2005). In adhering to the protection of the respondents, the consent form mentioned the voluntary participation of respondents, the right to anonymity and the respondent's right to ask questions and get results from the researcher. Information about the study duration and instruments enabled the respondent make a decision about participation in the study. The informed consent form served as permission to use the survey results.

Confidentiality

In order to avoid the risk to confidentiality of firm intellectual property rights, all data collected and recorded were anonymous. The anonymous data were stored in a codebook and the codebook will be preserved for a period of three years (Neuman, 2006). Privacy included a respondent's rights to control the investigators access to respondent's personal information (Hicks, 2009). Privacy related to the firm's ability to block access to confidential information about the firm. Though data were collected from public databases and through a survey of company personnel, sharing this information will not be done with outside parties to the study.

After the sample firms' directors received and signed the consent forms, respondents were asked to return the signed forms by fax or email. Each consent form and surveys was given an access code number to represent the company before surveys were accessed and completed. Matching numbers assigned to respondents and surveys facilitated the administrative process and guaranteed respondent and firm confidentiality.

Each respondent was informed that a document review on the firm's service quality performance and profitability was conducted. The returned informed consent forms and the survey data will be securely stored for three years after the completion of the process. Access to the data will be restricted. Electronic data will be maintained in a memory stick. At the end of this period, all data will be shredded, bagged, and discarded, the hard drive and other media will be electronically erased and all paper data will be incinerated.

Geographic Location

An analysis of local telecommunications regulations seen in table 2 indicated that states in the North East United States exhibited all three types of local telecommunications regulations. Potential respondents were identified in New Jersey, Rhode Island and New Hampshire, three states that are easily accessible and in close proximity to each other. The proximity enabled short trips to meet with local respondents of incumbent and competing telecommunication firms. The three states' vicinity was representative enough to gather data from respondents and through document review to meet the sample criteria.

Instrumentation

Instruments measure information about variables identified in the study (Salkind, 2006). The study used separate instruments to measure service quality, return on investment, and

innovation strategy. The survey instrument was pre-tested to ensure reliability. A description of the selection of the instruments and the appropriateness of these instruments follows.

Selection and Appropriateness of Instruments

Performance, regulation, and innovation strategy were operationalized using different measuring instruments. The model of performance developed by MacPherson and Pabari (2004), based on a firm's financial viability and relevance to the changing needs of its stakeholder, and enabled an operationalization and simplification of a telecommunication firm's performance. The simplified view of performance suggested that firms must continue to produce superior quality products and services to remain relevant to consumers. Consumer relevance attracts customers who create a competitive advantage to the firm.

Document Review Instrument: Because data on service quality, financial profitability indicators, and regulations were based on a document review of actual ground conditions, a table was created on which data from public sources were entered. Sources were the Federal Communications Commission and other public websites. After scrolling to the service quality and financial sections of these web pages, notes were taken on all data relevant to the variables. This method was appropriate because it provided reported values from official sources.

"Customer expectations and perceive performance of service have been found to be the main antecedents of perceived service quality" (Chandha Kapoor, 2009, p 26). Perception of service quality can occur at various levels in a telecommunication firm. The average installation intervals in days, the out of service intervals in hours, and the state complaints per month per 100 lines related to a sample firm were available. Only the complaint per month was judged to be strictly relevant to the consumers' satisfaction and was recorded. The complaints reflected the tangibles, reliability, responsiveness and empathy of the performing firm.

Measuring of Return on Investments (ROI): The traditional measure of profitability is the internal rate of return (Gjesdal, 2007). The rate of return indicator was not chosen because uncertainty was not captured in the cash flow analysis. The return on investment (ROI) captured this uncertainty and ROI equals the cost of capital as the economy moved towards equilibrium (Gjesdal, 2007).

Literature provided numerous approaches and instruments for measuring the return on investments on information technology investments. Each approach has advantages and limitations. Approaches at firm level provided insight on the contribution of firm assets on a firm's performance while process level approaches can be cost based or knowledge value-added (Pavlou, Housel, Rodgers, & Jansen, 2005). Firm level method of production as reported by the firms was used. Process based methods would have been appropriate if the returns on innovation alone were needed. Rather, data relating to revenue and cost allocations for the entire sample firms were collected by surfing the web, reviewing public data in books and online. The results were presented in the form of tables.

Measuring Innovation Strategy. Measuring innovation or innovation strategy using a single yardstick captured part of what makes the new obsolete (Sapiro, 2006). The most appealing quantitative measure of innovation that can be derived from a technological system was the percent of revenue from new products (Fusfeld, Tipping, & Zeffren, 1995; Schilling, 2004). The percent of revenue may present some problems because products change all the time and answers to questions such as how new is new and how long before the new is old needed to be provided in order to use this yardstick (Schilling, 2004; Shapiro, 2006). Innovation extends product lines, develops and helps in implementing new strategies for penetrating new markets, and introduces new technology (Davila, Epstein, & Shelton, 2006).

Tidd et al.'s (2006) 7-point Likert-type scale approach to measuring innovation provided some underpinnings of what would otherwise be subjective judgments about the innovation capabilities of a firm. Five basic areas were considered in designing the survey instrument, with six or seven questions addressing each indicator (Tidd et al., 2006). The areas included strategy, processes, organization, linkages, and learning which leads to knowledge creation and application to solve practical problems. The new knowledge enables the firm to live with the perils and promises of innovation (Day & Schoemaker, 2000).

Tidd et al's (2006) framework for innovation strategy measurement was designed to balance the facts and the subjective judgments needed to measure the concept. The better each of the operational indicators fit with the defined variable, the greater chances were that one was measuring the variable one set out to measure. The instrument was selected because it balanced the facts and the subjective judgments inherent in measuring innovation strategy.

The instrument contained 40 Likert-type questions measuring innovation strategy, processes, organization, linkages, and learning. The learning aspect was in some cases used in a knowledge-based view of measuring return on investments. The instrument was developed and tested by "analyzing more than 100 firms and validated during the course of conducting a total of 27 case studies in 18 companies" (Tidd et al., 2006, p. 570). A pre-test of the innovation strategy instrument was also conducted to enhance reliability.

Pre-test of Innovation Instrument

Prior to data collection, the innovation strategy instrument shown in Appendix A was administered to 10 regulatory board senior personnel and six middle level managers of firms in New Jersey as a pre-test. The pre-test provided insight on the reliability of the instrument. The pre-testing of the instrument was done on firms other than those in the sample. The purpose was

to ensure that participating firms were not provided with clues on how to respond to the questionnaires.

Reliability

"Reliability means dependability or consistency" (Neuman, 2006, p. 196). In spite of the relative difficulty in finding accurate financial indicators of firms, a perceptual approach to measuring financial performance was not adopted. The goal was to avoid questions about the reliability of self-reported financial data. Reliability was an indication that the numerical results produced for the variables were not influenced by the measuring process. The dependent variables, profitability and service quality was extracted from federal and state databases that are generally considered sources of reliable data. The secondary cross sectional data were associated with existing performance and regulation indicators to meet conditions for concurrent validity (Creswell, 2005). The data collection instruments also met content validity and strong construct and predictive validity considerations (Creswell, 2005).

Research Validity

Validity can be viewed from a multiplicity of ways (Martineau, Hannum, & Reinelt, 2007). The various views provide insight on the effectiveness of the instrument in measuring the variable the instrument was designed to measure and monitor. Validity relates to research instruments, research subjects, the purpose of the research and its consequences on research findings (Salkind, 2006).

"Measurement validity refers to how well the conceptual and operational definitions mesh with each other" (Neuman, 2006, p. 192). Two other kinds of measurement validity were supported in the use of the variable assessment tools. These are face or construct validity and content validity. Internal and external validity are discussed after a review of these two.

Construct Validity

Construct validity is also known as face validity (Salkind, 2006). "Face validity is a judgment by the scientific community that the instrument really measures the construct" (Newman, 2003, p. 192). Construct validity enables one to affirm that a tool meant to measure innovation strategy does exactly so.

Service quality and rate of return have been used in many studies to measure performance. Reported values were used avoiding the need to design various instruments to measure the desired concepts. Local business regulations were the basis on which telecommunications firms do business in the states in which they operate. Existing regulations were used.

The innovation strategy tool was "developed and tested by analyzing more than 100 firms and was validated during the course of conducting a total of 27 case studies in 18 companies" (Tidd et al., 2006, p. 570). The participating firms attested that the instrument reliably measured what was set out to be measured. A pre-test of the instrument on 10 regulatory board senior staff and six middle level managers of randomly selected firms in New Jersey confirmed the face validity of the instrument.

Content Validity

Content validity refers to the degree at which the full content of the conceptual definition of a variable is represented in an instrument measurement and how well the instrument measures the construct (Creswell, 2005; Martineau, Hannum, & Reinelt, 2007; Neuman, 2006). Because firm performance can involve more than service quality and rate of return, the content validity of the performance variable is low. However, service quality matrix and return on investments are

actual data observed by the firms. These performance indicators can be expressed in many ways but the content validity of service quality and ROI as defined was high.

The instrument for measuring innovation contains 40 Likert-type questions which measures strategy, processes, organization, linkages, and learning. The instrument met content validity requirements because the instrument measured strategy in a holistic manner with other related concepts. Day and Schoemaker (2000) argued that a firm with no clear innovation strategy, with limited technological resources, no plans for acquiring more, and a rigid and unsupported organization will unlikely succeed in innovation. These issues as well as poor project management skills and poor external linkages were planned to be measured in the innovation strategy instrument. Together, the measurements of these aspects increase the content validity of the instrument.

Internal Validity

"Internal validity is the quality of an experimental design such that the results obtained are attributed to the manipulation of the independent variable" (Salkind, 2006, p 223). Threats to internal validity are unavoidable in research wherein variables are manipulated to eliminate potential alternative factors that weaken causal confidence in findings and explanations from the research (Martineau et al., 2007). Threats to internal validity were virtually absent since the independent variables of innovation strategy and local telecommunications regulations were not manipulated.

Causal relations are not at issue and threats to internal validity only resulted from bias in selecting participating firms and instrumentation. The choice of firms in the northeastern United States as samples in the three regulatory frameworks was not based on any random sampling of firms from the list of potential states. Because the evolution of the U.S. telecommunications

market is moving toward reducing or eliminating regulation, chances are that some states would have revised their local telecommunications regulations prior to data collection. These shifts in regulations may influence the findings since the study would then be based on firms in similar regulatory frameworks.

External Validity

External validity urges researchers to generalize findings outside the settings of the research (Creswell, 2005; Newman, 2006). These generalizations suggested that external validity relates to the degree to which findings apply to people, places, or times besides those studied. The research was based on data from firms in the three regulatory regimes spanning all possible telecommunications business regulations and results could be extended to any firm in the U.S. telecommunications market. Given variations in regulatory frameworks in markets other than the United States, the results may not be extended beyond the United States since respondents in other markets may react differently on the Likert-type questions. A broader scaled study would be needed to infer a broader generalization of the results.

Data Collection

Data collection involves "everything from contacting possible sources and arranging data collecting trips to the actual recording of data" (Salkind, 2006, p146). The collection of data on innovation strategy, local business regulation and telecommunications firm performance provided information used in the identification of relationships between dependent and independent variables (Fontannaz & Oosthuizen, 2007). Data collection began upon receipt of the informed consent form from the participating firms and the approval of the proposal. Steps were taken to embark on three responsibilities that enable the acquisition of the research data. The activities included the identification of the respondents in participating firms, coding the

survey instruments, expediting the instruments and locating existing statistics for service quality and return on investments.

Identifying Respondents

The investigator worked together with a spokesperson of the participating firms to identify respondents. In some cases, the websites of sample firms was used to locate regulatory and planning personnel to involve in the study. Of particular concern was the need to identify no less than three respondents per firm. The purpose of choosing three respondents was to first to increase the possibility of receiving at least a returned survey from participating firm. In doing so, the response rate, the content validity and overall picture of the innovation strategy will increase (Tidd, et al, 2006).

