ORGANIZATIONAL INNOVATION: THE ROLE OF TOP MANAGEMENT IN DIFFERENT STAGES OF INNOVATION IMPLEMENTATION

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Organizational Innovation: The Role of Top Management in Different Stages of Innovation Implementation

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SUMMARY

This research was designed to explore the phenomenon of implementing technological innovation in organizations. By focusing on innovations that are purchased (instead of created in-house) and by distinguishing between the awareness stage and the adoption stage of innovation implementation, I sought to contribute to a better understanding of implementing organizational innovation. And by focusing on the role of top decision makers in innovation implementation, I sought to both replicate and move beyond the Upper Echelon Theory's (Hambrick & Mason, 1984) emphasis on top management characteristics as predictors of organizational outcomes.

This study examines the role of top management characteristics and strategic orientation on *specific stages* of the innovation implementation process, by exploring the following research questions,

1) What effect do top management characteristics have on organizational innovation awareness?
2) What effect does top management strategic orientation have on organizational innovation adoption?

Top management characteristics are hypothesized to positively relate to the *awareness stage* of the innovation process because of the implicit knowledge seeking of alternatives represented by the level of education and tenure of top managers. Top management strategic orientation is hypothesized to positively relate to the *adoption* and

implementation stages of the innovation process as a result of actions taken by top management to scan the environment for opportunities matching the organization's capabilities. I examine these relationships using data from a sample of 241 drug and alcohol treatment centers located across the United States. The data were collected over a 6-year period, from 1995 – 2001. In this study, I use centers that began the study in Wave 1 of data collection (1995-96) and continued through Wave 2 and Wave 3. The specific collected data used in this study is from Wave 2 and Wave 3.

It appears that in this data set, the cascading of knowledge of new innovative treatments for patients from top leadership to staff is related to the educational level of the top manager only when that top manager is relatively new to his or her position. In addition, this cascading of innovation awareness knowledge takes time to take root (i.e. significant results only found in a longitudinal analysis). These results support an argument advanced by Kimberly and Evanisko (1981) concerning newness of leadership and innovation. And, in light of Hannan's (1998) argument concerning the liability of newness of an organization, the newness of the centers in this study does not have an effect on this relationship.

These results also suggest that top management characteristics may provide some insights in better understanding the phenomenon of implementing technological innovation in organizations. However, moving beyond mere characteristics of top management to a more action-oriented conceptualization -- a conceptualization which captures orientations and behaviors -- of the upper echelons yielded more significant explanations of variance. Though there was no direct effect of strategic posture on innovation adoption in health centers found in this study, the significant negative effect of the interaction of perceived environmental uncertainty and entrepreneurial orientation is noteworthy. And in centers where customers exhibit more of an ability to pay for services without the assistance of the federal government, this customer profile enhances the relationship between an innovative and risk-taking strategic orientation of top management and innovation adoption.

This study contributes to an understanding of innovative behavior by suggesting that top decision-makers in organizations are significantly affected by the environment in ways not discussed broadly in recent literature. A dynamic competitive environment does not appear to be beneficial to innovation adoption in a historically regulated industry such as health care over time. However, aspects of an organization's customer profile have a tremendous impact on innovation activity over time. Focusing first on the customer, and later on the competition may enhance competitive advantage and long-term financial health. While this advice may be contrary to much of what is written on competitive advantage, a customer- first orientation may well be the source of long-term competitive advantage.

CHAPTER I

INTRODUCTION

The fast-paced business environment of the 1990's gave birth to The New Economy. Because technological innovation was greatly valued in this environment, there was a heightened interest in studying how technological innovation was produced, adopted and implemented. Now that The New Economy has faded, many *short-term* benefits of technological innovation, such as instant wealth creation for stockholders, have faded also. However, the *long-term* benefits of technological innovation, such as improved market positioning and customer satisfaction, continue to inspire scholars to examine the determinants of organizational innovation.

In a book recently published by Stanford University Press, Richard Ellsworth (2002) sharply challenges the conventional wisdom that corporations should be dedicated primarily to shareholder wealth creation. He argues that the path to competitive advantage and long-term financial health – especially in a global economy -- is found in having a customer-focused purpose. Since innovation has been widely recognized as a path to competitive advantage, one can infer from Ellsworth's argument that though short-term wealth is a reason to innovate, addressing the needs of your customer is an even more compelling reason to innovate given the longer-term benefits of doing so.

One industry that has focused on the longer term -- both in innovative processes and addressing customer needs -- is the healthcare industry. For example, a French subsidiary of a well-known pharmaceutical company has submitted paperwork to the Food and Drug Administration to have their new drug, acamprosate approved for a specific use in the United States. According to a recent news article, a top manager of the company chosen to market the new drug said, "Acamprosate demonstrated… a consistent ability to help motivated patients…" (2002:6) In his comments, this top manager captured the long-term benefits of technological innovation by focusing on product effectiveness and customer satisfaction. Thus, when choosing to study an industry that focuses on longer term benefits of innovation, the health care field is an apt choice.

The research interest in innovation certainly predates the "Initial Public Offering (IPO) frenzy" of the 1990's. Wolfe (1994) reported in his review of organizational innovation research that there were 1,299 published journal articles and 351 dissertations addressing *organizational* innovation in the five years preceding his 1994 article. He also reported that there were 6,244 published articles and 1,336 dissertations completed on the *general* topic of innovation. However, despite this plethora of work, there is little understanding of innovation in organizations. In a review and critique of organizational innovation literature, Wolfe (1994) said that "Despite broad interest and a vast literature, understanding of innovative behavior in organizations remains relatively undeveloped…the results of organizational innovation research have been inconclusive, inconsistent, and characterized by low levcls of explanation" (1994:405). Over the past few decades other scholars have commented on the lack of consistent findings in innovation research (Dewar & Dutton, 1986; Downs & Mohr, 1976; Fennell, 1984; Kimberly & Evanisko, 1981; Meyer & Goes, 1988; Zmud, 1984; Fiol, 1996).

Wolfe (1994) identified numerous reasons for these inconclusive and inconsistent research results. Two of these reasons, specifying the type of innovation and specifying stages of the innovation process, will be addressed in this study. Though recent innovation research has sometimes specified whether the type of innovation being studied is technological or administrative, not many researchers have distinguished between innovations that are *developed within* or *purchased by* an organization. Since determinants of administrative and technological innovation have been found to differ (Bantel & Jackson, 1989; Kimberly & Evanisko, 1981), it is also likely that determinants of successfully *purchasing* innovative products differ from the determinants of *producing* an innovative product in-house.

This current research will examine organizational innovation defined as a technological product or program that has been *purchased* by an organization. This is defined similarly to technological innovations operationalized by Kimberly and Evanisko (1981). They suggested that technological innovations in the medical field are ones that are directly related to the diagnosis and treatment of disease. The technological innovations in this current study will be innovative products or programs that are directly related to the treatment of disease.

This current research will also identify two specific stages of the innovation process. Damanpour (1991), referring to the work of Daft (1982), Damanpour and Evan (1984) and Zaltman, Duncan & Holbeck(1973), defined innovation as "*adoption* of an internally generated or purchased device, system, policy, program, process, product or service that is new to the adopting organization" (1991:556). Similarly, many studies of innovation have focused only on the *adoption* stage of the process,(e.g. Bantel & Jackson, 1989; Damanpour, 1987; Damanpour, 1991; Damanpour & Evan, 1984; Kimberly & Evanisko, 1981). However, the process of innovation is composed of other stages, including the awareness stage. (Fiol, 1996; Meyer & Goes, 1988; Rogers, 1995).

In addition, Wolfe (1994) suggested that innovation be defined as a broad process of implementation, not merely as an adoption decision that occurs at one point in time. Therefore, in this study, innovation will be defined as the *process of implementing* a purchased product or program that is new to the adopting organization, and two stages of the innovation process -- awareness and adoption -- will be chosen as outcome variables.

Since the process of implementing an innovation in an organization involves decision-making, an important determinant to examine is the role of organizational decision-makers. In the past, some organizational theorists questioned the impact that organizational decision-makers at top management levels had on organizational outcomes (Hannan & Freeman, 1977; Pfeffer, 1977). However, when Hambrick and Mason introduced the Upper Echelons Theory (1984), researchers began using this theory to link top management with organizational outcomes. One of the organizational outcomes that has been linked with top management using Upper Echelon Theory is organizational innovation (Bantel & Jackson, 1989; Young, Charns, & Shortell, 2001).

Upper Echelons Theory proposes that organizational outcomes are partially predicted by managerial characteristics of the organization's dominant coalition (Cyert & March, 1963), also referred to as top management. Hambrick and Mason reasoned that observable managerial characteristics represented cognitive dimensions of a manager that could predict a manager's decision-making behavior. Basing their argument on March and Simon's (1958) theories of decision-making in organizations, Hambrick and Mason (1984) explained that observable managerial characteristics indicate "the givens that a manager brings to an administrative situation" (1984:196). March and Simon (1958) proposed that these "givens" reflect "knowledge of alternatives available for action" (1958: 150-151) and suggested that in order to predict managerial decision-making behavior, we need to study these givens.

Thus, demographic characteristics of a manager, such as education and tenure, can represent the givens or knowledge of alternatives available for action of a particular manager or management group. This knowledge of alternatives could be the result of the socialization managers may have received as they pursued higher education opportunities and/or as these managers became more socialized in a particular work environment as their tenure increased (Cable & Parsons, 2001).

Recently, Young, Charns and Shortell (2001) found that top management characteristics were more important in earlier stages of the innovation process. This finding by Young and his colleagues may help explain why Kimberly and Evanisko (1981) found leader characteristics to explain less variance in the adoption of technological innovation than organizational variables. Since Kimberly and Evanisko examined only the *adoption* of innovation and not the specific stages of the innovation process, the full impact of leader characteristics on the entire innovation process could have been obscured. By specifying the stages of the innovation process more precisely, it may be possible to determine if *top management characteristics* have less impact on the actual adoption of an innovation and more effect on the stages leading up to the actual adoption.

However, focusing on management characteristics as proxies for cognitive dimensions that may predict decision-making behavior, Upper Echelon's Theory does not conceptualize the *actions* of top management. In their theories of organizational decision-making, March and Simon (1958) suggested that action was needed to reach a goal. Therefore, this study endeavors to broaden the concept of top management as a predictor of organizational innovation outcomes, by examining more action –oriented conceptualizations of top management in addition to examining management characteristics.

A study of organizational innovation outcomes conducted by Meyer and Goes (1988) highlights the need to look at top management action in addition to management characteristics. In their study, Meyer and Goes (1988) did not find that *management characteristics* were significant explanations of the innovation implementation process. However, in the same study they found that CEO advocacy – a more action-oriented conceptualization of top management – was positively related to organizational innovation. This finding suggests that managerial *action* may have more impact on the innovation implementation process than managerial *characteristics.*

Managerial action can take numerous forms. Similar to March and Simon's (1958) concept of initiation in organizational innovation, managerial action taken in order to reach a goal of organization innovation can be defined as behaviors and orientations which result in a search among alternatives and a decision to choose a course of action that represents change. One form of managerial action that has a fairly well developed research stream is management strategy. Management strategy has been defined in terms of how an organization defines its relationship to it's environment while pursuing its' objectives (Bourgeois, 1980). Generally, the dominant coalition or top managers take the actions necessary to develop management strategy. However, even though management strategy has a fairly well-developed literature, Drazin and Schoonhoven (1996) in the introduction to a special Academy of Management Journal issue on Innovation and Organizations reported that corporate strategy was a "heretofore underexamined area of innovation context" (1996:1068). In that same issue, Hitt, Hoskisson, Johnson and Moesel (1996) studied the effect of a particular management strategy on innovation, and found when senior management developed a strategy directing organizational attention away from innovation, such as a merger and acquisition strategy, organizational innovation decreased. When reflecting on this finding along with the Meyer and Goes (1988) results concerning the positive impact of CEO action on the organizational innovation process, it seems reasonable to propose that certain types of management strategy and strategic orientation can have an effect on the organizational innovation implementation processes.

Therefore, since top management characteristics have been found to be more significantly related to the early stages of the innovation process (Young et al., 2001), and top management actions in the form of management strategy may be important in the innovation implementation process, the following research questions are of interest:

1) What effect do top management characteristics have on organizational innovation awareness, which is the early stage of the innovation implementation process?
2) What effect does top management strategic orientation have on organizational innovation adoption, the more action-oriented stages of the innovation implementation process?

This research is designed to explore the phenomenon of implementing technological innovation in organizations. By focusing on innovations that are purchased (instead of created in-house) and by distinguishing between the awareness stage and the adoption stage of innovation implementation, I seek to contribute to a better understanding of implementing organizational innovation. And by focusing on the role of top decision makers in innovation implementation, I seek to both replicate and move beyond the Upper Echelon Theory's (Hambrick & Mason, 1984) emphasis on top management characteristics as predictors of organizational outcomes.