Coding and Expediting the Survey Instrument

Surveys were coded and administered electronically to the respondents. Coding created and assigned alpha-numeric characters to the questionnaires before expediting to respondents (Zikmund, McLeod, & Gilbert, 2003). The packets were sent directly to the respondents via electronic mail carrying a letter requesting for the respondent's participation. Directions attached to the question included a mailing address should the respondent prefer to mail the completed questionnaire. The questionnaires were administered to strategic planning and regulatory teams of incumbent carriers, sample competitive local exchange carriers, leading VoIP-only carrier and leading cable providers in each of the three market clusters considered for the study.

Researching Existing Statistics

The existing quantitative data on service quality and return on investment consisted of previously collected information available in the form of government reports or previously conducted surveys (Zikmund, McLeod, & Gilbert, 2003). Existing data and surveys were

examined using various statistical procedures. The investigator browsed through federal, state, and statistical databases on telecommunications firms from the sample states. In some situations, phone calls were used to contact respondents and ask for explanations on some aggregated data found in public databases.

Evaluating Collected Data

Data from the survey and document review were evaluated for sufficiency and exactness. The returned surveys were checked for omissions, incompleteness, and other unusable and obvious inconsistencies. The response rate of the survey was evaluated to insure sufficiency. Response rates of 15% or above was considered good enough for studies with large business firms that are usually reluctant to provide proprietary information about their business. In addition, techniques commonly used to increase response rates may not be effective in reaching these groups of respondent (Spitzmüller, Glenn, Barr, Rogelberg, & Daniel, 2006). Complete surveys were decoded and prepared for data entry and processing in an excel spreadsheet.

Data Analysis Plan

An essential component of a quantitative, descriptive correlational research was the use of statistical analysis and tools to interpret data (Creswell, 2005; Salkind, 2006). The selection of a statistical test depended on the nature of the hypotheses and the nature of the data analyzed (Hart, 2008). The study used an analysis of variance (ANOVA), a chi square test and a regression analysis. The multi-tests accommodated the comparison of the three groups and consideration of normal distribution of data. The tests provided answers to RQ1 and RQ2 and the hypotheses relating to the research questions.

To describe the degree of association between innovation strategy, local business regulation, and the fit between two indicators of firm performances, a simple regression, multiple

regression and the Pearson coefficient of correlation was used to measure the relationship between the predictor (innovation strategy) and the criterion variable (performances) (Sekaran, 2006). By no means was any relationship inferred as causation, given the non experimental nature of the study (Salkind, 2006). The descriptive ANOVA statistic provided a comparison of performances as a function of regulatory types to provide answers to RQ2.

Analysis of Variance

To investigate the variations in firm's service quality and rate of return (performances) as expressed in H_o5 and H_o6, an analysis of variance (ANOVA) method was employed. The purpose of an ANOVA test was to examine the relationship between one variable with one or more variables as well as observe how the interactions between variables was associated with another variable (Creswell, 2005). The former objective used a one-way ANOVA test, while the latter employed a two-way ANOVA test. The one-way ANOVA test examined two or more independent samples for equality in their population means, while the 2-way ANOVA simultaneously tested the effects of two factors on the dependent variable as well as the relationship of interaction between the two factors on the outcome (Weiers, Gray, & Peters, 2005).

ANOVA are used when the various treatments or levels of a given variable have varying effects on the dependent variable (Weiers, Gray, & Peters, 2005). The variations were viewed in terms of "(1) variations between the groups, reflecting the effect of the factor levels . . . and (2) variations within the groups, which represents random error from the sampling process. "Comparing these two kinds of variation is the basis of an ANOVA" (p. 483).

ANOVA is a parametric statistical test used when no independent covariates exist or when the covariates can be controlled in the experiment (Cone & Foster, 2006). On the contrary,

an analysis of covariance (ANCOVA) could become relevant to such a study. ANOVA resembles a t-test when a normal distribution exists among dependent variables and only two groups are involved (Salkind, 2006). The description suggested that ANOVA quantified variations between versus within samples, and the basic process was an intuitive conclusion drawn from the reading of an inferential statistic.

A research goal was to examine three local business regulations, interactions with firm innovation strategy on the service quality and profitability of telecommunications firms. ANOVA, rather than a t-test or ANCOVA, was used to examine the equality of the sample means of firm performance in the three regulatory frameworks (RF1, RF2, RF3) (Weiers, Gray, & Peters, 2005). A rejection of the null hypothesis was an indication that the differences were associated to (a) levels of regulation (H_o5), levels of innovation strategy (H_o1), and the interactions between regulation and innovation strategy (H_o6).

The starting point of an ANOVA was usually an experiment in which efforts are made to examine the effects of varying levels of an observation on another factor (Brooks & Cole, 2005). Although closely related to experimentation, the two-way ANOVA was appropriate for this research because of the use of existing data in three institutional environments. F-statistics determined the meaning of the difference among adjusted mean performance indicators of firms within a 5% chance of error ($p < 0.05$).

Regression Analysis

Regression analysis reflected a linear relationship between the level of innovation strategy as measured on the instruments and the measure of return on investments and service quality (H_o3 and H_o4) for firms in a regulatory framework (Salkind, 2006). The mean service quality indicator and rate of return of firms in one regulatory framework was linearly regressed

with innovation strategies (H_o1, H_o2). The linear regression statistics known as the correlations coefficient or the Pearson product moment correlation coefficient (r) measured the correlation between two variables and provided insights on the sense and direction of the relationship between variables in a research hypothesis. The coefficient factor normally lies between 1 and -1. The magnitude of *r* determined the strength of the relationship while the sign of *r* was an indication of its direction (Weiss, 2008).

The linear regression model allows firm leadership to predict the influence of regulation and innovation strategy on firm performance. Computations were done using standard commercial software packages such as SPSS or Excel. Regression analysis was appropriate because it does not imply causality of the relationship. Rather, regression explored the degree of association and predictability between the variables (Creswell, 2005).

Summary

Practitioners seek subtle forms of uniqueness that are capable of transforming organizations into short-term monopolies replaceable by newness and new inventions (Grant, 2007). Researchers are concerned with empirical observations from which they can draw inferences regarding factors influencing organizational performance. The concerns of researchers and the practitioners blend together in this study aimed at investigating the relationship between innovation strategy, local telecommunications regulation and firm performance. The quantitative non-experimental research design addressed the type of research design chosen, the measuring instruments, the validity and reliability of the data collection instruments, the data collection procedures, and the analytical tools for processing the data.

The quantitative descriptive design presented involved collecting data using specific instruments to describe existing conditions (Hsu, 2005). Existing data on regulation and firm

performance as well as survey data on firm innovation strategy were correlated and compared using an analysis of variance and Pearson correlations coefficient. The analysis provided information on the relationship between regulation and innovation strategy on performance in the telecommunications industry.

Descriptive correlational design tools were appropriate for the study seeking to compare performances and investigate the existence or not of a linear relationship between variables (Creswell, 2005; Saliknd, 2006). Using standard tools on innovation auditing and document review on performance and regulations, the non-experimental research method enabled an assessment of conditions for reliability and validity of the test instruments. Reliability relates to consistency of measurements and validity seeks to establish truthfulness or accuracy in the study (Creswell, 2005; Newman, 2006).

An informed consent form (appendix B) and permission to use the innovation strategy instrument (appendix C) are provided. A signed informed consent form was needed to comply with the code of federal regulations on the protection of the privacy of human research subjects (Creswell, 2005). Privacy entails a respondent's rights to control the investigator's access to respondent's personal information (Hicks, 2009). Privacy as relates to this study concerned a firm's ability to prevent access into its confidential information.

The results of this study explicating the outcomes of the document review and the surveys are presented in chapter four. The findings are expected to assist leaders and practitioners in the U.S. telecommunications market in predicting growth patterns when firms change innovation strategies. The influence of local business regulations was analyzed using an ANOVA test.

CHAPTER 4: RESULTS

The purpose of this study was to determine the degree of association between telecommunications business regulations, firm innovation strategy, and the interactions on the performance of U.S telecommunications firms. Firms in New Jersey, Rhode Island and New Hampshire completed the study questionnaires. Chapter 4 contains the results of the data collection process and an analysis of the possible relationship between the independent variables of telecommunications firms' innovation strategy and business regulations, and the dependent variables of service quality and return of investments.

The chapter presents the overall results from the study, discusses the results within the context of the research questions, and draws conclusions concerning the relationship between the variables. Chapter 4 contains a review of the research variables, the data analysis procedures, and the primary research findings. The primary research findings include a descriptive statistics, an analysis of variance, and a correlations analysis of the data variables. The chapter begins with a reminder of the research purpose and ends with a summary of the results.

Purpose of the Study

The purpose of this quantitative, descriptive, correlations study was to examine the degree of association between local telecommunications regulations, leadership innovation strategies and the performance of sample US telecommunications firms. A quantitative, descriptive, correlations research design involves collecting and analyzing numerical data for a study that is not a case study (Creswell, 2005; Hsu, 2005). The target population was 15 telecommunications firms drawn from three states. Each state enjoyed a specific type of telecommunication regulation. The firms used plain old telecommunications technology or innovative technologies such as VoIP. The responders were senior personnel of the regulatory

and planning offices of the sample firms. The sample included 30 management personnel, two from each firm.

The investigator defined the independent variable innovation strategy using Tidd, Bessant and Pavitt (2006) innovation audit tool. Regulation was viewed from the local telecommunications regulations perspective of three selected states. Each of the three states fitted within the confines of one of three regulatory frameworks as defined in Perez-Chavolla (2007). The frameworks matched New Hampshire as a state with complete regulation of all basic telecommunications services, Rhode Island as a state with deregulation on all local telecommunications services, and New Jersey as a state where only basic telecommunications services were regulated.

Performance dependent variables were operationalized by MacPherson and Pabari's (2004) model based on a firm's financial viability (return on investments) and relevance to the changing needs of its stakeholder (service quality). This view of performance suggested that firms must continue to produce superior quality products and services to remain relevant to the consumers. Such relevance provides a competitive advantage to the firm. Service quality was defined in accordance with the Federal Communication Commission's standards of providing telephone service. The performance indicator was measured in terms of the number of trouble tickets per 100 phone lines served by the firm per month. Return on investment was viewed as the ratio of the difference between the revenue and cost over the cost of providing service.

Researchers use a descriptive quantitative correlations design to investigate the association or not between variables pertaining to individuals, groups or organizations (Salkind, 2006). An exploration of the relationships between innovation strategy, local

telecommunications regulations and the joint effects regulation-innovation fit on performances of US telecommunications has been examined with the help of this design.

Revisiting Study Variables

The problem statement viewed asymmetries between innovation and regulations and how the two variables relate to the performance of telecommunication firms as an issue. From this statement emanated three study variables at the core of the descriptive quantitative correlations study. A sample of firms was drawn from three states with local business regulation ranging from complete regulation to deregulation.

In a standard bivariate correlations analysis, the correlation estimate from a study may be used to make a statement regarding the possible values of the correlation factor with some specified level of confidence (Bonett, 2008). For a given level of confidence, the width of the confidence interval depends on the sample size, and narrow confidence intervals often require large sample sizes. The present study examined three variables in a bivariate manner and also as a combination of the relationship between the independent variables, innovation strategy and local business regulations, and the performance of the firms. The sample size was n=15, which was relatively small and was expected to yield a wider confidence interval.

Regulations, innovation and performance can be viewed from a plethora of angles. The scope of this study constrained regulations to existing local telephone service regulations in the US telecommunications industry. The limitation was needed to perform an empirical study and to avoid conceptual and subjective interpretations of what regulations may mean.

Innovation strategy was chosen in favor of innovation simply to narrow the findings to the strategy aspect of innovation rather than the technological developments in the field. This

was done in order to avoid the use of patents or revenues from new products which have already been studied extensively.

Tidd, Bessant and Pavitt (2005) viewed innovation in terms of strategy, process, organization, linkages and learning. In which case, innovation strategy can not be misconstrued for innovation. Analyzing process/technology aspects of innovation was meant to be a follow up to this study. This approach does not purport to lay claims to an increasing level of innovation, but to an increasing level of innovation strategy.

One innovation strategy was placed on a higher level only for didactic reasons. For example a score of seven in the innovation strategy tool was simply an indication of the disruptive innovation occurring within the firm. A lower score was an indication of incremental innovation. In all cases, some innovation was taking place in the firm. Innovation strategy was viewed in terms of Miles and Snow (2007)'s concept of strategy in which four innovations strategies were possible for firms in a dynamic industry like telecommunications; reactor, defensive, analyzer and prospector innovation strategy.

Performance factors were limited to service quality and return on investment. The variables were chosen because both relate the concerns of consumers and owners as the industry rapidly changes (MacPherson & Pabari, 2004). Customers react positively to service providers with high service quality resulting in higher sales. Stakeholders pride in their firms when investments are profitable.

Data Collection Process

The data collection process involved two dimensions, a document review and an online survey. Each procedure was intended to collect data on specific variables. The collected data were crosschecked for accuracy and sufficiency before recorded for analysis.

Document Review

The document review consisted of surfing the websites of the Federal Communication Commission (FCC), the state websites and the official websites of the firms short listed for the study. Other data were collected from hard copy reports of the firms. Data on service quality and return on investments were essentially the results of this search.

Online Survey

Tidd, Bessant and Pratt (2006) provided permission to use the innovation audit tool (see appendix C). The company required its recognition in the dissertation acknowledgements as a condition for using the tool. A secure, password-protected internal website that combined the innovation strategy and learning question was created. Online survey was created after payments were made to freeonlinesurveys.com that owns the online survey website.

Data collection for NH and NJ were coordinated by an in-house senior staff. The senior staff forwarded the online survey and pass-word to select senior personnel. The participants were the only ones that could access the survey for which a specific code number had been attributed to them. Executive management of the firms provided permission to conduct the study (see appendix C). To improve upon the rate of return of questionnaire, telephone calls and reminder messages were sent via the internet and on a weekly basis to respondents.

Data Recording

Data from the document reviewed were copied directly into an excel spreadsheet. Data from surveys were collected directly on the website. The data were converted into a spreadsheet form, checked for accuracy to ensure that the website was collecting and recording data correctly. The data from the website were extracted into a Microsoft EXCEL spreadsheet and checked for missing data. Some firms provided data on their service quality through the survey.

Some data were coded for analysis purposes. Disagreement with a survey condition was identified by a 1 and 7 corresponded to a very true statement about the firm.

Reliability and Validity Controls

Due to concerns over the accuracy of the results, the validity and reliability of test instruments were reviewed to ensure adequate measurement of the variables. The innovation strategy tool was revisited to ensure that only aspects of the tool pertaining to strategy or learning were retained in the survey instruments. Because perfect reliability is rare, reliability was increased by clear and accurate conceptualization of the variables, the use of a precise level of measurement, multiple test indicators and a pilot test. Several reliability test instruments were used to determine the results of the analysis. An additional number of questions relating to technology and service quality of the firms were included in the surveys.

The dual purposes for these changes were to increase the response rate from company executives who generally lack time for surveys and to improve the reliability of the instrument. Document review data on service quality and innovation strategy were also compared with values provided by the company. Where differences existed or where document review produced no data, surveyed data were used.

Analysis

Primary analysis and an inferential statistical analysis were conducted on data collected from respondents who agreed to the informed consent and responded to the survey (n=30). The questionnaires were sent to two respondents per firm, making a total of 15 firms. Five firms in each state whose total telephone lines exceeded 80% of the total lines in the state were contacted.

The responding firms applied traditional plain old telephone system (POTS) and voice over internet protocol (VoIP) technology. A Microsoft EXCEL statistical application was used to

generate descriptive statistics such as the mean, mode and standard deviation of each variable per state and for the entire population. Tables and charts were constructed to depict the results.

Of the 15 firms that received questionnaires via email, one operated in two of the states, two were VoIP providers and the rest were competitors in their respective states. All respondents of the firms were management employees most of who worked in the regulatory affairs office. Of the 30 respondents contacted and served with survey questionnaires 15 returned a completely filled out questionnaire. The response rate was 50%.

Descriptive Statistics

Table 3 indicated that the mean value of the service quality indicator, innovation strategy and Return on investment were 4.41 tickets per 100 lines per month, 5.39 or the equivalence of an analytical firm and 30.78% respectively. The sample variances were nearly one level for strategy, 27 lines for service quality and 0.24 for ROI, an indication of very high variability in the data.

Table 4 indicates descriptive statistics for variables in the three states. States where all services were regulated or states with complete regulation of all service presented lower service quality values than in states where only basic services were regulated. More firms used a prospector innovation strategy in the state where only basic service was regulated. Firms in deregulated or completely regulated states showed less aggressiveness in their innovation strategy. The ROI was greatest for highly regulated states.

Table 3: *Descriptive Statistics for Innovation Strategy, Service Quality and Return on Investments*

	Strategy	Service Quality	Return on Investments
Mean	5.39	4.41	0.31
Standard Error	0.25	1.36	0.05
Median	5.50	2.11	0.28
Mode	5.50	5.00	0.33
Standard Deviation	0.96	5.25	0.20
Sample Variance	0.93	27.55	0.04
Range	3.50	19.31	0.69
Minimum	3.25	0.69	0.06
Maximum	6.75	20.00	0.75
Confidence Level (95.0%)	0.53	2.91	0.11

Table 5 compared and standardized the mean values of the variables for the various groups of firms by evaluating Z-scores. The Z-scores expressed the points or scores on a frequency distribution in the terms of the deviations from the mean (Neuman, 2006). Z-values represent the amount that a variable mean deviated from the general mean divided by the standard deviation (Salkind, 2006). The underlying assumption in the analysis was that in spite of the non-normal distribution of the sample, by applying the central limit theory, the means of all the samples will be normally distributed whenever the sample size is high (Salkind, 2006).

Table 4: *Descriptive Statistics for Variables in Terms of Regulatory Types*

Regulation of basic services	SQL	INS	ROI
Mean	8.69	5.70	28.97%
Median	5.00	6.25	27.27%
SD	7.38	1.14	22.53%
Max	20.00	6.75	69.70%
Min	1.48	3.25	5.66%
Regulation of all Services			
Mean	4.40	5.39	30.78%
Median	2.11	5.63	27.77%
Mode	5.00	5.63	33.33%
SD	2.03	1.21	33.02%
Max	20.00	6.75	75.00%
Min	0.69	3.25	5.66%
Deregulation of all Services			
Mean	1.70	5.23	22.68%
Median	2.11	5.50	27.27%
Mode	2.11	5.50	27.27%
SD	0.59	0.74	8.29%
Max	1.20	5.75	29.29%
Min	2.11	4.70	21.68%

Descriptive statistics shown in Table 5 suggested that service quality was higher in regulated or deregulated environments. Innovation strategy was tilted towards prospector types when only basic service was regulated. ROI seemed to be elevated in environments with complete regulation of telecommunication services.

Table 5: *Z-values for Key Variables*

	Service Quality		
Group name	Mean	Stdev	Z-values
Complete regulation	.97	.38	-0.12
Basic regulation	.48		1.05
Deregulation	.13		-0.94
	.01		

	Innovation Strategy		
Group name	ean	tdev	Z-values
Complete regulation	.33	.74	-0.50
Basic regulation			1.15

	.56	
Deregulation	.23	-0.65
	.70	

	Return on Investments		
Group name	ean	Stdev	Z-values
Complete regulation	.37	0.24	1.10
Basic regulation	.28		-0.25
Deregulation	.25		-0.85

To eliminate the possibilities that these variations were due only to chance, an analysis of variance test for four null hypotheses using an F-statistic was used to generalize the results within a 5% chance of error ($p<.05$). ANOVA is a method in which population means are examined by comparing different measures of variation in the sample measures (University of Phoenix Online statistical practice, n.d.).

To conclude the descriptive statistics, the characteristics of participating firms are shown in table 6. The table indicates that no firms employed a reactor strategy in a deregulated environment. More of the firms surveyed in a fully regulated environment showed tendencies of

users of an analyzer strategy. The more innovative firms (prospector strategy) were prevalent in the environment where only the regulation of basic services was in place. Overall, about 50% of all telecommunications firms surveyed employed analyzer strategy and 26% were prospector firms.

Table 6: *Types of Firms Surveyed*

Innovation Strategy Level	Full Regulation	Partial Regulation	Deregulation	Total
Prospector	1	3	0	4
Analyzer	3	2	2	7
Defender	1	0	1	2
Reactor	1	1	0	2
Total	6	6	3	15

Research Questions and Hypotheses

Two research questions provided insight for formulating six hypotheses examined with inferential statistics. The hypotheses included:

H_o1: A correlation does not exist between telecommunications firm's service quality performance and firm innovation strategy.

H_a1: A correlation exists between telecommunications firm's service quality performance and firm innovation strategy.

H_o2: A correlation does not exist between telecommunications firm's return on investment and firm innovation strategy.

H_a2: A correlation exists between telecommunications firm's return on investments and firm innovation strategy.

H_o3: A correlation does not exist between a telecommunications firm's service quality performance and the regulatory framework in which the firm does business.

H_a3: A correlation exists between a telecommunications firm's service quality performance and the regulatory framework in which the firm does business.

H_o4: A correlation does not exist between a telecommunications firm's return on investments and the regulatory framework in which the firm does business.

H_a4: A correlation exists between a telecommunications firm's return on investment and the regulatory framework in which the firm does business.

To determine which combination of regulation and innovation strategy produce optimal performance, the following two hypotheses in relationship to RQ2 were tested:

H_o5: The service quality performance of telecommunications firms is the same, irrespective of the interaction between business regulation and innovation strategy.

H_a5: The service quality performance of telecommunications firms is not the same, irrespective of the interaction between business regulation and innovation strategy.

H_o6: The return on investment of telecommunications firms is the same, irrespective of the interaction between business regulation and innovation strategy.

H_a6: The return on investment of telecommunications firms is not the same, irrespective of the interaction between business regulation and innovation strategy.

Inferential Statistics

The purpose of this descriptive quantitative correlations research was to examine the relationship between innovation strategy, regulations and their combined effect on the

performances (service quality and return on investments) of US telecommunications firms. This section includes a regression and correlations analysis to provide answers to research question one and an analysis of variance (ANOVA) study with regulation and innovation strategy as independent variables to investigate the research question two. A summary of chapter follows.

Correlations and Regression Analysis

Hypotheses one to four employed a statistical regression analysis and a correlations analysis to arrive at a mathematical relationship predicting the values of the dependent variable as a function of the independent variable. The confidence level of 95% was determined from the sample size of 15 responses. A regression analysis using Excel's regression analysis tool was conducted for all four null hypothesis H_o1 to H_o4. A multiple regression was also performed for the combine effect of regulation-innovation on performances.

Hypothesis 1: Innovation Strategy and Service Quality. The first hypothesis addressed the level of correlation between innovation strategy and service quality. Considerations such as the longevity of the firm or the market shares of firms were not at issue. Graph 1 shows a descriptive TREND analysis with scatter plot and best line fit of innovation strategy and service quality. A quick review of the graph showed some relationship between firm innovation strategy and the service quality of the firm. The graph suggested some evidence that innovation strategy and service quality may be related. The higher the innovation strategy levels the more complaints customers experience per 100 lines served by their service provider. The situation translates to less service quality provided when the firm adopts a more aggressive innovation strategy approach.