In this study, I first review the organization innovation literature and identify suggestions for developing an innovation outcome variable with more precision in measurement. Secondly, I review research examining the effects of top management on innovation outcomes and develop testable hypotheses concerning the role of top managers and two stages of the innovation implementation process. Following a description of alternative explanations, I outline the research methodology and analytical techniques. Finally, I report results of the analyses and discuss the implications of these results.

CHAPTER II

ORGANIZATIONAL INNOVATION

Most of the studies on innovation prior to the 1980's were focused on how innovations were communicated to *individual* members of a social system over time according to a review of more than 2000 innovation studies conducted by Rogers and Eveland (1978). Of the studies reviewed by these researchers, only 17 percent focused on how *organizations* adopt innovations. Some of the studies that examined organizational innovation conducted in this time period focused on the communication of innovations over time to one or more organizations (also known as diffusion of an innovation) (Rapoport, 1978; Romeo, 1975), while others examined the association of organizational innovativeness and specific organizational variables e.g. (Aiken & Hage, 1971; Baldridge & Burnham, 1975). A few years later, when Damanpour (1991) conducted his meta-analytic review of empirical studies examining organizational innovation he confined his analysis to those studies that associated organizational innovativeness with specific organization variables. More recently, Drazin and Schoonhooven (1996) said that innovation theory has been dominated by explanations of how to increase the number of innovations generated, suggesting that the process of generating innovations has been important to researchers as well.

Thus, the richness of the study of innovation is demonstrated by the numerous ways in which innovation can be defined. In the previous paragraph, the study of innovation was defined in terms of how innovations are communicated to individuals, how innovations are diffused to one or more organizations, what organizational characteristics are associated with organizational innovations, and what processes will increase the number of innovations generated. These and other diverse ways of defining the study of innovation reflect the "complex, context-sensitive nature of innovation" (Wolfe, 1994: 406).

In this chapter, I will review three categories of organizational innovation research streams and describe how different streams of research help dictate the definition of innovation in a study. Secondly, I will describe what stages of the innovation process are relevant to this analysis and why.

Organizational Innovation Research Streams

According to Wolfe (1994), the three categories of organizational innovation research are Diffusion of Innovation, Organizational Innovativeness and Process Theory. Diffusion of Innovation examines the question, "What is the pattern of diffusion of an innovation through a population of potential adopters?" (1994: 413). Given that much of the earlier work in innovation research concentrated on communicating innovations to adopters, there is quite a rich history of diffusion research that was initially focused on individuals, and then later on organizations. Rogers (1995) traces diffusion research back to early work in social science in 1903, when French social scientist Gabriel Tarde questioned why given 100 different innovations, only 10 would be broadly communicated and 90 would be forgotten. Diffusion research across organizations focuses on the innovation itself as the unit of analysis, and the outcome variable is usually conceptualized as the pattern, extent or rate of diffusion. For example, in their study of the diffusion of high-technology products, Norton and Bass (1987) defined innovation as the *pattern* of dynamic sales behavior of successive generations of high technology products.

The second category of organizational innovation research that Wolfe (1994) described, Organizational Innovativeness, focuses on the question, "What determines organizational innovativeness?" (1994: 413) Research in this category generally uses the organization as the unit of analysis and the outcome variable, innovativeness, is commonly measured as the number or speed of innovation adoptions. In their study of the relationship between top management characteristics and innovations in banking, Bantel and Jackson (1989) defined the innovativeness of banks by measuring the *number* of innovation adoptions.

Process Theory is the third stream of organizational innovativeness research that Wolfe (1994) described. Research in this stream looks at either one of two questions, "What are the stages organizations go through in implementing innovations?" or "What factors explain the chain of events which result in innovation implementation?" (1994: 413). In either case, the unit of analysis is the innovation process within an organization. The outcome variable is the *existence or sequence of innovation stages* for the former research question, and the variety of *outcomes within the process* for the latter question. An example of examining stage models of the innovation process is Ettlie's (1983) work that defined the innovation process as stages that moved from context to organizational policy to organizational innovation. An example of chain-of-events process research was conducted by Van de Ven and his colleagues (Van de Ven, Polley, Garud, & Venkatataman, 1999). In their study, these researchers defined the innovation process as a chain of events involving *new ideas* that achieve desired *outcomes* by *people* who are in *relationship* with others to *change* organizational *contexts*.

This current study is primarily rooted in the Organizational Innovativeness stream of literature because it will investigate an aspect of what determines organizational innovativeness. However, the dependent variable will not be conceptualized in the usual manner for this research stream. Instead of being defined as the number or speed of innovation adoptions, the dependent variable will be conceptualized more like outcome variables are conceptualized in the Process Theory stream of research. More detail concerning the conceptualization of the innovation outcome in this study is provided in the following section.

<u>Innovation Stage</u>

In the Organizational Innovativeness literature, innovation is generally defined as the adoption of a product, process, policy or service that is new to the adopting organization (Daft, 1982; Damanpour, 1991; Damanpour & Evan, 1984; Kimberly & Evanisko, 1981; Zaltman et al., 1973). This study will use this definition as its basic description of innovation. However, in response to Wolfe's (1994) admonition to move from organizational innovativeness research that captures merely the adoption decision, this study will follow the lead of Meyer and Goes (1988) by operationalizing innovation in terms of the stages of decision-making. When studying a series of decisions to evaluate and adopt new technologies in hospitals, Meyer and Goes (1988) took a slightly different view of studying the determinants of organizational innovativeness. Instead of confining their analysis to just the adoption of innovations, these researchers expanded their outcome variable to include the " knowledge-awareness stage" and the " adoption-implementation stage." In examining the relationship between determinants of innovation and this staged innovation decision-making process, Meyer and Goes (Meyer & Goes, 1988) chose to analyze each individual innovation decision. Thus, these researchers studied the decision-making stages associated with the adoption and implementation of 12 specified innovations at 25 hospitals, producing 300 processes of organizational decision-making for analysis.

When Rogers (1995) described the stages of the innovation-decision process he included the stages of awareness and the decision to adopt or not to adopt. Fiol (1996) referred to these two stages as awareness, and adoption. I will define this study's dependent variables as the two stages of the innovation decision-making process, awareness and adoption.

CHAPTER III

UPPER ECHELONS THEORY

The Upper Echelon Theory (Hambrick & Mason, 1984) was advanced at a time when some scholars suggested that the effects of leadership on organizational outcomes were questionable (Lieberson & O'Connor, 1972; Pfeffer, 1977). In 1972, Lieberson and O'Connor (1972) published a longitudinal study that analyzed changes in organizational performance (sales, earnings and profit margin) associated with executive succession. They found that changes in leadership accounted for less variance in performance than either industry or company. However, these researchers did not study the effects of leadership for leaders who were currently in the job. Therefore, caution should be exercised when generalizing results from a study focusing on changes in leadership to explain the effects of leadership of a sitting leader. Also, Hambrick and Mason (1984) reviewed this earlier empirical work by Lieberson and O'Connor (1972) and suggested that the lack of significance of the leadership variables in that study was due to methodological choices. For example, they argued that Lieberson and O'Connor analyzed the data by first attempting to explain variance in performance using year, industry and company as independent variables. These three variables accounted for more than 90 % of the explained variance. Leadership was then added to the analysis after the first three variables explained a large amount of variance. Additionally, leadership has also been found to covary with other independent variables in the Lieberson and O'Connor study (for example, company and leadership covary). Because of this covariance with the leader construct, the predictive value of the other independent variables that were entered first—industry and company – were overestimated, while the variance explained by the independent variable entered last, leadership, was underestimated (Weiner & Mahoney, 1981).

According to Hambrick and Mason (1984), the Lieberson and O'Connor study and other research modeled upon this study (i.e. Salancik & Pfeffer, 1977) were not the most appropriate analyses of leadership's effect on organizational performance. This perspective led them to conclude that "definite findings on the unimportance of chief executives are not in hand" (Hambrick & Mason, 1984).

Upper Echelon Theory proposed that top management characteristics represent knowledge of alternatives available for action that may determine top management decision-making behavior. Therefore, the tenure and education of top management have been used in research studies to represent cognitive dimensions of top managers to predict organizational innovation adoption.

Hambrick and Mason (1984) argued that complex organizational decisions -- such as innovation implementation decisions—were largely the result of behaviors that are boundedly rational (Cyert & March, 1963; Hambrick & Mason, 1984; March & Simon, 1958). In a boundedly rational world, *perfect* information is not available. Therefore, when complex organizational decisions are generated under an assumption of bounded rationality, these decisions may reflect "idiosyncrasies of decision makers" (1984:195).

In the organizational behavior literature, these idiosyncrasies could be categorized as cognitive individual differences (Murphy, 1996). And according to Herold and Fedor (1998), these cognitive individual differences could be considered situation-specific. That is, these idiosyncrasies of decision-makers would operate when the situation called for complex organizational decision-making, as opposed to operating across all situations. In addition, the argument that individual cognition is related to managerial decision-making is supported by the Cognitive Resources Theory (Fiedler & Garcia, 1987). Fiedler and his colleague proposed that a leader's cognitive abilities were the major source of plans, decisions and strategies that the leader used to guide his or her group.

Organizational Innovation and Top Management Characteristics

Several studies assess the impact of top management characteristics on organizational innovation. In studying the influence of individual, organizational, and contextual factors on the adoption of innovations in a hospital, Kimberly and Evanisko (1981) found that the tenure and educational level of a hospital administrator was significantly related to a hospital's adoption of technological innovation. Bantel and Jackson (1989) referred to the upper echelon perspective (Hambrick & Mason, 1984) when grounding their study in theory. They examined the relationship between the social composition of top management teams and innovation adoption of products, programs and services in a sample of banks in the Midwestern United States. They found that the education level of top management was positively related to technological innovation.

Studies grounded in Top Management Team Theory (Hambrick & Mason, 1984) -- such as Bantel and Jackson (1989) -- measure top management characteristics using demographic data. A recent study (Young, Charns, & Shortell, 2001) looks at top manager effects on the adoption of innovative management practices in a public hospital system and uses demographic data to describe top manager effects. The researchers explain that theoretically the demographic characteristics describe the background and experiences that shaped a manager's cognitive base – values, beliefs and abilities – which influence decision-making. Therefore, they argue that demographics, such as education, can serve as proxies for individual cognition. (Young et al., 2001).

Though both education and tenure describe the background and experiences of a manager's cognitive base and can serve as proxies for individual cognition, there have been competing hypotheses concerning how a manager's length of tenure is related to organizational outcomes. Kimberly and Evanisko (1981) argued that longevity in a job is a surrogate for legitimacy and knowledge about navigating organizational politics and could be related to organizational innovation. However, they also pointed out that it could be argued that fresh perspectives and lack of past obligations to an organization could also be related to organizational innovation. Kimberly and Evanisko found empirical evidence to support a positive relationship between the tenure of a the top hospital administator and technological organizational innovation.

In another study within the organizational innovation stream of research, Meyer and Goes (1988) examined a series of organizational decisions to evaluate, adopt and implement medical innovation by hospitals. Rogers (1995) commented that this Meyer and Goes (1988) study was "A particularly interesting investigation representing a new type of organizational innovativeness study…" (Rogers, 1995: 381). These researchers focused on twelve medical innovations as they were adopted in twenty-five private, non-profit hospitals in a large midwestern city. Meyer and Goes (1988) used a 9-point scale to rate each decision from the awareness stage (points 1-3) to evaluation-choice stage (points 4-6) to the adoption-implementation stage (points 7-9). They advanced a model suggesting that the process of becoming aware of an innovation, adopting it and implementing it (a process they called organizational assimilation of technological innovations) is determined by three types of antecedents, contextual attributes, innovation attributes and attributes resulting from the interaction of contexts and innovations. Contextual attributes included environmental variables (e.g. urban setting, few patients relied on federal health insurance), organizational variables (e.g. size, complexity of services) and leadership variables (tenure of CEO, educational level of CEO). And though the leadership variables were not found to be significant (they were added to the statistical analysis after the environmental and organizational variables), the innovation-decision variable -- CEO advocacy-- was found to have a positive and significant relationship with organizational awareness, adoption and implementation of medical innovations.

And though tenure and educational level of top management have been found to predict technical organizational innovativeness (Bantel & Jackson, 1989; Kimberly & Evanisko, 1981), Meyer & Goes did not find that leadership tenure and education of hospital top management was significant over and above organization effects in the innovation diffusion process. However, when one refers to Hambrick and Mason's (1984) rexamination of the Lieberson and O'Connor (1972) study, one may deduce that by adding the leadership variables after organization effects, one may lessen the significance of top management effects. Alternatively, since Meyer & Goes did not find an effect on the awareness, adoption and diffusion of hospital adoption of technological innovation for tenure and education levels of top management, but found that CEO advocacy had a significant effect on this process, it may be that the tenure and education levels of top management have the greatest impact at early stages of the innovation process. Indeed, the aforementioned study by Young, Charns and Shortell (2001) found top manager individual cognition as measured by demographic characteristics had greater influence on the earlier phases of the innovation adoption/implementation process of an administrative innovation in hospitals than later stages of the process. Since scholars have suggested that the early stages of this process involves becoming aware of a potential innovation (Fiol, 1996; Meyer & Goes, 1988; Rogers, 1995), I hypothesize that,

H1a: Higher levels of education of top management at Wave 3 will be positively related to the awareness stage of the innovation implementation process of a technological innovation at Wave 3.

H1b: Higher levels of tenure of top management at Wave 3 will be positively related to the awareness stage of the innovation implementation process of a technological innovation at Wave 3.

There has been a call for more longitudinal studies in organization change research (Pettigrew, Woodman, & Cameron, 2001). Therefore, one could ask the question, do managerial characteristics such as tenure, measured at one point in time, affect the awareness stage of the innovation implementation process at a later time also? Historically, most research focusing on top management and organizational outcomes has been cross-sectional in design. However, more dynamic designs have been used when examining the effects of executive succession on organizational performance. Recently, Donald Hambrick presented a paper at the Academy of Management meetings in Chicago that explored the temporal dynamics of executive tenure and its relationship to organizational performance (Hambrick & Henderson, 1999). They wanted to understand at what point in a CEO's tenure is he or she most effective. From prior research, they recognized that an inverted U shaped curve seem to represent CEO effectiveness over time. CEO's are relatively knowledge-deficient early in their tenure, confronting new issues, stakeholders and responsibilities and experience a season of new learning, even if they have been promoted to this position from within (Hambrick & Fukutomi, 1991). However, eventually this learning curve reaches an apex, which is a time characterized by bold changes (Virany, Tushman, & Romanelli, 1992). After awhile this emphasis on major changes gives way to incrementalism. This more conservative approach is generally the result of commitment to prior initiatives (Hambrick & Fukutomi, 1991). In their analysis, Hambrick and his colleague found an inverted U-shaped relationship between CEO tenure and organizational performance, with the peak at 12 years.

Suggesting that the relationship between managerial tenure and the awareness stage of the innovation implementation process is as important as the relationship between managerial tenure and organizational performance may seem odd from a short-term perspective. However, as Ellsworth (2002) argued, organizational performance viewed over the longer term is enhanced by an organizational focus on addressing customer needs. In order to have this organizational focus over time, top management would benefit from being aware of innovations that are potential solutions to customer needs. Thus, one could argue that over a period of time there is an important relationship between innovation awareness and organizational performance. That is, if members of an organization -- especially top management -- are continually ignorant of important innovations in their industry, over time organizational performance will reflect this lack of awareness. Therefore, over time a characteristic of top management such as tenure may be related to innovation awareness in a manner similar to its relationship with organizational performance. Given these arguments, I hypothesize that,

> H2: Levels of tenure of top management (measured at Wave 2) will have an inverted U shaped relationship with the awareness stage of the innovation implementation process (measured at Wave 3

CHAPTER IV

TOP MANAGEMENT STRATEGIC ORIENTATION

Upper Echelon Theory suggests that top management demographics play a role in explaining variance in the relationship between top management and organizational innovation. However, actions -- defined as orientations and behaviors of top managers -- are also important conceptualizations to consider when examining this relationship. March and Simon (1958) suggested that a distinction between inaction and action would help students of organizations make a distinction between the status quo and change. These researchers argued that when managers make decisions without *perfect* knowledge of all alternatives, managers consider alternatives that satisfy, rather than optimize. Under these assumptions, inaction is only appropriate when satisficing criteria (goals created under the assumptions of uncertainty) have not been established. Therefore action, in the form of orientations and behaviors, is necessary when an organization establishes a goal to innovate.

Some earlier studies that measured organizational strategy without conceptualizing top management involvement in that strategy failed to find top management significantly related to innovation outcomes. For example, Meyer and Goes (1988) did not find that individual leadership characteristics were significantly related to the stages of decision-making in the innovation process, when these characteristics were entered into the regression analysis after environmental and organizational variables. By entering the leadership variables into the analysis *after* organizational variables, the researchers assumed that leadership was not causally prior to organizational variables.

One of the organizational variables measured in the Meyer and Goes (1988) study was market strategy, defined as "aggressiveness in developing new services and penetrating new markets" (1988: 908). The assumption that leaders are not causally prior to organizational strategy is debatable. There are those organizational theorists who suggested that organizations adopt a basic orientation and are somehow unable to change this direction if the environment changes (Hannan & Freeman, 1977; Hannan & Freeman, 1984). This may lead one to believe that organizations somehow run themselves, and that strategies merely appear.

However, it is interesting to note that though Meyer and Goes (1988) did not find that the management characteristics were positively related to the innovation implementation process, they did find that CEO advocacy (a measure of top management action and strategy) had, in fact, a significant impact. The regression analyses show that CEO advocacy (with a regression coefficient of .28 ($p < .01$)), had a significant impact on the innovation outcome variable. And as with Hambrick and Mason's (1984) examination of the study by Lieberson and O'Connor (1972), one could suggest that the impact of CEO advocacy (action and strategy) was underestimated because organizational variables were entered into the hierarchical regression before CEO advocacy, which is just one aspect of top management strategizing.

Though Meyer and Goes (1988) identified stages of the innovation process in order to increase measurement precision of the dependent variable, management characteristics were not found to explain innovation outcomes. I argue that the lack of explanatory power of the management variable in the Meyer and Goes (1988) study could possibly be the result of their assumption that management had no causal effect on organizational strategy. Subsequent research from a strategy perspective has further challenged the assumption that management does not affect organizational strategy e.g. (Dougherty & Hardy, 1996; Hitt et al., 1996). I suggest that further explanation can be found for the role of top management in the innovation adoption process if, *conceptually*, the strategies of executive leaders are assumed to precede organizational factors.

Strategic Management and Entrepreneurial Orientation

Bourgeois (1980) argued that the concept of strategy "has main value, for both profit-seeking and nonprofit organizations, in determining how an organization defines its relationship to its environment in the pursuit of its objectives" (Bourgeois, 1980:27). He divides the study of strategic management into two areas, content and process. Research in the "content" school focuses on what set of strategies were implemented to achieve success. Research conducted in the "process" tradition focuses on how to develop strategies by scanning the organization's environment to find opportunities to match with the organization's capabilities. (Bourgeois, 1980).

The content school of strategic management was influenced by the field of economics, and examines management activities with an eye toward achieving a predetermined optimum or equilibrium (Eisenhardt & Zbaracki, 1992; Macintosh & Maclean, 1999). This examination assumes that one acts rationally when faced with making a decision. That is, he or she reviews all of the relevant alternatives and makes an optimal choice in a highly specified and clearly defined environment. There is an assumption that he or she has certainty regarding the universe of alternatives and perfect knowledge of the consequences of each alternative (March & Simon, 1958). Examples of work in this school include the strategy-structure-performance relationships (Chandler, 1962; Rumelt, 1974) and Porter's (1980; 1985) theories of market strategy and competitive advantage.

The process school of strategic management research is more influenced by the view that there are cognitive limits to rational models, and therefore economic rationality is not a primary determinant of strategic behavior. This concept of rationality bounded by cognitive limits (bounded rationality) is concerned with identifying satisfactory alternatives rather than optimal ones. Satisfactory alternatives are all those which meet minimally satisfactory criteria. Optimal alternatives are those which are considered optimal once *all possible* alternatives are compared against a set of criteria that take into consideration *all possible alternatives*. When reviewing optimal alternatives, there is an assumption that the decision-maker has uncertainty regarding the probabilities of the consequences of each alternative (March & Simon, 1958). Research in this area is not focused on the optimum decision, but on cognitive and social characteristics that affect strategic management and the management of strategic change (Macintosh & Maclean, 1999).

Research in the process school of strategy would include the strategy-making processes of organizations with innovation goals. Miller and Friesen's (1980) study of organizational adaptation as it occurs over time is an example of research in the process school. These researchers examined a sample of 26 firms over an average of five periods of history using published historical accounts. Raters identified " 'packages' of change" within the historical accounts to describe the type of adaptation that had a major impact on the way strategy making, structure and environment interacted over time. (Miller &

Friesen, (1980:595). Miller and Friesen (1980) found that organizations resist change in strategy, seemingly due to momentum of organizations to move in the direction they have been moving. In subsequent research, Miller and Friesen (1982) examined innovation and strategic momentum in conservative and entrepreneurial firms and found that the determinants of product innovation are largely a function of the strategy pursued.

According to Bourgeois' (1980) definition of strategy-making processes, if innovation is an objective of an organization, than decision-makers within the organization would scan the environment to find opportunities that fit within its capabilities. Some scholars define this type of strategy-making as corporate entrepreneurship (Guth & Ginsberg, 1990) and others define it as entrepreneurial orientation (Lumpkin & Dess, 1996). The domain of corporate entrepreneurship is influenced by Schumpeter's (1934) perspective that entrepreneurship is concerned with carrying out new combinations. In corporate entrepreneurship, the desire to carry out new combinations is related to developing strategies that alter the pattern of deploying resources rather than changing the magnitude of resource deployment. (Guth & Ginsberg, 1990). In other words, corporate entrepreneurship involves strategy-making processes that make changes in how an organization utilizes its resources.

Concepts from the process school of strategic management have been used as a framework for research on corporate entrepreneurship (Covin & Slevin, 1991; Covin & Slevin, 1989; Miller, 1983). When describing processes that are utilized in corporate or organizational-level entrepreneurship, Lumpkin and Dess (1996) use the term entrepreneurial orientation. These authors clearly state that entrepreneurial orientation does not represent entrepreneurship defined as new entry. They argue that entrepreneurial orientation is a concept from strategic management literature that describes *how* new opportunities are purposefully enacted. According to Lumpkin and Dess (1996), entrepreneurial orientation has five dimensions: autonomy, innovativeness, risk taking, proactiveness and competitive aggressiveness.

This concept of purposeful enactment is similar to the teleological theory of change described by Van de Ven and Poole (1995) as purposeful, adaptive and goal-oriented. And though there is an inherent quality of emergence surrounding a teleological perspective because there is the freedom to purposefully enact *any* goal, the theory also suggests that an organization is constrained by its resources and environment (Van de Ven & Poole, 1995). So though there is the freedom to purposefully enact or be optimally intentional about any goal, resource and environmental constraints bound this intentionality or purposeful enactment.

Because the purposeful enactment of entrepreneurial orientation strategies involves moving toward a goal or end state, it is possible that top management entrepreneurial orientation would be more positively related to the more action oriented stages of the innovation decision process, than to the awareness-information gathering stages. In order to allow for time for the strategy-making process to develop and result in envisioned outcomes, it would also be prudent to allow time to elapse before judging whether a top management entrepreneurial strategic orientation would be positively related to innovative outcomes. Therefore, I hypothesize that, H3: There will be a positive relationship between the strategic entrepreneurial orientation of top management at Wave 2 and the adoption stage of the innovation implementation process at Wave 3.

As mentioned earlier, the teleological theory of change (Van de Ven & Poole, 1995) recognizes environmental constraints. This study examines two environmental constraints, perceived uncertainty and ability of customers (patients) to pay for services. When considering uncertainty as an environmental constraint, some researchers argue that objective environmental uncertainty is more conceptually relevant (Tosi, 1973). However, Bourgeois (1980) argued "that *perceived* environmental uncertainty is more relevant, conceptually and perhaps empirically, to the study of strategy making than to the study of an organization's external environment. When decision-makers perceive the environment to be uncertain while they are scanning to find opportunities to fit with their organization's capabilities, they tend to promote more innovative strategies. In an uncertain environment, it is difficult to predict the behavior of customers and competitors. Therefore, innovative strategies are developed in an attempt to create customer loyalty and competitive advantage (Porter, 1980). Following this conceptualization of strategy and environment, Miller (1988) found correlations between perceived environmental uncertainty and a strategy of innovation when he analyzed data collected from leaders of 123 firms in Quebec, Canada. Given this significant association between perceived environmental uncertainty by top management and innovative strategies, I hypothesize that,

H4: The relationship between strategic entrepreneurial orientation of top management at Wave 2 and the adoption stage of the innovation implementation process at Wave 3 will be more positive for top management who perceive themselves to be operating in an uncertain environment.