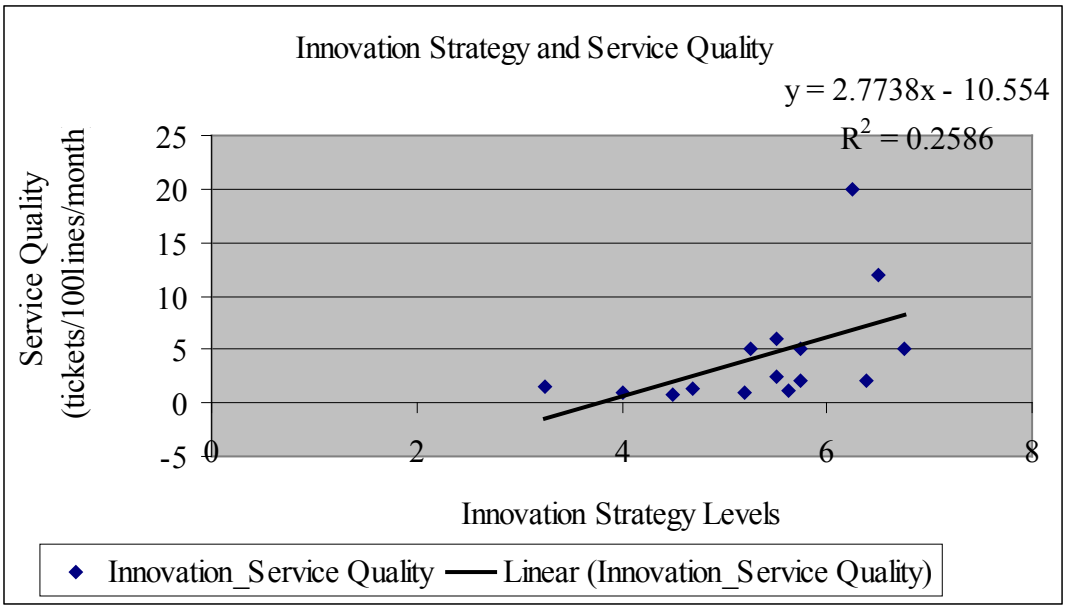

Figure 5: *Innovation Strategy and Service Quality*

Results from Excel's Regression analysis tool shown on table 5 indicated an impressive Pearson product moment coefficient of correlation, r, of 0.51. The low coefficient of determination, R square, of 0.26 suggested that the variability of service quality about its average value can not be explained by changes in innovation strategy. It is also an indication that the regression equation (y = 2.7738 x - 10.554) would create an error of 86% in predicting service quality values from innovation strategy levels.

The hypothesis was tested using Excel's simple linear regression with the regression analysis tool. The F-value of 4.53 for the test statistics produced a corresponding p-value of 0.053. The p-value is slightly higher than the critical value (p=0.05) required for any significance of the test value on the null hypothesis. Consequently the null hypothesis that no correlations existed between service quality and innovation strategy was accepted.

Table 7: *Regression and Test Statistics for Innovation Strategy and Service Quality*

Variables	Statistics

Multiple R	0.51
R Square	0.26
Adjusted R Square	0.20
Standard Error	0.86
Observations	15

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3.35	3.35	4.53	0.053
Residual	13	9.61	0.74		
Total	14	12.97			

Hypothesis 2: Innovation Strategy and Return on Investments. The second hypothesis addressed innovation strategy levels and return on investments of the firm. With similar sample size and confidence interval of 95%, Pearson correlation coefficients were generated irrespective of the type of regulations. The analysis resulted in a regression equation ($y = -0.1696x + 1.2225$), a Pearson correlation coefficient ($r = -0.81$) and an R square of 0.65 (see Graph 2). The high coefficient of determination (R square) suggested a significant linearity between innovation strategy and return on investments.

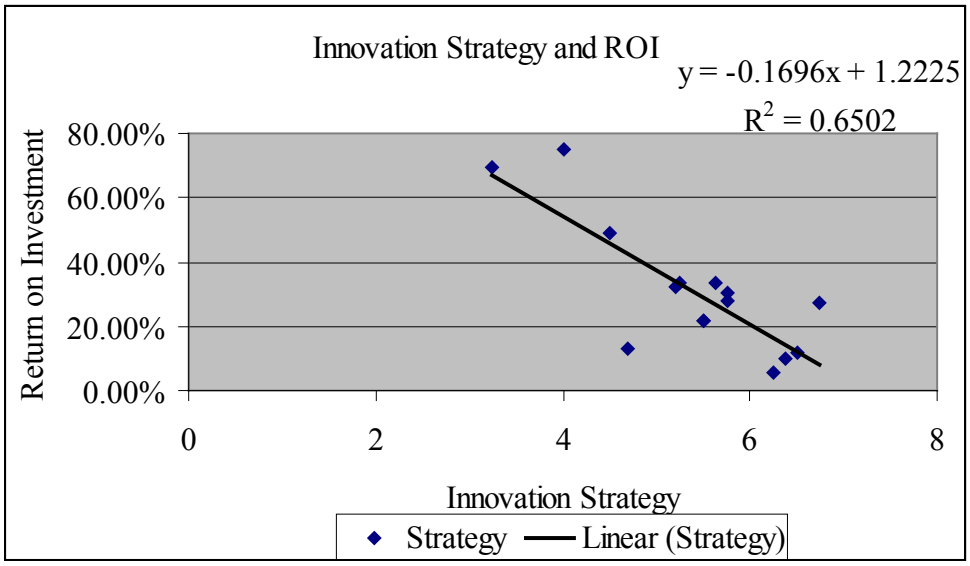

Figure 6: *Innovation Strategy and Return on Investments*

From the ANOVA table 6, the results further indicated a negative and significant relationship between innovation strategy and ROI ($r = -0.81$, $p = 0.0003$). The R square value of 0.65 suggests that about 65% of the variability of the return on investments can be explained by changes in innovation strategy. The F-statistic value of 24.17 generated a corresponding p-value of 0.0003 resulting in a significant relationship. The null hypothesis that no correlation exists between firm return on investment and firm innovation strategy was rejected.

Reactor and defensive strategy yielded more returns than analyzer and prospective strategy. This suggested that the innovation strategy used by firms will have a strong influence on the firm's performance. The more disruptive the innovation activity, the less profitable the telecommunications firm will be. Kodoma (2004) found that organizations develop strategies that are inherently planned in nature but are also needed to be creative or deliberate. Most organizations want to be flexible enough to promptly cope with the threat of competition. Weick (1989) surmised the situation as disciplined imagination. The less disciplined the firm is in its innovation strategy, the less profitable it will be.

ROI was further correlated with innovation strategy for firms within the same regulatory framework. As expected ROI increased as the innovation strategy changed from reactor to prospector strategy in a deregulated environment (r= 0.72, p= 0.02). This suggested that in the absence of constraining regulations, firms with disruptive innovation strategies yield higher dividends. The ROI decreased in strongly regulated (r= -0.95, p= 0.003) and partially regulated (r= -0.88, p= 0.02) environments. This suggested that regulations may have some relationship with the ROI of firms. A determination of the level of significance of the relationship has to be made.

Hypothesis 3: Regulation and Service Quality. The third hypothesis considered the relationship between regulations and service quality of the firms. With similar sample size and confidence interval of 95%, Pearson correlation coefficients were generated irrespective of the innovation strategy level. The analysis resulted in a regression equation y = 1.1652x + 2.3086, a small Pearson correlation coefficient, r, of 0.17 and a standard regression error of 79% (see Figure 3). The high regression error associated with the relationship was an indication of some independence between the two variables. This relationship was further elucidated by the ANAVA analysis in H_o5 and H_o6 and the chi square tests of independence of the variables.

From the ANOVA table 7, the results further indicated a week positive correlations coefficient and a non-significant relationship between regulations and Service quality (r = 0.17, p= 0.54). The R square value of 0.03 suggested that about 3% of the variability of the return on investments can be explained by changes in regulation giving a standard error of more than 79%. The linear relationship was not sufficient to predict the outcomes between regulation and service quality.

Table 8: *Regression and Test Statistics for Innovation Strategy and ROI*

Variables	Statistics
Multiple R	0.81
R Square	0.65
Adjusted R Square	0.62
Standard Error	0.59
Observations	15

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	8.43	8.43	24.17	0.0003
Residual	13	4.53	0.35		
Total	14	12.97			

The F-statistic value of 0.03 generated a corresponding p-value of 0.54 found to be statistically insignificant. Thus the null hypothesis that no correlation exists between firm regulation and service quality was accepted. A detailed analysis of variance was reconsidered in hypothesis H_o5 and H_o6 to answer the second research question.

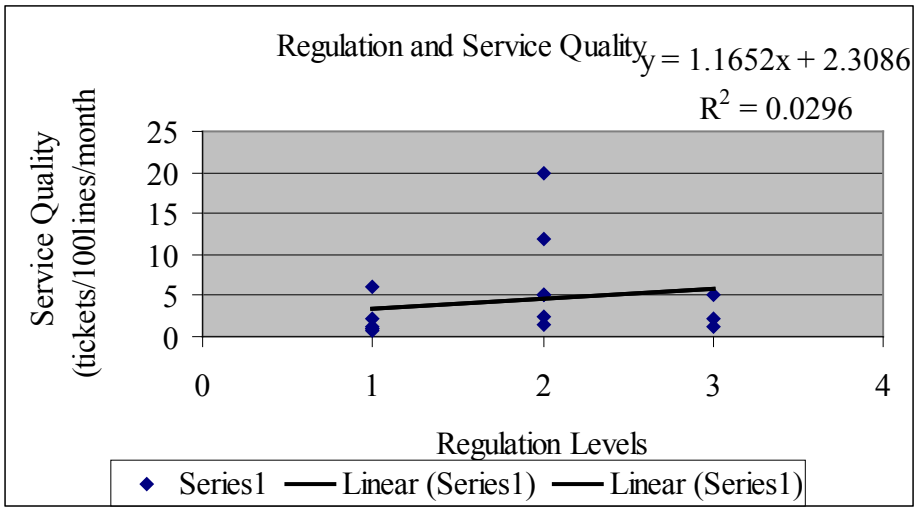

Figure 7: *Regression of Regulation and Service Quality*

Table 9: *Regression and Test Statistics for Regulation and Service Quality*

Variables	Statistics
Multiple R	0.17
R Square	0.03
Adjusted R Square	-0.05
Standard Error	0.79
Observations	15

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.25	0.25	0.40	0.54
Residual	13	8.15	0.63		
Total	14	8.40			

Hypothesis 4: Regulations and Return on Investments. The fourth hypothesis considered the relationship between regulations and firms' return on investments (ROI). With similar sample size and confidence interval of 95%, Pearson correlation coefficients were generated irrespective of the innovation strategy level. The analysis resulted in a regression equation y = -0.0647x + 0.4242, a Pearson correlation coefficient, r, of -0.25, R square of 0.06 and a standard regression error of 18% (see Figure 4). The low R square translated into a low strength of the linear relationship.

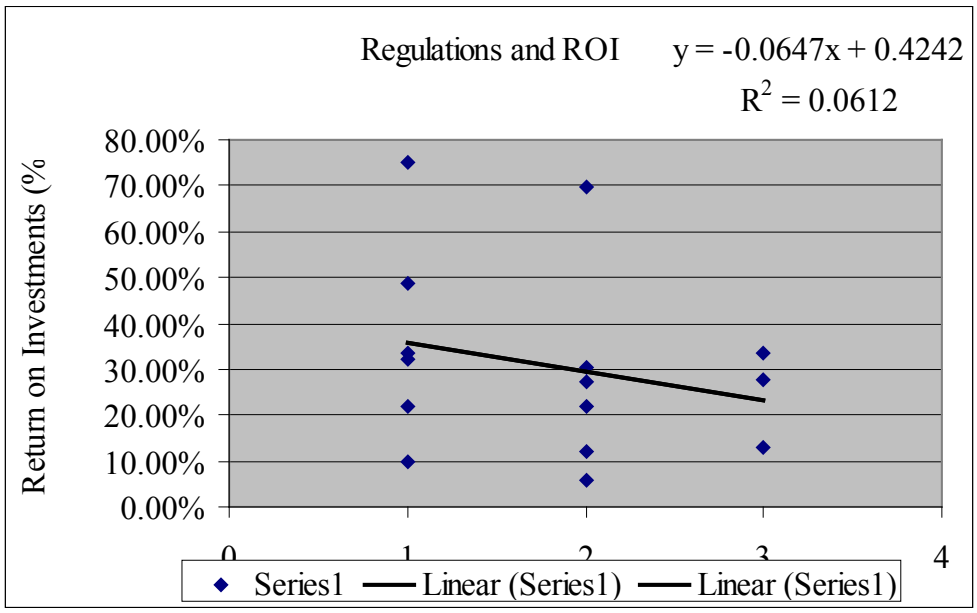

Figure 8: *Regulations and Return on Investments*

From the ANOVA table 10, the results further indicated a week negative correlations coefficient and a significant relationship between Regulations and return on investments (ROI) (r = -0.25, p= 0.05). The R square value of 0.26 suggests that about 26% of the variability of the return on investments can be explained by changes in regulation giving a standard error of more than 18%. The F-statistic value of 4.68 and t-statistic of -2.16 both generated a corresponding p-value of 0.05. The relationship between regulation and return on investments is significant, even

with a weak coefficient of correlation. Thus the null hypothesis stating that no correlation exists between local telecommunications regulations and return on investments was rejected.