Another environmental constraint of interest is the ability of patients to pay for innovative treatment. In non-health care studies, this constraint would be considered the customer's ability to pay for innovative products and services. Meyer and Goes (1988) included this variable in their set of potential environmental antecedents of innovation implementation. They proposed that medical innovations were more likely to be assimilated into hospitals where fewer patients relied on federal health insurance. This operationalization assumes that local markets comprised of a higher proportion of patients who rely on federal health insurance are less affluent than markets with a greater proportion of patients paying for health services themselves or relying on private insurers. The set of environmental variables used in their study also included measures of urbanization and income growth of each hospital's geographic market. This data was collected over a 6-year period. As a set of environmental variables, the urbanization, income growth and ability to pay of the patient market had a positive and significant relationship with the innovation implementation process. This finding underscores the popular adage that the health care field has a local market orientation.

Given this positive relationship between ability to pay and organizational innovation implementation, I hypothesize that,

H5: The relationship between strategic entrepreneurial orientation of top management at Wave 2 and the adoption stage of the innovation implementation process at Wave 3 will be more positive for health care organizations whose local market has a greater proportion of patients who demonstrate an ability to pay for treatment without reliance on federal health insurance.

CHAPTER V

ALTERNATE EXPLANATIONS

Top management characteristics can be positively related to the awareness stage of the innovation implementation process because of the implicit knowledge seeking represented in the level of education attained and tenure of top managers (Hambrick & Mason, 1984; March & Simon, 1958). And top management strategic orientation can be positively related to the adoption and implementation stages of the innovation implementation process as a result of the scanning process in which top management may engage to find opportunities to match organization's capabilities (Bourgeois, 1980; Meyer & Goes, 1988). However, there are alternative explanations for these relationships that must be considered.

Organizational Performance. Cyert and March (1963) defined innovation as a new solution to a problem that an organization is facing, and argued that organizational failure can generate search for new solutions. In other words, poor performance by an organization can be related to the innovation implementation process. Singh (1986) examined the relationship between organizational performance and risk taking (considered to be one of the factors of an action to incorporate innovation into an organization (Miller, 1983)), and found a negative relationship between the two variables. Given this conceptual and empirical evidence of the relationship between performance and innovation, it is important to consider the effect of organizational performance when studying the relationship between top management and the innovation implementation process. Therefore, organizational performance is controlled in the analyses.

Hospital Subsidiary . Studies have shown that when larger corporations form subsidiaries that financial performance can be affected (Clement, D'Aunno, & Poyzer, 1993; Keats & Hitt, 1988; Rumelt, 1982). Therefore, organizations that are part of larger, diversified organizations can benefit from the parent company in terms of resource exchanges that may not be available to stand alone organizations. Cyert and March (1963) argued that a cushion of resources would have a positive relationship with innovation. Thus, the additional resources available to a subsidiary organization of a diversified corporation could help explain that organization's innovation activity. Therefore, centers which are subsidiaries of hospitals are identified in this study, and the effect of this identification is controlled in the analyses.

Size. Liability of size arguments suggest that organizational size can also have an effect on performance (Hannan & Freeman, 1984), contributing to inertia within the organization. Organization size may also reflect increased complexity and growth related concerns that can effect top management and performance (Covin & Slevin, 1997). At the same time, organizational size has been found to be positively associated with innovation (Baldridge & Burnham, 1975; Bantel & Jackson, 1989). Thus, the size of an organization may explain the absence or presence of innovative activity in an organization. Therefore, organizational size is controlled in this study.

For-profit/Non-profit status. The choice to organize as a non-profit organization has been a popular one over the past two decades, and has been called the fastest growing segment of the U.S. economy (Hisrich, Freeman, Standley, Yankey, & Young, 1997). Growth of this magnitude among non-profits can have a somewhat unexpected competitive effect on the for-profit sector. This is especially true in the health care industry where there are marked increases in for-profit organizations among start-up ventures, in the development of for-profit subsidiaries of non-profit holding companies, and in the conversion of formerly non-profits to for-profit organizations.

Some researchers argue that the behavior of non-profit and for-profit organizations is expected to differ because of differences in regulatory environment (DiMaggio & Anheier, 1990; Schlesinger, 1998). Kanter and Summers (1987) suggested that the large number of groups wanting to influence outcomes of non-profit organizations (including donors and regulators) affect the non-profit organization's ability to innovate and be proactive (Schlesinger 1998). Davis, Blum and Roman (2000) found that a risk-taking orientation among top management is not as beneficial in non-profit organizations as it is in for-profit organizations. Therefore, an organization's profit-status may explain the absence or presence of innovative activity in an organization. Thus, profit status is controlled in this study.

CHAPTER VI

METHODS AND ANALYSIS

Research Design

The data for this study are from a National Treatment Center Study conducted over a six year period, from 1995-2001 by the Institute for Behavioral Research at the University of Georgia in collaboration with the DuPree College of Management at the Georgia Institute of Technology. The drug and alcohol treatment centers used in the study were drawn from a stratified random sample of geographic areas throughout the United States. Of the centers contacted, 450 agreed to participate in the study, providing an 89% response rate. To be eligible for the study, the centers had to offer inpatient adult or adolescent chemical dependency or psychiatric care, partial hospitalization/day treatment, intensive outpatient, or structured outpatient programs. Programs that had captive sources of referrals for all of their patients from a single Health Maintenance Organization or other organizational source were excluded, as were organizations that had assured sources of funding. Eligible centers were required to receive the majority of their operating funds from private sources, which excluded those centers that may be considered public in that they received all of their funds from state, county or block grant funds. Facilities relying heavily or exclusively on Medicare or Medicaid payments were eligible for inclusion because these funds are not guaranteed to providers but are connected to payments for program utilization by referred patients.

Researchers conducted on-site interviews with the top level program Administrator (top position in the center), Clinical Directors, and Marketing Directors (where they existed) from June 1995 through September 1996 for Wave 1 of the study, from October 1997 through December 1998 for Wave 2 of the study and from July 2000 through December 2001 for Wave 3 of the study. The interviews lasted between 1.5 and 3 hours in each phase of data collection. The response rate for Wave 2 interviews was 94% of eligible Wave 1 respondents, while the response rate for Wave 3 interviews was 91% of eligible respondents. For Wave 1 and Wave 2, interviews were supplemented by self-administered questionnaires (80% response rate for Wave 1, 70% response rate for Wave 2) that were mailed to the research site after the interview. The data show that 303 of the 451 centers in the original sample participated in all phases of data collection (both participating in interviews and responding to questionnaires over the 6-year period). This suggests that 148 centers closed or refused to participate over the 6-year study period. Of these 303 centers, 250 centers in this group answered an interview question asking if the center treated patients who are opiate-addicted. Of these 250 centers, respondents at 241 centers responded "yes" to this question. These 241 centers will be used in this analysis.

Dependent Variable

Innovation in these drug and alcohol treatment centers is measured using three patient treatments that have been recently recommended by the National Institute on Drug Abuse (NIDA), a part of the National Institutes of Health. In a booklet entitled, Principles of Drug Addiction Treatment: A Research-Based Guide (2000), the director of NIDA said that the purpose of the booklet was to "foster more widespread use of scientifically based treatments." In the booklet's introduction, NIDA points out that drug addiction is an illness that has yielded to a variety of effective approaches of treatment. The booklet emphasizes that treatment of drug addiction has been as successful as treatment of other chronic diseases, such as asthma and hypertension. However, since research has shown that not all drug abuse treatment is equally effective, this booklet describes treatments for chemical dependency that have been found to be effective in recent research studies. The three treatments listed in this booklet that are used in this study are LAAM, naltrexone and motivational enhancement therapy.

Once new treatments have been approved by the Federal Drug Administration (FDA) after being tested in clinical trials, it takes time for these treatments to be adopted by a large number of treatment facilities. The study of treatment innovation diffusion began in the 1950's, with the Columbia University study of the adoption of tetracycline. (Rogers, 1995). One of the findings of that study suggests that interpersonal networks of doctors and health professionals assist in the adoption of a new treatment. By definition, the process of communicating information about new treatments via interpersonal networks takes time. As part of a more recent process of communicating information about new substance abuse treatments, NIDA held the National Conference on Drug Addiction Treatment: From Research to Practice in April, 1998 and prepared the guide, "Principles of Drug Addiction Treatment: A Research Based Guide," published in 2000 which described the three treatments used in this study. Descriptions of these three innovative treatments follow.

1) LAAM (levo-alpha-acetyl-methadol) is a medication used in treating opiate addiction (e.g. heroin). It was approved by the Federal Drug Administration (FDA) in

July 1993 and was commercially available in August of that same year. LAAM works like methadone by blocking euphoric effects of opiates in a patient's brain and controlling cravings, but can suppress withdrawal systems for a longer period than methadone. According to FDA regulations, LAAM can only be used in therapy programs that have been approved by the state in which the program operates (Johns Hopkins Medical Institutions, 1998; National Institute on Drug Abuse, 2000; SAMHSA, 2002).

2) Naltrexone is a medication that also blocks the effects of opiates in the patient's brain. It is used to treat opiate addiction, and was also approved by the FDA in 1994 as a treatment for alcoholism. Naltrexone has been found to block part of the brain associated with the pleasure of drinking alcohol, thereby reducing the desire to drink (American, 2002; National Institute on Drug Abuse, 2000; Physicians, 2001).

3) Motivational Enhancement Therapy is a counseling approach to treatment that helps clients make behavioral changes that are rapid and internally motivated. The approach consists of the patient taking a battery of assessments, and two to four individual sessions with a therapist to provide feedback from the battery of assessments and to use motivational interviewing techniques to strengthen the patient's motivation and create a plan for change. The approach has been successful with alcohol and marijuana addicted patients (National Institute on Drug Abuse, 2000).

Organizational Innovation Implementation Process. In this study organizational innovation is measured as three separate stages of the innovation implementation process (Fiol, 1996; Meyer & Goes, 1988) and measured at the organizational level of analysis. All data used to measure these outcome variables were collected in interviews conducted during phase three of the study (2000-2001) with either the Administrator or Clinical Director of the treatment center.

The first stage of the organizational innovation implementation process is the Awareness Stage. Meyer and Goes (1988) suggested that one aspect of this stage is individual members of an organization knowing about the existence of an innovation. In this study, this variable will be measured using responses to the following questions answered by either the Administrator (person leading the center) or Clinical Director of the center, "To what extent do you believe the staff at this center is familiar with LAAM?", "To what extent do you believe the staff at this center is familiar with Naltrexone?", and "To what extent do you believe the staff at this center is familiar with Motivational Enhancement Therapy?" Each question is coded from 0 to 5, with 0 describing no familiarity and 5 describing maximum familiarity with the innovative treatment in question. The correlation between the three treatments will be assessed. Then the responses will be averaged for each center, resulting in an awareness score for each treatment center, representing how aware leadership and staff of the center are of these three innovative treatments. The awareness scores for each center will range from 0 (no awareness) to 15 (maximum awareness).

The second stage of the organizational innovation implementation process will be identified as the Adoption Stage. Rogers (1995) emphasized the decision-making nature of this stage, saying "adoption" is the decision to make use of the innovation and "not to adopt" is the decision to reject the innovation. In this study, adoption of an innovative treatment is measured in *two ways*. First, this variable is measured using responses from either the Administrator (person leading the center) or Clinical Director to a question asking about *current use* of the innovative treatment. Secondly, the adoption stage is measured using responses answered by either the Administrator or Clinical Director of the center to a question asking about the *existence of a written protocol* for the administration of the innovative treatment in question. The questions asking about current use of treatment are as follows: "Does this center currently use LAAM?", "Do any of the patients treated at this center currently receive Naltrexone?" and ""Do any of the patients treated at this center currently receive Motivational Enhancement Therapy (MET)?" The questions asking about the existence of a written protocol are as follows: "Does this center have a written protocol for the administration of LAAM?", "Does this center have a written protocol for the administration of Naltrexone?" and "Does this center have a written protocol for the administration of MET?"

Responses to these questions were Yes or No . "Yes" responses are coded "1," "No" responses will be coded "0." For each center an adoption score will be the sum of codes for each opportunity for a decision concerning the three innovative treatments. Adoption scores will range from 0 to 3.

Independent Variables

Top Management Factors. Following from Upper Echelons Theory (Hambrick & Mason, 1984), characteristics of top managers-- such as educational level attained and tenure-- can be related to organizational outcomes. In past studies, top managers of an organization have been defined as members of the board of directors, such as a Chief Executive Officer (e.g. (Bantel, 1998)) or as executive leadership, highest ranking officials in the organization (e.g. (Young et al., 2001)). In this study, the upper echelon of drug and alcohol treatment centers is the Administrator. As the person leading the center, he or she is the high-ranking official in the organization.