The results confirmed that ROI were significantly influenced by the various regulatory frameworks. The implication was one of firms using a disruptive innovation strategy in a regulated environment and seeing their ROI fall. Firms employing incremental innovation strategies reap the most benefits. In a deregulated environment, firms with disruptive innovation strategies performed better. The regulations in place do not significantly influence the service quality of the firm.

Table 10: *Regression and Test Statistics for Regulation and ROI*

Variables	Statistics
Multiple R	0.51
R Square	0.26
Adjusted R Square	0.21
Standard Error	0.18
Observations	15

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.15	0.15	4.68	0.05
Residual	13	0.42	0.03		
Total	14	0.57			

Analysis of Variance

An ANOVA was used in hypotheses H_o5 and H_o6 to test for the equivalence of the service quality and return on investment means for firms in the three state regulations framework types. Given that three states were involved, a one way analysis of variance test using an F-statistic was used to generalize the results within a 5% chance of error ($p<.05$). ANOVA test accepted or rejected the possibilities that the differences observed in the means scores for service quality and return on investments (ROI) in the three regulatory frameworks was due to chance.

All ANOVA test were one way tests. Two way tests or two-tailed tests of significance are appropriate when previous research predetermined values for the two independent variables affecting a dependent variable (Creswell, 2005). One way tests are appropriate to test the difference in the means of two variables. One way ANOVA tests were used to determine the differences in means in regulated telecommunications firms, deregulated firms and firms where only basic regulations applied.

Hypothesis 5: ANOVA on Service Quality. Hypothesis five sought to investigate equality of the service quality performance of telecommunications firms in three regulatory types ($\mu1=\mu2=\mu3$) where $\mu1$, $\mu2$ and $\mu3$ are the mean/average service quality in a specific regulatory framework. The alternate hypothesis was that at least one of the means was different. Table 9 indicates the test results for an ANOVA between groups and within groups of firms and service quality of the firms.

At a significant level of alpha = 0.05, the calculated F-value was 2.78. This value is clearly lower than the critical F-value of 3.89. The critical value is the value from the F distribution that corresponded to the alpha value and the degrees of freedom specified (Eldredge, 2005). The P-value of 0.10 is non-significant forcing the acceptance of the null hypothesis. The

result suggested a lack of evidence that regulations and service quality have a dependent relationship in telecommunication firms in spite of the observed variability shown in the descriptive statistics. The results also corroborated the results of H_o3 that no correlations existed between regulations and service quality.

Table 11: *ANOVA Comparing Regulations and Service Quality of Firms*

Groups	*Count*	*Sum*	*Average*	*Variance*
Regulated	6	11.82	1.97	4.12
Basic Reg	6	32.88	5.48	14.15
Deregulated	3	6.39	2.13	0.74

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	43.07	2	21.53	2.78	0.10	3.89
Within Groups	92.85	12	7.74			
Total	135.92	14				

Hypothesis 6: ANOVA on Return on Investments. Hypothesis six sought to investigate equality of the means of the return on investments of telecommunications firms in three different regulatory types ($\mu1=\mu2=\mu3$) where $\mu1$, $\mu2$ and $\mu3$ are the mean/average return on investments in a specific regulation framework. The alternate hypothesis to the null hypothesis was that at least one of the means was different. Table10 indicates the test results for an ANOVA between groups and within groups of firms and ROI of the firms.

At a significance level of alpha = 0.05, the calculated F-value was 0.43. This value is clearly lower than the critical F-value of 3.89. The critical value is the value from the F distribution that corresponded to the alpha value and the degrees of freedom specified (Eldredge, 2005).

Table 12: *ANOVA Comparing Regulations and Return on Investments of Firms*

Groups	*Count*	*Sum*	*Average*	*Variance*
Regulated	6	2.20	0.37	0.05
Basic Regulation	6	1.67	0.28	0.05
Deregulated	3	0.74	0.25	0.01

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.04	2	0.02	0.43	0.66	3.89
Within Groups	0.54	12	0.04			
Total	0.57	14				

The computed F-statistics is less than the critical F statistics. This was an indication that regulations did not induce changes on the mean values of the ROI of firms in a statistically significant manner. The null hypothesis H_o6 was not rejected.

Investigating the Interaction Effects

After accepting the null hypotheses for H_o5 and H_o6, a two way ANOVA test was applied to investigate the influence of the interactions of regulation and firm strategies on service quality and return on investments. Three firms each representing a prospector, analyzer or defender firm

was chosen from the sample. Three was chosen to correspond with the number of responding firms in the deregulated environment.

A two way ANOVA with interactions was applied using Excels data analysis and the results are shown on table 13. The results indicated the means and variances for each of the 18 combinations of regulations, innovation strategy and performances. The ANOVA table provided sample statistics for conducting three separate F-tests.

The first test determined whether the three regulatory frameworks had a significant effect on firm performances. The second determined the impact of strategy on performance. The null and alternate hypotheses are shown below.

H_o: $\mu 1=\mu 2=\mu 3$ (2)

$H_{a:}$ Not all μ's are equal

The point of interest in the two-way ANOVA was in the third test examining whether a significant combined relationship existed between the regulations and innovation strategy. The test hypotheses for the interactions were

H_o: An interaction relationship does not exist between regulation and strategy influencing the performances of firms.

Hα: An interaction relationship exists between regulation and strategy influencing the firm performances.

Table 13: *ANOVA: Two-Factor with Replication*

	Strategy	SQL	ROI	Total
Regulated				
Count	3	3	3	9
Sum	16.50	3.90	0.92	21.32
Average	5.50	1.30	0.31	2.37
Variance	0.89	0.53	0.04	6.07
Basic Regulation				
Count	3	3	3	9
Sum	15.50	8.88	1.19	25.57
Average	5.17	2.96	0.40	2.84
Variance	3.15	3.33	0.07	5.91
Deregulation				
Count	3	3	3	9
Sum	15.70	8.39	0.74	24.83
Average	5.23	2.80	0.25	2.76
Variance	0.28	3.81	0.01	5.67
Total				
Count	9	9	9	
Sum	47.70	21.17	2.85	
Average	5.30	2.35	0.32	
Variance	1.10	2.55	0.03	

ANOVA

Source of Variation	*S*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	1.14	2	0.57	0.43	0.66	3.55
Columns	113.00	2	56.50	41.99	1.66E-07	3.55
Interaction	4.10	4	1.02	0.76	0.56	2.93
Within	24.22	18	1.35			
Total	142.46	26				

At an alpha = 0.05, the calculated F-values were lower than the critical F-Values for regulations and performances, and interactions and performances. For these two, the p-values are higher than the critical p = 0.05. The null hypotheses are not rejected. The results validated the results of the single ANOVA test for regulations and service quality and regulations and ROI. The results suggested that no significant relationship existed between regulations, innovation strategy and their combined effects on the service quality and ROI of telecommunications firms.

Coincidentally, the F-value (41.98) relating innovation strategy levels and performances was much higher than the critical value (F critical = 2.76). The test confirmed the results of the regression and correlations analysis where a significant relationship existed between innovation strategy and firm performances.

Recapitulation of the Inferential Findings

Table 14 recapitulates the results for the first four hypotheses. Innovation strategy and regulations showed a somewhat positive correlation with service quality that was refuted by the less than significant test statistics. The corresponding null hypotheses relating the variables were

accepted. Regulation and innovation strategy showed a negative Pearson correlations factor with return on investments. The relating null hypotheses were rejected. Though significant, the relationship between regulation and ROI was weak.

Table 14: *Correlation Factors and P-Values*

	Service	Quality	Return on	Investments
	r	p	r	p
Regulation	0.17	0.05	-0.25	0.049
Innovation Strategy	0.51	0.54	-0.81	0.0003

In a similar manner, the lower value of the F-statistics compared to the critical F-statistics caused a non rejection of the null hypotheses H_o5 and H_o6. The conclusion was that 95 % of the differences observed in the service quality of the firms in varying regulatory frameworks were due to chance. The ROI was negatively influenced by both innovation strategy and regulations. The more radical types of innovation strategy yielded lower ROI. The relationship with regulations was one of decreased ROI with increased deregulation.

The results of the ANOVA test supported the results of the regression analysis with respect to regulations and service quality. With respect to regulation and ROI, the regression analysis indicated a significant relationship and the ANOVA test did not. Complementary results of the type led to further analysis of the independence of the variables using a chi square test.

Chi-Square Test of Independence

The regression analysis and the ANOVA test were complemented by the use of a chi-square (χ^2) test of independence to investigate the validity of the relationships. The χ^2 test is

usually a more powerful and precise way to investigate whether a relationship existed between two percentage tables than by simply eyeballing the tables (Neuman, 2006). Chi square tests were developed for four bivariate relationships; innovation strategy and return on investments, innovation strategy and service quality, regulations and service quality and regulations and return on investments. The statistics were computed after categorizing innovation strategy into four levels; prospector, analyzer, defender and reactor firm strategies. Regulations were in three levels, complete regulation, deregulation and partial regulation of telecommunications services.

The dependent variables (service quality and return on investments) were categorized into two levels. Service quality was viewed as excellent where the firms reported less than 6 troubles per 100 lines per month. Service quality of more than this value was categorized as poor. Returns on investments values were categorized as high or low dependent on whether the ROI attained the 50% mark.

The categorization enabled an implementation of contingency tables for the observed frequencies of the variables. Theoretical or expected frequencies were computed with the help of an Excel spreadsheet and various statistics identified. Tables 15 and 16 summarized the results of the tests.

At a significance level of alpha = 0.05, the chi-square test statistics was not zero for any of the paired variables. However, the return on investment and regulation relationship was very close to an independent relationship and reflected a near zero chi-square statistics ($\chi^2 = 0.58$). The chi square results confirmed the results of the regression analysis H_o1 relating innovation strategy and service quality as well as H2 relating innovations strategy and ROI. The test also agreed with both ANOVA and regression analysis indicating no significant relationship between regulation and service quality.

Regulations and Performance

Concerning the influence of regulations on ROI, the regression analysis H_o4 suggested a small negative correlation between regulations and ROI. The ANOVA test F-statistics (H_o6) caused no rejection of the null hypothesis that regulations did not influence the return on investments. Because chi-square was not zero for any relationship, one could not with certainty conclude that the variables were not independent.

Table 15: *Chi-Square Tests for Independence of Innovation Strategy and Dependent Variables*

Parameters	Service Quality	ROI
Observed frequency sum	15	15
Number of first category	2	2
Number of second category	8	8
Number of degrees of freedom (*df)*	7	7
Significance level of test (α)	0.05	0.05
Chi-square test statistics (χ^2)	3.39	15.00
χ^2 critical value	14.07	14.07
P-value for test	0.85	0.04

Innovation Strategy and Performance

The association was strongest between innovation strategy level and ROI ($\chi^2 = 15$). The high value buttressed the results of the correlations and regression analysis in which innovation and ROI were very significantly correlated. Innovation strategy level and service quality and regulations and service quality were only minimally dependent on each other. The chi-square test

confirmed the results of the regression analysis in which a significant negative correlation existed between level of innovation strategy and ROI. The more disruptive the innovation strategy, the less returns were yielded.

The chi-square test statistics was lower than the chi-square critical value for three of the relationships. For those three the null hypotheses were rejected. The results suggested that innovation strategy had a stronger influence on performance than regulation did on performance. The influence of regulations on ROI was not determined with absolute certainty.

Table 16: *Chi-square Tests of Independence for Regulation and Dependent Variables*

Parameters	Service Quality	ROI
Observed frequency sum	15	15
Number of first category	2	2
Number of second category	8	8
Number of degrees of freedom (*df)*	7	7
Significance level of test (α)	0.05	0.05
Chi-square test statistics (χ^2)	2.50	0.58
χ^2 critical value	14.07	14.07
P-value for test	0.93	0.99

Cronbach's Reliability Measurement

Cronbach's alpha was used to measure the reliability of the measuring instrument with several possible answers. The Cronbach's alpha is an index of reliability associated with a variation in measurement with respect to the true score of the underlying construct (Lopez, 2007). The Cronbach's alpha integrated the average correlation of a dataset and an adjusted

correlation. The value reflects the expected correlation between samples drawn from the population of all the possible conceptual items that relate to the construct measured. Alphas of 0.7 and above provide a statistically strong correlation between what is measured and the expected value of the variable.