In this study, education is measured as highest degree held. Respondents were given 5 categories from which to choose. The five categories provided were 1) less than Bachelor's, 2) Bachelor's, 3) Master's, 4) Doctorate, 5) M.D. Data from Wave 3 are used in the analysis of Hypothesis 1a.

Top management tenure is measured in two ways, tenure in the field and tenure in the position held. Tenure in the field is measured from responses of Administrators to a query regarding the total number of years the respondent worked in the substance abuse treatment field.. Position tenure is measured from responses of these top managers to a query regarding the year they began working in their current position. Data from Wave 3 will be used to examine Hypothesis 1b, and data from Wave 2 will be used to examine Hypothesis 2.

Strategic Orientation. There are various ways in which the strategic orientation of an organization's top management can be assessed. In this study, strategic orientation is measured using the concept of entrepreneurial orientation. Entrepreneurial orientation (EO) is measured by an eight-item scale adapted from Covin and Slevin's (1989) scale measuring strategic posture that was included in the questionnaire in Wave 2. The scale consists of items that measure an orientation towards innovation, proactivity and risk-taking. Miller (1983) suggested that these three components of strategic orientation were related to technological innovation. The Covin and Slevin (1989) scale has been widely used and has come to be known as an Entrepreneurial Orientation Scale (Brown, Davidsson, & Wiklund, 2001; Kreiser, Marino, & Weaver, 2002; Lumpkin & G.G., 2001). This Entrepreneurial Orientation Scale was found to be reliable and valid in a variety of research settings (Barringer & Bluedorn, 1999; Brown et al., 2001; Kreiser et al., 2002; Lumpkin & G.G., 2001). The eight items adapted from this scale used in this study are included in the appendix. Covin and Slevin factored analyzed this EO scale and found that the items above 0.5 loaded on a single-factor., thus suggesting that EO is a unidimensional construct. However, Brown, Davidsson and Wiklund factor-analyzed the items in the Covin and Slevin scale and found that the items loaded onto three separate factors which they labeled innovation, proactiveness and risk-taking. In this research, the EO scale will be factor-analyzed to determine if it operates unidimensionally or multidimensionally.

Environmental Uncertainty. Milliken (1987) defined environmental uncertainty in terms of how one perceived it. She viewed environmental uncertainty as a perceptual inability to determine how an environment is changing. In this study, one aspect of environmental uncertainty will be measured, change in perceived competition. For change in perceived competition, Administrators and Clinical Directors were asked at the on-site interview of Wave 2 had the competition in the center's market area "increased," decreased" or "stayed the same." Perceived changes in the competitive scene can lead to perceived environmental volatility. And perceived environmental volatility can fuel an inability to determine how the environment is changing. Therefore, a response of "stayed the same" will be coded 0 and a response of "increased" or decreased" will be coded 1. Since the correlations between perceived uncertainty of administrators and perceived uncertainty of clinical directors was not significant, and there were only 52 responses from clinical directors, only the responses for administrators are used in this study. To more closely examine competitive activity across time, I calculated the following correlations. The number of competitors that respondents listed in Wave 2 (1997-1998) is significantly correlated ($r = .26$, $p < .01$) with the number of competitors listed in Wave 3 (2000-2001) and correlated ($r = .17$, $p < .01$) with the number of new centers opened in Wave 3.

Ability to pay. Meyer and Goes' (1988) findings suggest that the ability to pay of patients in a healthcare organization's local market has an effect on the implementation of innovations. In this study, ability to pay is measured using the same operationalization as Meyer and Goes (1988). Ability to pay is measured two ways for each center using two separate measures: the proportion of patients covered by Medicaid and the proportion of patients covered by Medicare. The assumption is that those who pay without reliance on federal health insurance have a greater ability to pay for medical services. This data will be taken from information provided in the on- site interview with Administrators in Wave 2 of data collection.

Control Variables

Organizational Performance. Organizational performance of the treatment centers is measured using a calculation of profit margin. The calculation ((operating revenue – operating expenses)/operating expenses) is a formula used by Tomal (1998) to report hospital profitability levels. The operating revenue and operating expenses are for the fiscal year before the on-site visit. The data for this variable was collected from the Administrator at the time of the interview, unless there was a better informant in the organization, in which case information was obtained from that person either after the interview or during a follow-up phone call. Profit margin is argued to be an appropriate indicator of short-term financial performance of health service organizations (Clement et al., 1993).

Hospital Subsidiary. Organizations that are subsidiaries of larger organizations can benefit from resource exchanges with the parent organization. According to Cyert and March (Cyert & March, 1963), a cushion of resources could have a positive effect on the innovativeness of an organization. Also, the profit margin may be better in centers that benefit from resource exchanges, including client referrals. Therefore, if the treatment center is a hospital subsidiary, it is coded as 1, while organizations that are not owned by hospitals or located in hospitals are coded as 0.

Size. The size of an organization may explain the absence or presence of innovative activity (Baldridge & Burnham, 1975; Bantel & Jackson, 1989). Organization size will be measured by the number of full-time equivalent employees the year before the on-site interview was conducted. This information was provided by the Administrator during the on-site interview.

For-profit/Non-profit status: Health care, and chemical dependency treatment organizations, represent a mixed ownership industry. If the treatment center was organized as a non-profit tax-exempt organization under the guidelines provided by the U.S. Department of Treasury, Internal Revenue Service, the organization was coded as 0. If organized as a profit-making venture, the center was coded as 1. This information was provided in the on-site interview.

Organizational Performance: Many measures of financial performance are skewed. This measure was skewed for both Wave 2 (skewness statistic = 3.50) and Wave

3 (skewness statistic = 3.85). I, therefore, transformed this variable by its natural logarithm. When transformed, the organizational performance variable for Wave 2 has a skewness statistic of 1.76, and the organizational performance variable for Wave 3 has a skewness statistic of 1.57.

Analysis

Since the awareness, adoption and implementation measures can be treated as continuous variables (Awareness scores range from 0 – 15; Adoption scores range from 0 –6; Implementation percentages range from 1 – 100%), I initially used ordinary least squares regression to analyze most of the hypotheses. To analyze Hypothesis 1a and Hypothesis 1b, I conducted an ordinary least squares analysis regression analysis, entering the control variables before the top management characteristics, regressing the awareness variable on the top management characteristics. I used t-tests to examine the difference between means for missing data versus available values for each of the variables. For Hypothesis 2, I conducted an ordinary least squares regression analysis entering control variables first, then entering the tenure variable and the squared term of the tenure variable, regressing the awareness variable on top management tenure.

For Hypothesis 3, I conducted an ordinary least squares regression. For Hypotheses 4 and 5, I entered multiplicative terms after the control and independent variables to analyze the moderation effects of environmental uncertainty and ability to pay. Because I am using longitudinal data, I also assessed the non-random sampling effects of treatment center attrition using logistic regression (Goodman & Blum, 1996) for the longitudinal analyses where I use a missing data correlation matrix produced by pairwise deletion of cases. Logistic regression analysis models the probability of being included in the category of those who remained or those who did not. By using logistic regression, the relationships between the variables are taken into account. Statistically significant logistic regression coefficients will indicate non-random sampling on specific variables, meaning that the probability of being included in the sample in subsequent data collections would depend on these statistically significant variables. No significant regression coefficients will indicate that the missing centers do not bias the analyses.

CHAPTER VII

RESULTS

Merging Data

In order to conduct analyses across data collected at different points in time, the data from Wave 1 (collected in 1995-86), Wave 2 (collected in 1997-98) and Wave 3 (collected in 2000-01) were merged keyed on the 451 centers that originally participated in Wave 1. This means that centers which were added to the study in subsequent waves are not included. Of these 451 centers, respondents in 250 centers answered the question in the Wave 3 data collection, "Does this center treat patients who are addicted to opiates?" Data is missing from 201 centers on this question. For 49 of the missing centers, the question was "not applicable." Respondents at two of the missing centers did not know the answer to the inquiry concerning opiate-addicted patients, while the remaining 150 missing centers were no longer participants in the study (they were categorized as system-missing).

The following analyses examine whether staff were aware of and adopted treatment innovations. Two of the three treatment innovations used in this study can be used to treat opiate-addicted patients. Therefore, the centers used in these analyses were those where respondents answered "yes" to the question, "Does this center treat patients who are addicted to opiates?" Of the 250 centers with a response to this question, respondents from 241 treatment centers responded "yes" to this question, and 9 answered "no." The 241 centers responding "yes" were used in this study.

For the cross-sectional hypotheses in this study (Hypotheses 1a and 1b), Wave 3 (data collected in 2000-01) variables are used in the analyses. For the longitudinal hypotheses in this study (Hypotheses 2, 3, 4 and 5), the predictor and control variables are from Wave 2 (data collected in 1997-98) and the outcome variable is from Wave 3. In order to determine if there was any significant difference in means between those centers with available data and those without available data on each variable , t-tests were conducted on these variables (Logistic regression was later used to analyze the randomness of missing data. Results of those analyses are reported later in this section.)

For the Wave 3 variables used in Hypotheses 1a and 1b, there were significant differences found between the means of the control variables measuring whether a center was affiliated with a hospital ($t = 13.03$, $p < .001$, equal variances not assumed) and whether the center was organized as a profit or non-profit enterprise ($t = -23.78$, $p < .001$, equal variances not assumed). These results suggest quite a bit of volatility in the health care industry among hospitals that were reorganizing and changes in profit status between 1995 (when data collection began) and 2001 (the end of data collection for Wave 3), since the missing centers dropped out between those dates. The t-test results for the outcome variable, innovation awareness, was also significant ($t = 7.11$, p , .001, equal variances assumed), suggesting that caution should be exercised when interpreting the results of Hypotheses 1a, 1b and 2. In addition, for Wave 2 variables used in Hypothesis 2 (and further exploration of Hypothesis 1a), tenure of the top administrator (measured in terms of *years in the position*) had a significant t-test result (-.3.05, $p < .01$, equal variance not assumed). This result suggests that tenure measured in terms of the number of years in the substance abuse treatment field is a more valid measure of tenure in this study.

For Wave 2 variables used in Hypotheses 3, 4 and 5, the control variable measuring whether a center was organized as a for-profit or non-profit enterprise was significant ($t = -2.52$, $p < .05$, equal variances not assumed), and the variable measuring the proportion of patients covered by Medicare was also significant ($t = -3.28$, $p < .01$, equal variances not assumed). This suggests that the mean of the variable measuring the proportion of patients covered by *Medicaid* does not distinguish between centers that participated in three waves of data collection and those that did not.

Also, since single sources of information were used to gather the data used in this study (for each wave of data collection), there is a possibility that spurious relationships may be found among the variables. In order to test for possible effects of common method variance for the variables collected in the interviews, I used Harmon's one-factor test (Podaskoff, Mackenzie, Lee & Podsakoff, 2003). Blum and her colleagues also used Harmon's one-factor test to analyze possible effects of common method variance for variables collected in interviews measuring organization-level determinants (Blum, Fields and Goodman, 1994). For this study, after entering the interview variables for Wave 2 into a factor analysis, 6 factors were extracted with eigenvalues greater than one that together account for 75.2 percent of the variance. The first factor accounted for 16.2 percent of the variance. After entering the interview variables for Wave 3 into a factor analysis, 4 factors were extracted with eigenvalues greater than one that together account for 65.7 percent of the variance. The first factor accounted for 21.6 percent of the variance. In both cases, a single factor did not emerge and therefore, one general factor did not account for the majority of variance in the independent and dependent variables. Thus, a substantial amount of common method variance does not appear to have had an effect on the analyses.

Descriptives

Table 1 contains the means, standard deviations, sample size and correlations for Wave 3 variables (data collected in 2000 and 2001). This analysis indicates that the control variable size, is significantly correlated with both measures of innovation adoption ($r = .13$, $p < .05$ and $r = .20$, $p < .05$) suggesting that innovation adoption, measured as both use and having a written protocol, is more likely as the organization grows in size (measured as full time equivalent employees). The correlation analysis also indicates that when a treatment center is affiliated with a hospital, the treatment center is more likely to be a non-profit organization ($r = -.40$, $p < .01$). Other notable significant correlations within the Wave 3 data include: profit margin is positively correlated with centers which are affiliated with hospitals ($r = .17$, $p < .05$); the two measures of tenure (measured as years in position as administrator and years in the field of substance abuse treatment) are positively correlated ($r = .36$, $p < .01$); tenure in the field is correlated with education ($r = .15$, $p < .01$); and the three measures of innovation implementation are all positively correlated (innovation adoption (use) and innovation awareness, $r = .48$, $p < .001$; innovation adoption (written protocol) and innovation awareness, $r = .31$, $p < .01$; innovation adoption (use) with innovation adoption (written protocol), $r = .46$, $p < .01$.

Table 1 also indicates that the mean for the Innovation Awareness for treatment centers is 8.50 (maximum= 15) with a standard deviation of 3.46. The mean for Innovation Adoption measured as "use" is 1.05 (range from 0 - 3) with a standard deviation of .75. While the mean for Innovation Adoption measured as "written protocol" is .84 (range from 0 – 3) with a standard deviation of .66.

Tables 2A and 2B contain correlations for Wave 2 variables (data collected in 1997 and 1998). This correlation analysis indicates that entrepreneurial orientation of the treatment center administrator is positively correlated with tenure in the field of substance abuse ($r = .32$, $p < .05$) and the entrepreneurial orientation of the administrator is also positively correlated with the size of the center measured as full-time equivalent employees ($r = .31$, $p < .05$). It is also interesting to note that the entrepreneurial orientation of top administrators *is not* significantly correlated with the entrepreneurial orientation of the clinical director (a member of the administrator's top management group). Nor is perceived uncertainty of the top administrator significantly correlated with the perceived uncertainty of the clinical director. (Due to lack of correlation and small numbers of clinical directors versus top administrators, only top administrators responses to the entrepreneurial orientation scale are used in this study. And for consistency purposes, only top administrator demographics are used to analyze Hypotheses 1a, 1b and 2.)

A somewhat surprising correlation among the Wave 2 variables is that profit margin is negatively correlated with an administrator's tenure (measured as years in the field). This tenure variable measures the tenure of 51 administrators who were new to centers since 1996 (the end of the Wave 1 collection). When the administrator's tenure is correlated with the tenure variable including updated tenure responses for administrators who were interviewed in Wave 1 also, there is no significant correlation. Therefore, it is possible that this negative relationship between tenure (measured as years in field) and profit margin is most relevant when tenure in the job is relatively recent. Other significant correlations among the Wave 2 variables include: treatment centers affiliated with hospitals are more likely to be non-profit organizations (hospital and profit status, $r = -.40$, $p < .01$) and treatment centers affiliated with hospitals are more likely to have more full time equivalent employees (hospital and size, $r = .29$, $p < .01$).

Table 3 contains correlations of selected Wave 2 variables to Wave 3 variables. This correlation analysis shows that education measured in 1997-98 (Wave 2) and measured again in 2000-01 (Wave 3) are significantly correlated ($r = .52$, $p < .01$) and both tenure variables measured at these two points in time are correlated (tenure (position), $r = .54$, $p < .01$; tenure (field), $r = .33$, $p < .01$). Also, profit status measured at these two points in time ($r = .96$, $p < .01$), being affiliated with a hospital measured at these two points in time ($r = .79$, $p < .01$) and size measured at these two points in time ($r = .76$, $p < .01$) are significantly correlated. Other interesting significant correlations of variables measured across time include: a) being affiliated with a hospital in Wave 2 is negatively correlated with size in wave 3 ($r = - .25$, $P < .01$) -- which could indicate some form of staff down-sizing; b) being affiliated with a hospital in Wave 2 is positively correlated with profit margin in Wave 3 ($r = .14$, $p < .05$) -- which could be a result of cost reductions, including possible staff down-sizing; and c) being affiliated with a hospital in Wave 2 is positively correlated with innovation adoption in Wave 3 measured as having a written protocol for administering the innovative treatment ($r = .16$, $p < .05$).

These significant correlations involving hospital affiliation are important because a majority of the treatment centers in Wave 2 (69%, see Table 2A) are affiliated with a hospital. Also, size measured in Wave 2 is significantly correlated with innovation adoption measured as having a written protocol for administering the innovative treatment ($r = .27$, $p < .01$). These results confirm that further analyses should control for size and hospital affiliation when examining the relationship between top management and innovation adoption.

Hypothesis Testing

Hypothesis 1a and Hypothesis 1b were tested using ordinary least square regression analysis. In Hypothesis 1a, innovation awareness was regressed on the level of education of the top administrator. Table 4 contains results from this analysis. When innovation awareness was measured as the sum of awareness scores of the three selected innovative treatments for each center (awareness scores for the three treatments were significantly correlated, LAAM and MET, $r = .32$, $p < .001$; LAAM and Naltrexone, $r = .31$, $p < .001$; Naltrexone and MET, $r = .31$, $p < .001$), and the education of the top administrator was measured as a continuous variable in a cross-sectional analysis (from less than Bachelor through M.D.), there was no significant relationship between the educational level of top management and innovation awareness(see Table 4, Model 3). However, when education was measured as a continuous variable and innovation awareness was measured for each individual treatment, the relationship between education and innovation awareness is significant for awareness of the innovative treatment, Naltrexone (Table 4, Model 1). When education was measured in a dichotomous fashion for each level of education, the relationship between the education of the top administrator and innovation awareness was near significance (see Table 4, Model 2).

I also ran a number of exploratory analyses using a longitudinal design. Since Wave 2 data consisted mostly of responses from administrators who were not in the administrator position in Wave, I merged data from Wave 1 with Wave 2 and regressed innovation awareness on education. This analysis consisted of 241 cases and was not significant. However, education measured as a continuous variable in Wave 2 (N= 50) was significantly related to innovation awareness (sum of innovation scores of all three treatments) measured in Wave 3 (B (education) = 2.09, $p < .01$, $F = 2.77$, $P < .05$, R-square = .24, see Table 4, Model 4). Thus, Hypothesis 1a is partially supported in a cross-sectional design, and supported in a longitudinal design.

Table 5 displays the results of the analysis of Hypothesis 1b, higher levels of tenure of top management will be positively related to the awareness stage of the innovation implementation process. Neither tenure of the top administrator measured as years in the position (Table 5, Model 1) or measured as years in the field (Table 5, Model 2) was significantly related to innovation awareness. When position tenure was measured longitudinally, the relationship between tenure and innovation awareness came closer to significance (Table 5, Model 3). Therefore, Hypothesis 1b was not supported.

Table 6 displays the results of the analysis of Hypothesis 2, levels of tenure of top management (measured at Time 1) will have an inverted U-shaped relationship with innovation awareness. When the variable measuring *position tenure* was squared to examine this hypothesized non-linear relationship and entered into the hierarchal regression analysis following the linear term, the term was excluded from the final analysis because of excessive multicolliniearity (See Table 6, Model 1). When the variable measuring *tenure in the field* was squared and entered in the analysis following it's linear term, neither term was found to be significant (See Table 6, Model 2). Therefore, Hypothesis 2 was not supported.

For Hypotheses 3, 4 and 5, instead of measuring characteristics of top management, the entrepreneurial orientation of top management was measured using a scale that has been used in previous research (Covin & Slevin, 1989). The reliability among scale items was measured using Cronbach's alpha. Alpha equaled .83 for the administrators' scale ($N = 153$) and .85 for the clinical directors' scale ($N = 64$). There was little correlation between scale item responses of administrators and clinical directors. Because of the low correlation and low number of clinical responses to the entrepreneurial orientation scale ($N=64$), I chose to continue the analysis using responses from top administrators. All eight of the top administrators' scale items were significantly correlated with each other. The correlation among administrators' scale items ranged from $r = .21, p < .01$ to $r = .72, P < .001$. To create the entrepreneurial orientation variable for administrators, I calculated the mean of scale items when there were at least four responses among the eight items, in order to capture the largest number of responses concerning the organization's strategic posture.

When Brown, Davidsson and Wiklund (2001) assessed the reliability of the EO scale based on seven of the nine original items, they found the Cronback alpha to equal .73. Covin and Slevin (1989) found the inter-item reliability coefficient of the original nine items to be .87. When Covin and Slevin (1989) factor-analyzed the scale they found that all of the items loaded above .50 on a single factor with the average loading being .66. Therefore, they assumed the scale represented a unidimensional strategic orientation. However, when Brown and his colleagues (Brown et al., 2001) factor-analyzed 7 items of the scale, they found that the items loaded on three subfactors which they termed innovation, proactiveness and risktaking.

In this study, I factor analyzed the scale to provide more evidence for the dimensionality of the scale. Using the administrators' scale, I conducted a factor analysis using principal component extraction and varimax rotation and two factors emerged. Items f, g and h (see Table 9) loaded above .50 onto Factor 1,.These three items (f ,g and h) that loaded cleanly onto Factor 1 in this research also loaded onto a single factor in the Brown et al (2001) study. In this study, the loadings for these items were as follows: item f: .76, item g: .79 and item h: .87. Covin and Slevin (1989) added these three items to their scale to measure risk-taking propensity, and Brown and his colleagues labeled these three items as risk-taking elements of entrepreneurial orientation. Upon close examination of these items, they also can be labeled as risk-taking elements of entrepreneurial orientation in this current study as well.

Items a, b, and c loaded onto Factor 2. The loadings for these items in this study were as follows: item a: .50, item b: .90 and item c: .87. Covin and Slevin (1989) added these three items to their scale to measure a firm's tendency toward innovation. Brown and his colleagues (2001) found that two of these three items (b and c) loaded on the same factor as well (they found item a to load on a separate factor in an exploratory factor analysis and removed it from further study). They labeled these two factors, innovativeness. In this study, these three items can also be labeled innovativeness. Item e in this study did not load above .50 on either factor and item d cross-loaded on both factors. Therefore, in this study, the entrepreneurial orientation construct behaves as a multidimensional construct with two dimensions, risk-taking and innovativeness.

For Hypothesis 3, innovation adoption (measured as "use" and "written protocol" in Wave 3 of data collection) was regressed on the control variables and entrepreneurial orientation (EO), collected in Wave 2 of the data collection. Because of missing data," which is characteristic of longitudinal analyses, I assessed the sampling effects of missing data using logistic regression (Goodman & Blum, 1996). By dichotomizing the dependent variable (innovation adoption measured as "use" and measured as "written protocol") and creating a term for each independent variable that is coded 1 for the missing values and 0 for the non-missing values, I examined the randomness of the missing data. I conducted four logistic regression analyses, two using the dichotomized "use" term as the dependent variable and two using the dichotomized "written protocol" term as the dependent variable. The first analysis with each dependent variables, used all the dichotomized terms for the independent variables in Hypothesis 3 and 4 (focused on the moderating effects of perceived environmental uncertainty). The second analysis used all the dichotomized terms for the independent variables in Hypothesis 5 (patients' ability to pay). Statistically significant logistic regression coefficients will indicate non-random sampling on specific variables, meaning that the probability of being included in the sample in subsequent data collections would depend on these statistically significant variables. The only independent variable in all four of these analyses that had a significant regression coefficient was "profit status," with a regression coefficient ranging from 2.66 with a standard error of .69, $p < .001$ to 3.64 with a standard error of .70, $P <$

.001. These results indicate that the probability of a center being included in future samples may depend on whether the organization is organized as a non-profit or a profit making center. Since the majority of these centers (.69) are non-profit organizations, the likelihood is that non-profit organizations may be overrepresented in this sample. However, since the profit status of the centers is being controlled, this result does not materially affect interpretation of the results. So, though the data are not missing completely at random (MCAR), they can be considered missing at random (MAR). Therefore, I used a missing data correlation matrix produced by pairwise deletion of cases to analyze Hypotheses 3, 4 and 5. The results of the analysis of Hypothesis 3 are presented in Table 7, Model 1 (use) and Model 2 (written protocol). The entrepreneurial orientation of top managers did not have a significant linear relationship with innovation adoption in this analysis. Therefore, Hypothesis 3 was not supported.

However, when the perceived uncertainty of top management was introduced as a possible moderator of the relationship between entrepreneurial orientation and innovation adoption, the relationship was significant when innovation adoption was measured as "written protocol", though not in the direction hypothesized. In this analysis, the regression coefficient for the moderator variable, entrepreneurial orientation * perceived uncertainty was significant ($B = -.75$, $P < .001$) suggesting that the relationship between entrepreneurial orientation and innovation adoption is negatively impacted by perceived uncertainty. Statistics for the regression equation were highly significant ($F = 5.03$, $p < .003$, R-square = .27 . Figure 1 depicts this relationship. The figure shows that when perceived *environmental uncertainty is low*, innovation adoption *increases* as entrepreneurial orientation of top management increases. When perceived *environmental* *uncertainty is high*, innovation adoption *decreases* as entrepreneurial orientation of top management increases. Therefore, Hypothesis 4 is significant in a direction opposite of that hypothesized.

For Hypothesis 5, innovation adoption was regressed on entrepreneurial orientation of top managers and market (patients') ability to pay for medical treatment. . The proportion of clients with federal health insurance (Medicare and Medicaid) used in this study was gathered from Wave 2 data. To validate these responses, they were correlated with responses to this question gathered approximately 2 years before in Wave 1 (Medicaid, Wave 1 and Wave 2, $r = .64$, $p < .001$; Medicare, Wave 1 and Wave 2, $r = .62$, $p < .001$) and approximately 3 years later in Wave 3 (Medicaid, Wave 2 and Wave 3, $r = .70$, $p < .001$; Medicare, Wave 2 and Wave 3, $r = .27$, $P < .001$).