In other words, Cronbach's alpha is analogous to the signal to noise ratio in transmission equipment. Ratios where the angle (θ) between the signal and noise is lower than 45˚ indicate that the signal is stronger than the distortion (noise). The cosine of the angle (45˚) is 0.7. For smaller angles meaning stronger signals, the cosine (θ) will be larger that 0.7. Cronbach's alpha measures the internal consistency of a test and was defined mathematically as (Cronbach, 1951):

$$\alpha = k / (k-1)*(1-\Sigma \text{variance } (s_¡)/ \Sigma\, s_¡),\ ¡= (1….k) \quad \text{.....3}$$

Where k is the number of items in the instrument

And $s_¡$ represents the score for item ¡.

Only the innovation strategy instrument was evaluated because it met the conditions of dichotomous answers. The Likert scale used had seven possible answers. Service quality and ROI were obtained from single data reported by the firms. Variations in values were zero and resulted in an alpha = 1.

Using an Excel spreadsheet, calculations based on innovation strategy for k=15 items indicated a sum of variance of the individual recordings as 12.95 and the sum of the recorded items was 95.9. Cronbach's α = 0.93. The value indicated a very small distortion of the measured variable from its true value. The strong correlation showed that the innovation strategy instrument reliably measured the innovation strategy construct.

Summary of Chapter 4

The research consisted of finding an answer to two research questions. The first question sought to find a relationship between the independent variables (innovation strategy levels and levels of regulation) and their combined effect (multivariable regression analysis) and firm performances (service quality and return on investment). The second question aimed at investigating the effects of regulation on firms in a competitive industry like the U.S. telecommunications.

Data for the analysis were collected using a survey method and a document review. A preliminary analysis (descriptive statistics) of the sample data indicated that telecommunication firms adopted a more prospective innovation strategy in environments where only basic services were regulated. Analyzer firms visibly indicated higher service quality standards and prospector firms earned the least return on investment.

The inferential statistical analysis relating research question one and the corresponding four null and alternate hypotheses yielded impressive results. Innovation strategy was found to be highly significantly and negatively related to return on investment. The results agreed with the descriptive statistics in which return on investment dropped as the innovation strategy level increased from an incremental innovation strategy (reactor) to a more disruptive innovation strategy (prospector). Test on hypothesis H_o4 indicated that the return on investments increased with decreasing regulation.

Research question two and related hypotheses H_o5 and H_o6 were examined using a one way ANOVA with F-statistics. The results indicated an F-statistics that was lower than the critical F-value. The null hypotheses that no differences existed in the mean performances of firms in varying regulatory frameworks was not rejected. Further investigations using a two-way ANOVA and a chi-square test of independence of the variables followed.

After categorizing the variables, the chi-square statistics for regulation and return on investments reflected a case of independence between the two variables ($\chi^2 = 0.58$). The result was not in sync with the regression analysis. The chi square analysis confirmed the findings of the ANOVA and correlations analysis where no relationship was found between innovation strategy and service quality, regulations and service quality. Complementary findings of the sought demonstrated the need for further investigation on the influence of regulations and innovation strategy on firm performances.

The validity of the results may have been limited by the response rate of the surveys. Only three firms responded from the highly deregulated environment. Double that size responded in the regulated and partially regulated environments. Equality of data responses would have enabled the use of a multi-regression analysis to find a relationship between the combined effects of regulation and innovation strategy on firm performances and improve the reliability and validity of the results. The Cronbach's alpha for the instrument was 0.93.

In chapter five, the scope and limitations of the study will be revisited. Suggestions for future research and better methods for conducting this type of research will also be proposed. The discussion and interpretation will offer insight on what innovation strategy provided adequate returns on investments and service quality standards when firms operate in specific regulatory environments.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

This study examined the general problem of asymmetries between local telecommunications regulation and firm innovation strategies, and how both were related to the performance of competing firms (Crandall, 2008; Robinson, & Weisman, 2008). Regulations were viewed as an additional impediment that set performance constraints for firms (Gann, Wang & Hawkins, 1998). Strategic management theories asserted that using one innovation strategy in a regulatory framework may lead to competitiveness while the use of another may not (Mintzberg, 2003). Strategic management and Schumpeterian dynamics provided a theoretical framework for investigating the complex relationship between innovation strategy, regulation and firm performance.

The quantitative, descriptive correlation study primarily addressed the relationship between regulation, innovation strategy, and firm performances in the US telecommunications industry. At a secondary level, emphasis was on the impact of regulations on the service quality and return on investments of US telecommunications firms. The underlying premise was that regulatory policy induces a framework for the enhancement of technological innovation and innovation strategy is an ingredient of telecommunication firm performance.

The non-experimental nature of the study and the absence of randomness in the choice of US states and telecommunications firms negate chances of interpreting the observed variations and correlations as causal relationships (Jaekyung, 2008). Little or no control was made over extraneous variables that may be responsible for the outcomes being researched. The use of self reported data in federal, state, and firm documents and databases to a lesser extent increased the power of the research to uncover the nature of the relationship (Salkind, 2006).

Chapter 5 discusses and interprets the results. The chapter is organized into four discussion sections; (a) the research study questions and the hypotheses, (b) the conclusions, (c) the implications of the findings, and (d) future recommendations. The recommendations suggest possible ways forward to increased understanding of how regulation-innovation fit influences firm performance in a dynamic industry. The insight hopes to bridge other literary gaps as shown on Table 1 and contribute to the sparse literature on the dynamic nature of firm innovation strategies, regulations, and performance (Huang & Liu, 2005; Marques & Simon, 2006).

Research Questions and Hypotheses

The research questions sought to understand the implications of changes in telecommunications regulation and innovation strategies of firms on the observed variations in service quality and return on investments of the competing firms. The hypotheses aimed at establishing a link between regulation, innovation strategy, and the interactive effects of the independent variables on the dependent variables. The first research question (RQ1) led to an examination of the degree to which telecommunications firm performances were associated with the innovation strategies of firms complying with varying regulatory policies in the telecommunications industry. The second research question (RQ2) guided the formulation of hypotheses which enabled an examination of the performance of firms operating within specific regulatory conditions and using specific innovation strategies.

Overall, the results suggested no significant relationship between regulations and the interactive effect of regulation and innovation strategy on performances. The results juxtaposed conventional economic theory suggesting an antithesis between standards (regulations) and technological innovation wherein creativity may be stifled, constricting the scope for learning, and competition (Thomson, 1954; Gann, Wang & Hawkins, 1998). Some innovation strategies

yielded higher performances in certain regulatory frameworks. The result was consistent with evidence in U.S broadband markets suggesting efficiency gains from deregulation when appropriate innovation strategy was implemented (Hazlett & Calrliskan, 2008). The results were compared with the literature in terms of the research question and the related hypotheses.

Research Question One and Related Hypotheses

The associated four null and alternate hypotheses to research question one provided an answer to the question seeking to understand the relationship between the independent variables and the dependent variables. The independent variables demonstrated different relationships with respect to service quality and ROI. Based on the results, the null hypotheses of H_o2 and H_o3 were rejected and the null hypothesis of H_o1 and H_o4 were not rejected.

Innovation Strategy, Regulations and Service Quality. Innovation strategy and regulations showed some association with service quality but was refuted by the less than significant F-test statistic. The result supported Lo and Wand (2007) who found that differences in service quality were not significant as regulations changed. The influence of regulation and innovation strategy were not significant enough to constitute any major impact on the manner in which U.S. telecommunications firms responded to the service quality demands of the customers within the study period. Kropp and Zohlin (2005) conducted a similar study in an industry other than telecommunications and found a positive correlation between regulations and firm performance. This did not come as a surprise given that the specific performance indicator measured was not service quality.

The result was reminiscent of an industry where regulations and innovation strategy showed no significant correlation with the service quality of firms in New Jersey, Rhode Island, and New Hampshire. The absence of correlation supported Farrell and Weisman's (2004) level

playing field argument in which incumbents are properly subject to regulation that would not apply to new entrants. Absent regulations which were found not to be associated with service quality, new entrants may be prevented from entering a market that was conceptually a monopoly.

Regulation, Innovation Strategy and ROI. Regulation and innovation strategy showed a negative Pearson correlation when associated with ROI. When the innovation strategy changed from an incremental innovation strategy (reactor and defensor) to a disruptive strategy (analyzer and prospector), the ROI investments declined. Between the disruptive classes of innovation strategy, an analyzer innovation strategy yielded more ROI than the prospector strategy. Firms that asserted a more aggressive innovation strategy were found to earn lower return on investments. The study supported Kodoma (2004)'s assertion that a highly innovative firm should establish a different organization within the traditional parent organization to implement radical innovation. Scott and Davis (2007) described this behavior in terms of the perils of innovation.

The results supported the view that firms must review the industry environment and analyze both the competition and the variety of products before selecting an innovation strategy (Lo & Wang, 2007). Results of this nature led Huang and Liu (2005) to conclude that innovation positively affects a firm's performance while its square term negatively affects a firm's performance. In other words, innovation positively influences performance at the initial stages of research and development interventions. Being old and mature firms, the negative correlation factors would be expected whenever the firm grappled with radically new technology.

The results also suggested that the expected benefits of deregulations pale in comparison to their opportunity costs (Robinson & Weisman, 2008). Firms in a deregulated market earned

less ROI than firms in a regulated market suggesting that some regulations was needed for firms to improve performances. Undoubtedly, when faced with organizational innovation and regulation, paradoxes could be of many forms; global versus local, efficiency versus control, command and control versus decentralized creativity (Kodoma, 2004). In this study, one paradox was to set rules that enhance benefits to firms and consumers. In the process, the regulator must choose to create an edge and not a bland mid way between regulations and creativity.

Research Question Two and Related Hypotheses

Research question two sought to investigate if regulatory frameworks or innovation strategies were responsible for changes on the service quality and ROI performances of firms. Research hypotheses (H_o5 and H_o6) were tested using a single side ANOVA, a two sided ANOVA and a χ^2 test of independence to provide an answer to the question. Depending on the test, null hypotheses related to service quality were not rejected confirming that no significant differences existed between the service qualities of firms in the respective regulatory settings.

The chi square analysis specifically revealed that basic telecommunications regulations and return on investments were independent (χ^2= 0.58, p=99) while innovation strategy and ROI were significantly associated (χ^2= 15, p= 0.04). The independence of regulations and ROI contradicted the results of the regression analysis and the work of previous researchers who found significant improvements in productivity with deregulation in the banking sector (Maudos & Pastor, 2003). The findings provided insight on Dawson's (2006) assertion that no well-developed theories existed on how regulation influences firm performance and suggested that as regulations change, innovation strategies also changed to adapt to the new environment. The

overall consequences of the bivariate changes were a reduction of regulatory influence on the performance of firms.

The results of the chi square test supported the one way and two ANOVA test results in which no statistically significant difference existed in the service quality and ROI of firms operating in varying regulatory frameworks. An element of interest in the results was that the two tailed ANOVA and the chi square test showed relative independence between regulation and ROI. The regression and correlations test provided the reverse results reflecting a small positive association between regulations and ROI.

Contradictory results of the sought led to second thoughts over arguments for leveling the playing field as the "seductive appeal for even-handedness too easily becomes an excuse for more regulation" (Robinson & Weisman, 2008, p538). In an industry where regulators have set the pace for innovation for many years, each regulator may be more influenced by other issues than simply leveling the playing field. Problems, solutions, participants, and choices in the regulatory process may produce outcomes of oversight, flight, or resolution (Mezias & Scarselletta, 1994).

Decisions by resolution occur when choices made by regulators resolve the problems of the stakeholders (Mezias & Scarselletta, 1994). As this writer observed in many regulatory processes, the more times an issue was discussed prior to the regulatory process, the more likely a decision by resolution occurred. Decision by oversight occurred when a particular problem was raised only by a less dominant stakeholder and ends up being overlooked. Decision by flight occurred when a regulation made for a specific problem failed to solve the problem.

The regulatory process did not present a clear and consistent relationship between a problem, its solution, the participants and the choices (Robinson & Weisman, 2008). The process

resembled a garbage can decision method in which participants were grouped into incumbents, competitors and consumer coalitions pushing forth their ideas. Regulators, in the guise of deregulation would "align themselves with powerful entrenched interest groups" (p535).

The χ^2 test is usually a more powerful and precise way to investigate whether a relationship existed between two variables than simply observing the data (Neuman, 2006). Based on the χ^2 test and two way ANOVA results, one may conclude like Khan, the last Schumpeterian, that in a telecommunications market regulation and competition co-exist and complement each other (Robinson & Weisman, 2008). The regulator may eventually exit the scene if the creative and destructive components of the market must discipline market prices and eventually reduce industry performance.

Firms applying a more innovative strategy (prospector firms) earned low returns on investments. Firms with a defender innovation strategy enjoyed high ROI. The results match empirical analysis of the causal relationship between knowledge capital (innovation) and performance indicators at the firm level (Heshmanti, 2009).

Innovation strategy and regulations jointly resulted in no significant association with firm performance. This added to the requirements of the literature which needed an insight on how regulation-innovation fit was related to performances. The result could be expected as firms chose a specific innovation strategy to meet the demands of the regulatory system in which they operated. A firm that employed a prospector strategy in an environment with regulations on basic service must change its strategy to an analyzer type in a completely deregulated environment. Fitting counteracted the influence of interactions on performances (Huang & Liu, 2005).

Conclusions

The application of radical innovation in a market with legacy regulations can result in pivotal and survival decisions for competitors. The result of the study described three relationships which together paint a picture of the US telecommunications industry. The conclusions are reviewed according to the bivariate relationships in the study.

The first relationship is that of declining performances (ROI) when the telecommunication firm's innovation strategy moved from an incremental innovation strategy (reactor) to a disruptive innovation strategy (prospector). The finding was in line with Kodoma (2004) who found that organizations with innovative technologies should be established as a different organization within the traditional parent organization to promote integrative competencies and increase performance. The study is supported by Keunjae and Sang-Mok's (2007) findings that the type of "innovation matter in productivity growth" (p359). Responsiveness in innovation strategies may erode the quality of the service and diminish profits absent a more analytical or defensive innovation strategy from the firm. This translates into lower SQ and lower ROI when compared to less innovative firms applying regular routines and established competencies.

. The study corroborates Sinha and Noble (2008) in their findings that the adoption of radical manufacturing technologies or product innovation prior to the inflection point of the estimated Bass diffusion curve for each technology leads to significant reduction in firm mortality and performance. Product innovation (PI) includes the development of a product and radical innovation strategy (Sinha & Noble, 2008). Innovation related to PI may reduce efficiency growth relative to other types of innovation as a result of adjustments needed to obtain new products. Process innovation involves an incremental innovation strategy to reduce defects,

lead time, costs and other factors, and as such is very efficiency orientated (Sinha & Noble, 2008).

The second relationship depicted an industry where no statistically significant variations in SQ were observed among firms in three regulatory types as innovation strategy and regulations changed. This was expected given that regulatory agencies responsible for deregulation are risk adverse and are generally more oriented towards avoiding unplanned contingencies in a dynamic industry like telecommunications (Robinson & Weisman, 2008). Though performances in regulatory types as defined by Perez-Chavolla (2006) showed no differences, chances are these variations only appear as paper work than do they actually significantly influence results in the industry.

The relationship between regulations and ROI yielded mixed results. Using the regression analysis, ROI decreased with deregulation. Chances are that firms invested on new networks to improve service quality in order to compete and minimize risks. The results suggested that regulations improve risk management and capital allocation efficiency (Cai & Wheale, 2009). However, based on the ANOVA and Chi square test, ROI and regulations were independent.

Regulation and innovation strategy were jointly inconsequential on the performances of sample firms. The conclusion based on comparing the present study with previous research on the degree of association of an organizational variable, an environmental variable and performances was that competition and regulation coexisted in the telecommunications industry. Wilcock and Feeny (2006) viewed the complex situation in terms of an innovation and leadership strategy that enhances the organization's abilities to achieve an alignment between information technology (IT) and business strategy. The central goal of leadership innovation strategy was to decide on what innovation strategy to use given the regulatory environment in

order to create needed relationship building and interdependence that adds value to the investments (Wilcock & Feeny, 2006).

Implications of the Study

The results of the present research study indicated a significant relationship between innovation strategy and firm return on investment, no significant relationship between innovation and service quality, and no significant relationship between the fitting of regulations and innovation strategy on performance. The difference in service quality as regulations changed was found to be statistically non-significant from all tests. However, regulation and innovation strategy were associated with ROI depending on the test instrument. Each of these findings can have implications for academia as well as implications for leadership in a dynamic industry like telecommunications.

Implications to Leaders in a Dynamic Organization

Any framework that provides direction for enhancing performance in a complex and dynamic environment evokes a leadership strategy and a model that predicts the efficient use of critical company resources such as people and technology (McLaurianne, 2008). Integrating and linking regulations, innovation strategy, and performance provides leaders with knowledge and insights for optimizing business innovation strategy. Insights from this study alluding to no correlation between existing regulatory types and firm service quality provides business leaders and regulators with ammunition to balance public interests with other firm concerns.

Over the past 20 years, successive regulations lifting restrictions from entering the market have enabled a significant increase in the number of telecommunications providers. Cost of service declined with the new technology used by newer companies that do not operate under the same regulatory restrictions as the incumbents. The study has revealed that service quality for

both older and new firms were statistically equal and the choice of an appropriate leadership innovation strategy for a particular regulatory type was strongly associated with ROI. The negative correlations between regulations and innovation with ROI must not be construed to mean that firms must not innovate. Innovation remains the only strategy for survival but the innovation strategy employed, incremental or radical, must rhyme with the regulations in place.

The results suggested that of the multitude of issues confronting the US telecommunications industry today, leadership decision making may be the most important issue to address. If leaders can align innovation strategy with regulatory types, service quality and ROI will increase. The innovation strategy must be clearly communicated so that everyone knows the targets for improvements and a clear link must exist between the innovation project and the business strategy of the firm (Tidd, Bessant & Pavitt, 2006).

Implications to the Literature

Several implications exist for theory and research for investigating the relationships between local telecommunications regulations, innovation strategy levels of firms, and their performance. First the study adds insight on the seminal work of Chandler (1962) who investigated the influence of an alignment between two variables on the performance of firms. By analyzing the relationships between the study variables, Chandler's seminal work is extended into the telecommunications domain.

The relationship between innovation strategy, regulations and performance in the telecommunications industry takes the previous work of Huang and Hu (2007) and Lau (2005) one step forward. The previous researchers investigated the relationship between IT strategy and Business strategy. The work of previous investigators is enhanced to include a third variable;

performance. Depending on the test performed, regulations and innovation strategy are positively, negatively or not associated with performance.

The study also adds value to existing literature on regulations and performances, innovation strategy and performances, and the combined effects on performance. The void that existed due to the absence of an empirical study of the relationship may no longer exist. Telecommunications firms will henceforth enhance service quality and return on investments by choosing the innovation strategy type that aligns with regulations to provide optimal performance.

Regulations were found to be independent of service quality. However, the relationships between regulations and return on investments were inconclusive. The regression analysis indicated significant drops in ROI as the environment became more deregulated. The ANOVA and chi test predicted no statistically significant influence of regulations on telecommunications firm ROI.

Service quality and ROI contribute to the satisfaction of the consumer on the one hand and the investor on the other hand. The implications were that the industry was so robust that regulators have a free hand to decide whether to continue to regulate or allow the market to follow its process of creative destruction (Schumpeter, 1954). Deregulation in the industry does not argue well for firm performances. Where regulations are needed, the insights from this study will enable operators to establish a more symmetrical regulatory framework that will promote innovation, increase performance and enhance consumer satisfaction.

Recommendations for Future Studies

Innovation is an enabling component required by any firm to remain successful. Leaders must not refrain from innovating even when firms appear to be obtaining high performances. The

innovation strategy of the firm, usually grounded on the business strategy of the organization, is subject to competitive forces in the market or the local business regulations.

The study has revealed that in a dynamic industry like telecommunications where several competitors exist, service quality is not significantly influenced by regulation and innovation strategy levels. The firms return on investments can be predicted more from the innovation strategy of the firm than the local business regulation. The results of this descriptive quantitative correlations study found a negative relationship between innovation strategy and ROI. This adds on a new variant to the positive correlation between innovation and performance or the square term relationship between innovation and maturity of the firm (Hiu and Lang, 2008). Recommendations for actions are grouped into two main categories; limitations and suggestions for future research and recommendations to telecommunications leaders.

Recommendation for Action by Key Stakeholders

Leaders in the U.S. telecommunications industry are grappling with many changes. Regulations and innovation play a significant role in guiding the industry through turbulent times. In regulating, a distinction has to be made between the content of standards and the administration of the standards. Stakeholders will find meaning in regulations only if it provides a means to grow customer base and increase firms' bottom lines. Faced with the contrary, leaders invent and provide meaning how the market works.

The findings that increased deregulation reduce return on investments are in agreement with results from the Banking sector (Sensarma (2008). The results constitute a reason for former monopolies (incumbent) and new entrants to view deregulations and vibrant competition from subjective points of anchorage. Incumbents may view regulation as a means to facilitate entry by new entrants who implement processes that cut into their market base and create an unrealistic

and idealized vision of a telecommunication process. New entrants may see incumbent process safeguards as inefficiencies.

Deciding on the true level of regulation and innovation strategies must therefore be achieved by what the state's telecommunications community agrees upon. The process must involve an effort to construct a rational picture of vibrant telecommunications competition that makes sense of the data provided to stakeholders. The difficulties involved in reaching a consensus in the regulatory process supports the assertion that "a critique of universal reason has an easier time than a defender" (Nagel, 2003, p.26).

A key finding in the study was that regulatory changes do not significantly related to the service quality and, based on the ANOVA test, ROI on telecommunications firms. These performance indicators are strongly associated with the innovation strategy used by the firm. Different innovation strategies appear to work for different regulatory types. Knowing in what regulatory framework to apply a specific innovation strategy is an important aspect of leadership to be developed by firm leaders and regulators.

Firm leaders should begin to look at ways to better prepare their business strategy so that it ties with the type of regulations in place. Ubiquitous networks may add an embedded cost to the system but the results of this investigation has indicated that innovation strategy is more responsible for performance failures than the type of regulations in place. The perception that regulations negatively influence firms' bottom lines need to be reconsidered and perhaps reviewed from a value-based point of view. Giblin and Amuso (1997) posited that values should be management's attempt to define "good" in the light of corporate life and endeavors, must represent good in a societal context, and must drive the people within the business.

A growing body of literature has shown that performance standards enable firms to innovate while prescriptive standards depend on the type of industry and the goal to achieve (Porter, 1999). The focus depends on the purpose of the regulation and the activity regulated. Telecommunications regulators will now be able to take measures that create a trade-off between performance objectives and systemic innovation. The regulations must be flexible enough not to inhibit innovation found to strongly correlate with performance. Clarity and simplicity will enable the regulatory process to promote good practice and encourage innovation and the capacity to change.

Limitations and Recommendations for Future Research

A number of limitations could affect the generalization and the internal validity of the study. The choice of sample, the scope and the research approach are reviewed in order to make recommendations for future research. Overcoming these limitations will add more insights to the research findings.

Research Approach. The linear approach used in the study may hinder the observance of nonlinearities in the study. The research findings approximated the relationships between innovation strategy and performance to a model with a negative linear correlations relationship. The negative nature raised further questions about innovation and firm performances and suggested that the approach may have had an influence in the results obtained. Previous findings had suggested a positive correlation between innovations and performance and a dual relationship in the founding and mature stages of firms. Another approach may provide greater insights into the investigation.

An approach that could be employed to examine the relationship between innovation strategy and regulation and firm performance was a qualitative design based on configuration

theory to break away with the predominantly linear paradigms (Hult, Boyer, & Ketchen, 2007). A qualitative analysis "may use narrative data gathered from in a variety of ways to provide meaning, insight, and understanding of the variables" (Hart, 2008 p23). The configuration approach would imply the simultaneous consideration of multiple interwoven parameters and assume complex causalities where innovation strategy could have a nonlinear relationship, no relations or could be even inversely related to the other variables (Fiss, 2007; Hult et al., 2007).