Although, a linear association between market ability to pay and innovation adoption is not apparent, this relationship is significantly moderated by market (patients') ability to pay (see Table 8, Model 3: $B = -.02$, $p < .001$, $F = 9.91$, $p < .001$, R-square = .52). This relationship was found to be significant. The negative regression coefficient indicates that a higher proportion of patients relying on Medicaid is negatively related with innovation adoptions. Thus, the relationship between strategic entrepreneurial orientation of top management at Time 1 and the adoption state of the innovation implementation process at Time 2 will be more positive for treatment centers whose local market has a greater proportion of patients who demonstrate an ability to pay for treatment without reliance on federal health insurance. Figure 2 depicts this relationship. When patients exhibit a *higher ability to pay*, innovation adoption *increases* as entrepreneurial orientation of top management increases. When patients exhibit a *lower* *ability to pay*, innovation adoption *decreases* as entrepreneurial orientation of top management increases. Thus, Hypothesis 5 was supported.

Also, there was no significance found on a 3- way interaction (entrepreneurial orientation* perceived environmental uncertainty*patients' ability to pay). The statistics for the analysis were, B = .001, Standard error = .001, p = .61.

CHAPTER VIII

DISCUSSION

This research was designed to explore the phenomenon of implementing technological innovation in organizations. By focusing on innovations that are purchased (instead of created in-house) and by distinguishing between the awareness stage and the adoption stage of innovation implementation, I sought to contribute to a better understanding of implementing organizational innovation. And by focusing on the role of top decision makers in innovation implementation, I sought to both replicate and move beyond the Upper Echelon Theory's (Hambrick & Mason, 1984) emphasis on top management characteristics as predictors of organizational outcomes.

The first research question, "What effect do top management characteristics have on the early stages of the innovation implementation process?", was examined by analyzing Hypothesis 1a, Hypothesis 1b and Hypothesis 2. As the results indicated, in a cross-sectional analysis of the effect of the educational level of top administrators and the effect of both position and field tenure, a significant relationship between these top management characteristics and innovation awareness was not apparent as the research was initially designed. However, when awareness of treatments was measured by each individual treatment, education was found to have a significant relationship with the awareness of one specific innovative treatment, though higher levels of education was found to have a negative relationship with the awareness of this particular treatment. This negative relationship is at first, rather counter-intuitive. However, given the lack of significant correlation between education and a summed index of innovation awareness in a cross-sectional analysis, this result appears to be peculiar to the individual treatment itself.

When the relationship between education and innovation awareness was considered longitudinally, results indicated a positive significant relationship between educational level (data collected in Wave 2, 1997 – 1998) and innovation awareness (data collected in Wave 3, 2000-2001). And, in light of Hannan's (1998) argument concerning the liability of newness of an organization, the newness of the centers in this study does not have an effect on this relationship.

However, these results reflect more than just the suggestion that innovation awareness is significantly related to education over time. The respondents to the inquiry about education in Wave 2 also had held the position of administrator for less than 3 years. This was the result of the research design. Because of the large number of questions asked in the interview segment of Wave 2 data collection, if the administrator of the treatment center had not changed since the collection of data in Wave 1 (1995-1996), questions about education level were not asked in the Wave 2 data collection. Therefore, the significant positive relationship between educational level and innovation awareness was found using data collected from top managers who had been in the administrator position for less than three years. When I created an education variable that also included the updated educational levels of top administrators who had been interviewed in 1995-1996, I no longer found a significant relationship between educational level and innovation awareness.

It appears that in this data set, the cascading of knowledge of new innovative treatments for patients from top leadership to staff is related to the educational level of the top manager only when that top manager is relatively new to his or her position. Results of a moderated regression analyzing the moderating effects of new tenure on the relationship between education levels of top administrators and innovation awareness indicate a marginally significant relationship. The regression coefficient for the moderator variable "new tenure (coded 1 for tenure greater than or equal to 1995) * education" was .67, with a standard error = .38, p =.08. In addition, this cascading of innovation awareness knowledge takes time to take root (i.e. significant results only found in a longitudinal analysis). In other exploratory analyses, I found that Entrepreneurial Orientation * tenure (measured as years the administrator had been in his or her job) had a significant effect on the relationship between the entrepreneurial orientation of top managers and innovation adoption (B= -.03, S.E. = .01, p < .05, for adoption measured as "written protocol"; B= -.04, S.E. = .01, p < .01, for adoption measured as "use."). These statistics suggest that the greater the entrepreneurial orientation of top management in these treatment centers, the greater the relationship between low tenure in the job of the top manager and innovation adoption. These results support an argument advanced by Kimberly and Evanisko (1981) concerning newness of leadership and innovation. They suggested "it could be argued that new leaders with fresh perspectives and unfettered by obligations to particular organizational constituencies might be more likely to advocate and support innovations" (1981:696).

Kimberly and Evanisko's (1981) argument may also explain why I found no significant results for the hypotheses (1b and 2) which suggested that tenure was significantly related to the innovation implementation process. Despite their acknowledgment of the benefits of fresh perspectives, Kimberly and Evanisko (1981) found a positive relationship between tenure and innovation (Damanpour, 1991). However, in a meta-analysis of organizational innovation and 13 potential determinants, tenure was found to have no significant relation with organizational innovation. Thus, longevity in a position or an industry does not necessarily provide top leaders with the knowledge of alternatives needed to lead staff in becoming aware of relevant innovations.

These results also suggest that top management characteristics may provide some insights in better understanding the phenomenon of implementing technological innovation in organizations. However, moving beyond mere characteristics of top management to a more action-oriented conceptualization of the upper echelons yielded more significant explanations of variance. The second research question, "What effect does top management strategic orientation have on more action-oriented stages of the innovation implementation process?" was examined by analyzing Hypotheses 3, 4 and 5.

Hypothesis 3 examined the direct relationship between the entrepreneurial orientation of top management and innovation adoption. This hypothesis was not supported. Similar to the findings of Waldman, Ramirez, House and Puranam (2001), leadership demonstrated no significant main effects on organizational outcome. In order to test the Upper Echelons Theory using a conceptualization of leadership beyond characteristics (such as age and tenure), these researchers examined the effect of leadership characteristics (transactional and charismatic) on performance under conditions of perceived environmental uncertainty. Though they found no direct relationship between leadership and organizational outcome, their findings were consistent with theories of charismatic leadership that suggest that leadership will only have effects under conditions of perceived uncertainty (Trice & Beyer, 1986). Thus, this research extends Trice & Beyer (1986) and Waldman et al's (2001) work to suggest that leadership conceptualized in terms of an innovative and risk-taking orientation (innovativeness and risk-taking were the two factors found in the factor-analysis of the entrepreneurial orientation scale in this study) has no direct effect of the organizational outcome of innovation adoption.

In addition, though there was no direct effect of this strategic posture on innovation adoption in health centers found in this study, the significant negative effect of the interaction of perceived environmental uncertainty and entrepreneurial orientation is noteworthy (Hypothesis 4). Since strategy-making is defined by Bourgeois (1980) as an activity that involves scanning the environment by decision-makers to find opportunities that fit within its capabilities, it is important to consider the *negative influence* of perceived uncertainty on adopting innovative opportunities. Porter (1980) argued that in an uncertain environment, it is difficult to predict the behavior of customers and competition. He followed this argument with the conclusion that this difficulty in predicting behavior would lead to the creation of innovative strategies to retain customers and beat the competition. Waldman and his colleagues (2001) found that perceived environmental uncertainty had a positive and significant effect on the relationship between top management leader characteristics (charisma) and organizational outcome (financial performance), using a risk-oriented characteristic of leadership.

However, difficulty in predicting behavior of customers and competition had a different effect in this study. In this research, perceived environmental uncertainty by top management had a negative effect the relationship between innovative and risk-oriented strategies (entrepreneurial orientation) and the adoption of innovative treatments for patients. The inability to predict the behavior of customers and competition, led to maintaining the status quo. This kind of action was reflected in the comments of a nursing specialist I interviewed at the Substance Abuse Treatment Center affiliated with Mercy Hospital in Chicago (she was a participant in my survey of a small random sample of treatment centers). After answering questions about awareness and adoption of the three innovative treatment used in this study, she volunteered the following additional comments concerning the doctor who is responsible for adopting new treatment for patients: "*...I give [him] articles [on innovative treatments] and I tell him, 'This could increase business.' ...[he is] slow to make changes ...this doctor is in a comfort zone*"

This finding is noteworthy because it suggests that *all* top management do not react to perceived environmental uncertainty in a positive fashion. In regulated industries, such as health care, perceived environmental uncertainty may have an opposite effect on strategy making, than in unregulated industries. And since perceived environmental uncertainty was measured as the perceived change in the competitive landscape, this finding suggests that theories of competition and competitive advantage may need to be adjusted for regulated industries.

If perceived uncertainty is seen by organizational decision-makers as an adverse circumstance or threat, this finding also supports the threat-rigidity thesis advanced by Staw and his colleagues (1981) which describes an organizational response to threat as one of rigidity. In a study of 72 drug abuse treatment organizations, D'Aunno and Sutton (1992) found support for the threat-rigidity thesis. They found that the organizational response of these treatment centers to the threat of reduced funding was related to rigid responses such as less participative decision-making and work-force reduction. Given that more organic management practices are related with innovation (Burns and Stalker, 1961), these rigid management responses would be less likely to lead to innovation adoption in these organizations. Thus, if the perceived uncertainty of change in competition is determined to be a threat by these organizations, then this finding that suggests less innovation adoption by entrepreneurial oriented decision-makers in the face of perceived uncertainty makes sense from the threat-rigidity thesis view.

The second research question, "What effect does top management strategic orientation have on more action-oriented stages of the innovation implementation process?" was also examined by studying the possible moderating effects of the customer's (patient's) ability to pay. The significant negative moderating effect of higher proportions of Medicaid patients on the relationship between entrepreneurial orientation of top management and innovation adoption may reflect the customer orientation of the heath care industry.

In centers where customers exhibit more of an ability to pay for services without the assistance of the federal government, this customer profile enhances the relationship between an innovative and risk-taking strategic orientation of top management and innovation adoption. The R square for this significant regression analysis was .52, which explains more than half the variance! It is interesting that this effect was not seen for higher proportions of Medicare patients, whose eligibility is more tied to age rather than income. So one may infer that Ellsworth's (2000) comments paraphrased in the introduction to this study are worth considering. He argued that the path to competitive advantage and long-term financial health was found in having a customer-focused purpose. Ellsworth's arguments are in line with Peter Drucker, who some call the father of modern management. Drucker (1993) focuses on the customer as ultimate purpose of a business. He argued that innovative strategies which adapt to the customer's social and economic realities are important. This finding supports Drucker's arguments.

Thus, this study contributes to an understanding of innovative behavior by suggesting that top decision-makers in organizations are significantly affected by the environment in ways not discussed broadly in recent literature. A dynamic competitive environment does not appear to be beneficial to innovation adoption in a historically regulated industry such as health care over time. However, aspects of an organization's customer profile have a tremendous impact on innovation activity over time. From a practitioner's standpoint, focusing first on your customer and later on your competition may enhance competitive advantage and long-term financial health. While this advice may be contrary to much of the recent popular advice on competitive advantage, a customer- first orientation may well be the source of long-term competitive advantage.

If innovation implementation is viewed as a component of organizational change, one could discuss the role of institutional forces that may affect an organization's propensity to adopt innovation. Neo-institutional theory focuses on a change in widely held beliefs and norms as a result of coercive, normative or mimetic pressures to explain why organizations are isomorphic (DiMaggio & Powell, 1991). Though at first blush, isomorphism and innovation appear to be in conflict with each other, there may well exist environmental forces that exert pressures on organizations to innovate. In a study of the role of institutional and market forces in divergent organizational change among rural hospitals in the United States, D'Aunno and his colleagues found support for the argument that divergent change depends on both institutional and market forces (D'Aunno, Succi & Alexander, 2000). In this study market forces included proximity to competitors and institutional forces included profit status of the organization.

Further research is needed which focuses more specifically on how environmental forces affect these treatment centers. A recent study of the state-level and organizational-level effects on adoption of a particular treatment for substance abuse found a correlation between Medicaid policies and decisions to use treatment and found that for-profit organizations were more likely to dispense this treatment (Fournier and Isett, 2003).