The configurations approach is a gestalt of bidirectional causal loops with no strictly dependent or independent elements and no assumption of a linear relationship (Miller, 1990). Configurations approach tends to build on synergistic effects with outreach beyond those of a bi-variant interaction (Delery & Doty, 1996). Because the focus in the proposed study was limited to linear relationships between study variables, not multiple outcomes linked by a loop of feedback relations, a correlations linear approach was appropriate.

Scope and Sample. The scope of this study was broadened to three states with varying regulatory frameworks and firms with different levels of innovation strategy and technology. The firms employed varying technologies. No hypothesis was formulated to investigate the influence of the adopted technology on the performances of the firms. In this study some of the firms employed traditional platforms while others used innovative technologies like VoIP and FiOS. Future studies may include hypotheses to test the influence of the technology platforms on the performances of the firms. The study may be extended to include wireless providers. In a state like New Jersey, incumbents are regulated differently. A case study of the influence of regulation and innovations on firm performances would be more appropriate.

Summary of Chapter and Research

A commonly held view is that an excessive regulation is the prime cause of Europe's underperformance with respect to the United States (Blanchard, 2004). Intricate regulation coupled with arbitrary enforcement is listed as key obstacles to growth in developing countries (World Bank, 2004). Caballero and Hammour (1996) asserted that the mechanism through which regulation is related to performance is the Schumpeterian process of creative destruction at the core of the growth engine in market economies. Nicoletti and Scapertta (2003) found that product market regulation lowered multifactor productivity growth in OECD countries while Bansani and Ernst (2202) reported a negative effect of regulation on innovation.

The present dissertation study has reflected that innovation strategy has a strong degree of association with a firm's return on investments and business regulations in the US telecommunications industry and showed mixed results on performances depending on the test performed. Of particular interest in the quantitative descriptive study wqs the finding that ROI declined as the innovation strategy level changed from incremental to disruptive innovation. The finding suggested that incremental innovation yields higher dividends in the telecommunications industry than disruptive innovation. A judicious choice of innovation strategy and regulatory framework produces optimal performances.

Though limited to three states in the North East United States, the results may be generalized in the United States telecommunication industry. In an industry that was hitherto strongly regulated, regulations have played a core role in ushering an era of technological innovation, cutting costs, increasing speed of service, and maintaining service quality. Innovation involves risks and this warrants the formulation of acceptable innovative and ethical processes that will enable competing firms to survive. A more detailed case study of regulation

and innovation strategy within specific states and across country boundaries may improve upon the findings of the present study.

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APPENDIX A: MEASURING FIRM INNOVATION STRATEGY

Measurement of Firm Innovation Strategy

Company Code:

Respondent Number:

The purpose of this questionnaire is to provide insight into how well the firm relates to its environment and to determine the firm's innovation strategy as it attempts to maintain a competitive edge over other carriers in the industry. The table below contains statements which describe the way this carrier name above does business. For each statement, simply put a score between 1 (=not true at all) to 7 (=very true)

No:	Statement	Score 1 (*not true at all*) Score 7 (*very true*)
1	Workers have a clear idea of how innovation can help you compete	
2	You have processes in place to help you manage new product development effectively from idea to launch	
3	Your organization structure does not stifle but helps innovation happen	
4	You firm has a strong commitment to training and development of people	
5	You have good "win-win" relationships with our suppliers	

Table continued

No:	Statement	Score 1 (*not true at all*) Score 7 (*very true*)
6	Your innovation strategy is clearly communicated so that everyone knows the targets for improvement	
7	Your innovation projects are usually completed on time and within budgets	
8	People work well together across departmental borders	
9	You take time to review your projects to improve your performance next time	
10	You are good at understanding the needs of your customers and end-users	
11	People know what your distinctive competence is-what gives you a competitive edge	
12	You have effective mechanisms to make sure everyone understands customer needs	
13	People are involved in suggesting ideas for improvements to products or processes	
14	You work well with universities and other research centers to help you develop your knowledge	
15	You learn from your mistakes	

Table continued

No:	Statement	Score 1 (*not true at all*) Score 7 (*very true*)
16	You look ahead in a structured way (using forecasting tools and techniques) to try to imagine future threats and opportunities	
17	You have effective mechanism for managing process change from idea through to successful implementation	
18	Your structure helps to take decisions rapidly	
19	You work closely with your customers in exploring and developing new concepts	
20	You systematically compare your products and processes with other firms	
21	Your top team has a shared vision of how the company will develop through innovation	
22	You systematically search for new product ideas	
23	Communication is effective and works top-down, bottom-up and across the organization	
24	You collaborate with other firms to develop new processes and products	
25	You meet and share experiences with other firms to help you learn	
26	Top management supports innovation	
27	You have mechanism in place to ensure early involvement of all departments in developing new products/processes	
28	Your reward and recognition system supports innovation	
29	You try to develop external networks of people who can help us with specialist knowledge	
30	You are good at capturing knowledge so that others in the organization can make use of it	
31	You have processes in place to renew new technological and market orientation and what they mean for firm strategy	
32	You have a clear system for choosing innovation projects	
33	You have a supportive climate for new ideas-people don't have to leave the organization to make them happen	
34	You work close with the local and national education system to communicate our needs for skills	
35	You are good at learning from other organizations	

Table continued

Table continued

No:	Statement	Score 1 (*not true at all*) Score 7 (*very true*)
36	This firm has sufficient flexibility needed for product development to allow small fast track projects to happen	
37	This firm's innovation projects differ from the overall strategy of our business	
38	You work well in teams	
39	You work closely with lead users to develop innovative new products and services	
40	You use measurement to help identify when and where improvements can be made on firm innovation management	

APPENDIX B: INFORMED CONSENT FORM

XXXX XXXX
University of Phoenix
XXXXXXXXXXXX
XXXXXXX, NJ 07304
Tel: XXX-XXX-XXXX
Email: XXXXX@msn.com or XXXXX@phoenix.edu
November 14, 2008

Dear Telecommunication Eirm Executive

Subject: Informed Consent

The undersigned is a student at the University of Phoenix working on a Doctor of Management in Information System and Technology (DM/IST) degree. The student is conducting a research study entitled the "Relationship between Firm Innovation Strategy, Local Telecommunications Regulations and Firm Performances in the US Telecommunications Industry." The purpose of the study is to investigate the relationship between types of local telecommunications regulations in three sample states, the type of innovation strategy implemented by the firm to cope with competition and the influences of both on the service quality and financial performance of the firm. The study may also enable the research determine if certain strategies produce better performance in certain regulatory frameworks.

The student has short listed your firm to be one of the sample firms to be included in the study. Select respondents in your planning and or regulatory offices in New Jersey, Rhodes Island and New Hampshire will be part of the study. In this study, there are no foreseeable risks to your firm or to your staff. The results of the study may help you understand what strategies to implement in a given regulatory framework. The study will also enhance scholars' understanding of the relationship between fitting innovation strategy to local regulations in a dynamic industry like telecommunications.

Your participation will involve completing one type of instrument. The instrument is a validated 7-point Likert type survey questionnaire used by industries for auditing innovation. The remaining data on service quality and return on investments will be retrieved from publicly available data on federal, state and firm databases. The estimated time for completing the instrument is less than 20 minutes.

While I am enthusiastic about the study and your involvement as a telecommunications leader, participation in this study is voluntary. If you choose not to participate or withdraw from the study at anytime, there are no penalties or loss of benefits to yourself. The results of the research study may be published (with composite data results only) and your name will not be used. The study results will be maintained in a confidential file by the researcher for a period of three years. After the three year period, the documents will be shredded and destroyed. The coding on the questionnaire is for data collection purpose only.

Should you have concerns relating to the study, please feel free to contact the student at 201-658-7718 or email me at tmchu02@msn.com.

Since there is a relatively short time frame for collecting data, I will appreciate efforts to sign the consent form and return the study form to me at your earliest convenience, possible no later than one week

Thank you ahead of time for participating in this research study.

Sincerely

XXXX XXXX

All Participants must sign the informed consent form and return it by regular mail or fax to 973-624-9453

INFORMED CONSENT STATEMENT

BY SIGNING THIS FORM I ACKNOWLEDGE THAT I UNDERSTAND THE NATURE OF THE STUDY, THE POTENTIAL RISKS TO ME AS A PARTICIPATING FIRM, AND THE MEANS BY WHICH MY IDENTITY WILL BE KEPT CONFIDENTIAL. MY SIGNATURE ON THIS FORM ALSO INDICATES THAT I AM 18 YEARS OLD OR OLDER AND THAT I GIVE MY PERMISSION TO VOLUNTARILY SERVE AS A PARTICIPATING FIRM IN THE STUDY DESCRIBED.

_____ _____

Signature of Participants Date

Thank you ahead of time for participating in this research study.

Sincerely

Thomas M. Chu

All Participants must sign the informed consent form and return it by regular mail or fax to 973-624-9453

INFORMED CONSENT STATEMENT

BY SIGNING THIS FORM I ACKNOWLEDGE THAT I UNDERSTAND THE NATURE OF THE STUDY, THE POTENTIAL RISKS TO ME AS A PARTICIPATING FIRM, AND THE MEANS BY WHICH MY IDENTITY WILL BE KEPT CONFIDENTIAL. MY SIGNATURE ON THIS FORM ALSO INDICATES THAT I AM 18 YEARS OLD OR OLDER AND THAT I GIVE MY PERMISSION TO VOLUNTARILY SERVE AS A PARTICIPATING FIRM IN THE STUDY DESCRIBED.

Roberta Varettoni 4/9/09

Signature of Participants Date

Verizon Communications Inc.

On 4/1/09, **Varettoni, Robert A (Bob)** <robert.a.varettoni@verizon.com> wrote:

4/9/2009

APPENDIX C: INNOVATION STRATEGY TOOL PERMISSION

Thomas Chu <mehchu@email.phoenix.edu>

Permission Required **Wed, Apr 1, 2009**

XXXXXX **<XXXXXX@email.phoenix.edu>** **at 10:21 AM**

To: permreq@wiley.co.uk

XXXXXXXXXXX
University of Phoenix
137 Ege Avenue
Jersey City, NJ 07304
Tel: 201-658-7718
Email: XXXXXX@msn.com
March 31, 2009

Dear Sir/ Madam

Subject: Use of "How well do we manage innovation" tool?

The undersigned is a student at the University of Phoenix working on a Doctor of Management in Information System and Technology (DM/IST) degree. The student is conducting a research study entitled the "Relationship between Firm Innovation Strategy, Local Telecommunications Regulations and Firm Performances in the US Telecommunications Industry." The purpose of the study is to investigate the relationship between types of local telecommunications regulations in three sample states, the type of innovation strategy implemented by the firm to cope with competition and the influences of both on the service quality and financial performance of the firm. The study may also enable the research determine if certain strategies produce better performance in certain regulatory frameworks.

Your 7-point Likert tool for auditing innovation management has been adapted for use in the study. The remaining data on service quality and return on investments will be retrieved from publicly available data on federal, state and firm databases.
As a copyright requirement, I am hereby requesting your permission to use this tool found on page 566-568 of the Tidd, Bessant and Pavitt (2205) Managing Innovation (3rd edition) reference book.

Thank you in advance for giving me the permission to use the tool

Sincerely
XXXXXXXX

Permission Requests - UK **Thu, Apr 2, 2009**

<permissionsuk@wiley.com> **at 3:54 AM**

To: XXXXXX<xxxxxxx@email.phoenix.edu>

Dear XXXXXXX

Thank you for your email request. Permission is granted for you to use the material below for the below stated study, subject to the usual acknowledgements and on the understanding that you will reapply for permission if you wish to distribute or publish your thesis/dissertation commercially.

Kind Regards

Katie B Wade

Permissions Assistant

Wiley-Blackwell

9600 Garsington Road

Oxford OX4 2DQ

UK

Tel: +44 (0) 1865 476149

Fax: +44 (0) 1865 471158

Email: katie.wade@wiley.com

From: XXXXXX [mailto:xxxxxx@email.phoenix.edu]
Sent: 01 April 2009 16:21
To: Permission Requests - UK
Subject: Permission Required

[Quoted text hidden]