Additional analyses of my data show that the profit status of the treatment center has a moderating effect on the relationship between top management entrepreneurial orientation and innovation adoption. When innovation adoption is measured as use of new, innovative treatment, for-profit organizations (profit status * entrepreneurial orientation: B = .96, standard error = .32, p = .003) are more likely to adopt innovation in the presence of top management entrepreneurial orientation. When innovation adoption is measure as having a written protocol for the new innovative treatment, non-profit organizations (profit status * entrepreneurial orientation: B = -1.13, standard error = .25, p = .003) are more likely to adopt innovation in the presence of top management entrepreneurial orientation. These findings may suggest that for-profit organizations are less likely to commit to adoption through written protocol, but will adopt by dispensing a new treatment or using new treatment techniques.

These additional analyses also point to the possibility of other factors that may explain the adoption of new treatment other than top management entrepreneurial orientation. When looking at the frequency distributions of the use and written protocols for each of the three treatments used in the study, one sees a wide disparity of adoption. Of the centers responding to the interview question, only 7 used and had written protocols for LAAM. However, 125 centers use Naltrexone, and 96 centers have a written protocol for Naltrexone. And 109 centers currently use MET, while 40 centers have written protocols. In future research, categorizing treatments as behavioral or drug therapies may give additional insight in adoption behaviors. Also, looking more at the regulatory environment and focusing on what states allow Medicaid reimbursement for opiate treatment would also broaden our understanding of this phenomenon.

The longitudinal nature of this study has allowed for empirical study of innovative behavior in organizations. However, as in the Kimberly and Evanisko (1981) study, the analyses reported in this paper used an existing data set. As Kimberly and his associate pointed out, the benefit of using such a data set is that it provides an opportunity to address a number of research questions fairly comprehensively. But the limitation is that variables could have conceptualized and measured differently had the initial study been designed to specifically address the research questions of this paper.

Also, given the longitudinal nature of this study, another limitation of analysis is missing data. Future analysis of this data will include a more refined assessment of error of these models using structural equation modeling. Also, comparing the effects of *objective* environmental uncertainty and *perceived* environmental uncertainty in the same analysis will more clearly demonstrate the effects of the perceptions of decision-makers as they scan the environment to locate opportunities that fit in the respective organizations.

This study also builds on previous research that has found the entrepreneurial orientation construct to be multidimensional. Previous studies have found three dimensions, innovativeness, risk-taking and proactiveness. In this study two dimensions, innovativeness and risk-taking, dominate the strategic posture of the decision-makers. Future research should continue to examine this entrepreneurial orientation to learn which elements are beneficial to what types of organizations.

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TABLE 1
CORRELATIONS OF WAVE 3 VARIABLES TO WAVE 3 VARIABLES

Variable	Mean	S.D.	N	1	2	3	4	5	6	7	8	9
1) Education	2.68	.81	232									
2) Tenure (position)	1994.76	5.57	239	.04								
3) Tenure (field)	17.84	7.14	240	.15*	-.36**							
4) Hospital	.66	.48	241	-.02	-.02	.02						
5) Profit Status	.30	.46	238	-.04	.01	.05	-.40**					
6) Size (log)	3.20	1.20	239	.12	.10	-.04	-.23**	.04				
7) Profit Margin (log)	.92	.36	218	.04	.11	.07	.17*	-.04	-.05			
8) Innovation Awareness	8.50	3.46	241	-.02	-.04	.09	-.07	.02	.03	-.10		
9) Innovation. Adoption (use)	1.05	.75	229	.08	.04	.04	-.11	.05	.13*	-.03	.48**	
10)Innovation Adoption (protocol)	.84	.66	171	-.04	.06	.03	-.13	.10	.20**	-.02	.31**	.46**

* $p < .05$
** $p < .01$

TABLE 2A
CORRELATIONS OF WAVE 2 VARIABLES TO WAVE 2 VARIABLES

Variables	Mean	S.D.	N	1	2	3	4	5	6	7	8
1) Education	2.60	.76	86								
2) Tenure (position)	1995.35	3.86	81	.02							
3) Tenure (field)	17.02	8.31	59	.07	-.12						
4) Profit Status	.28	.45	236	- .15	-.09	- .23					
5) Hospital	.69	.46	241	- .05	.19	.09	-.40**				
6) Size (log)	3.07	1.16	212	.03	-.04	.10	-.02	-.29**			
7) Profit Margin (log)	.89	.30	152	.09	-.01	- .41*	.13	.18*	.13		
8) Uncertainty (Admin)	.44	.50	201	- .13	.04	.01	.01	.07	-.02	-.06	
9) Uncertainty (Clinical)	.44	.50	52	.00	-.03	.22	.17	-.01	-.06	.08	.22
10) % Medicaid patients	30.51	25.15	160	.07	.20	.12	-.00	-.04	.03	.13	-.04
11) % Medicare patients	17.28	15.92	170	.14	.04	- .01	.42**	-.12	-.05	.02	.06
12) Entrep. Orient (adm)	4.62	.96	156	.08	-.03	.32*	-.09	-.08	.31*	-.18	-.00
13) Entrep. Orient (clin)	4.44	.95	64	- .05	-.32	.14	-.06	-.24	.23	-.11	-.14
14) Education (w1 update)	2.46	1.70	235	1.00**	.02	.07	-.01	.01	.14	.08	-.05
15) Tenure, pos (w1 update)											
16) Tenure, field (w1 update)	18.54	6.91	201	.11	-.19	1.00**	-.06	.03	.10	-.10	.01

* $p < .05$
** $p < .01$

TABLE 2B
CORRELATIONS OF WAVE 2 VARIABLES TO WAVE 2 VARIABLES

Variables	9	10	11	12	13	14	15	16
1) Education								
2) Tenure (position)								
3) Tenure (field)								
4) Profit Status								
5) Hospital								
6) Size (log)								
7) Profit Margin (log)								
8) Uncertainty (Admin)								
9) Uncertainty (Clinical)								
10) % Medicaid patients	.27							
11) % Medicare patients	-.23	-.19						
12) Entrep. Orient (adm)	-.09	-.15	-.04					
13) Entrep. Orient (clin)	-.01	-.13	-.21	.29				
14) Education (w1 update)	.24	.15	.08	-.02	-.20			
15) Tenure, pos (w1 update)								
16) Tenure, field (w1 update)	.17	-.03	.03	.18*	-.06	.02	-.31**	

* $p < .05$
** $p < .0$

TABLE 3
CORRELATIONS OF SELECTED WAVE 2 VARIABLES TO WAVE 3 VARIABLES

Variables	14	15	16	17	18	19	20	21	22	23
1) Education (W2)	.52**	.12	-.20	-.00	-.18	.04	.16	.16	.07	.02
2) Tenure (position) (W2)	-.09	.54**	-.16	.18	-.09	.06	-.07	.08	-.08	.14
3) Tenure (field)(W2)	.13	-.12	.33*	-.01	-.23	.09	-.10	-.10	.17	.19
4) Profit Status (W2)	-.03	-.02	.01	-.39**	.96**	.02	-.07	.05	.06	.11
5) Hospital (W2)	-.00	.05	.06	.79**	-.39**	-.25**	.14*	-.09	-.06	-.16*
6) Size (log) (W2)	.20**	.02	-.02	-.19**	-.02	.76**	-.04	.05	.10	.27**
7) Profit Margin (log)(W2)	.02	.15	.06	.19*	.10	-.09	.38**	-.18*	-.08	-.21*
8) Uncertainty (Admin)(W2)	.08	-.13	.04	.11	-.01	-.11	-.06	-.01	-.00	.08
9) Uncertainty (Clinical)(W2)	.23	.16	.05	-.02	.09	-.16	.05	.20	.04	.28
10) % Medicaid patients (W2)	-.01	.22**	-.07	-.01	.02	.04	.15	-.00	-.13	.02
11) % Medicare patients (W2)	-.04	-.03	-.07	-.06	.42**	-.00	.03	-.05	.03	.03
12) Entrep. Orient (adm)(W2)	.08	-.15	-.02	-.09	-.13	.26**	-.07	.01	.02	.03
13) Entrep. Orient (clin)(W2)	.04	-.11	.06	-.21	-.05	.19	.01	.10	.13	.16
14) Education (W3)										
15) Tenure (position) (W3)										
16) Tenure (field) (W3)										
17) Hospital (W3)										
18) Profit Status (W3)										
19) Size (log) (W3)										
20) Profit Margin (log) (W3)										
21) Innovation Awareness (W3)										
22) Innovation. Adoption (use) (W3)										
23) Innovation Adoption (protocol) (W3)										

* p < .05   **p < 01

TABLE 4

H1a -- Innovation Awareness regressed on Education

	Model 1		Model 2		Model 3		Model 4	
Variables	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Profit Margin (log)	-.45	.26	-.80	.66	- .60	.65	-2.43	1.49
Size (log)	-.16^	.08	.07	.20	.01	.20	- .71	.58
Profit Status	.05	.22	-.06	.56	-.38	.56	- .70	1.39
Hospital	.06	.23	-.48	.56	-.62	.56	- .57	1.28
Education (continuous)	-.24*	.12			-.10	.30		
Education (MD)			-1.95^	1.06				
Education (longitudinal-continuous)							2.09**	.73
Constant	5.27***	.51	9.31***	1.08	9.70***	1.25	7.82*	3.18
F	2.53*		1.28		.54		2.77*	
R-square	.06		.03		.01		.24	
N	206		213		206		50	
Note: (how innovation awareness is measured)	Naltrexone Awareness		Awareness of 3 treatments summed		Awareness of 3 treatments summed		Awareness of 3 treatments summed	

^ $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 5
H1b -- Innovation Awareness regressed on Tenure

	Model 1		Model 2		Model 3	
Variables	B	S.E.	B	S.E.	B	S.E.
Profit Margin (log)	-.61	.67	-.73	.67	-1.58	1.46
Size (log)	-.15	.21	.14	.21	-.48	.58
Profit Status	-.06	.57	-.11	.57	-1.57	1.34
Hospital	-.50	.57	-.51	.60	-.37	1.30
Tenure (position)	-.03	.04				
Tenure (field)			.04	.03		
Tenure (position) longitudinal					.26^	.13
Constant	75.71	84.52	8.18***	1.22	-496.73	254.00
F	.74		.93		1.99	
R-square	.02		.02		.19	
N	211		211		48	
Note: (how innovation awareness is measured)	Awareness of 3 treatments summed		Awareness of 3 treatments summed		Awareness of 3 treatments summed	

^ p < .10
* p < .05
** p < .01
*** p < .001

TABLE 6

H2 -- Innovation Awareness regressed on Tenure (Squared) --Longitudinal

	Model 1		Model 2	
Variables	B	S.E.	B	S.E.
Profit Margin (log)	-1.58	1.46	-2.22	2.42
Size (log)	-.48	.58	-1.42	.95
Profit Status	-1.57	1.34	1.13	1.91
Hospital	-.37	1.30	-1.49	1.85
Tenure (position)	.26^	.13		
Tenure squared	excluded			
Tenure (field)			-.01	.38
Tenure squared			.00	.01
Constant	-496.73^	254.00	15.62**	4.29
F	1.99		.64	
R-square	.19		.13	
N	48		33	
Note: (how innovation awareness is measured)	Awareness of 3 treatments summed		Awareness of 3 treatments summed	

^ $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 7
H3 and H4 -- Innovation Adoption regressed on Entrepreneurial Orientation and Perceived Uncertainty -- Longitudinal

	Model 1		Model 2		Model 3		Model 4	
Variables	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Profit Margin (log)	-.19	.26	-.43^	.22	-.10	.27	-.23	.20
Size (log)	.07	.07	.15*	.06	.08	.07	.18**	.06
Profit Status	.13	.19	.20	.16	.22	.20	.40*	.15
Hospital	.03	.20	.00	.16	.16	.21	.27	.16
Entrepreneurial Orientation (EO)	-.02	.09	-.05	.07	.12	.13	.26**	.10
Perceived Uncertainty					1.54	1.05	3.46***	.80
EO * Perceived Uncertainty					-.35	.23	-.75***	.18
Constant	1.03*	.52	.94*	.43			-1.21	.63
F	.39		2.79*		.60		5.03***	
R-square	.02		.13		.04		.27	
Note: (how innovation adoption is measured)	USE of 3 treatments summed		PROTOCOL of 3 treatments summed		USE of 3 treatments summed		PROTOCOL of 3 treatments summed	

^ $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

Note: Analyses were conducted using pairwise deletion of cases.

TABLE 8

H5 -- Innovation Adoption regressed on Entrepreneurial Orientation and Patients' Ability to Pay --Longitudinal

	Model 1		Model 2		Model 3	
Variables	B	S.E.	B	S.E.	B	S.E.
Profit Margin (log)	-.43^	.26	-.43^	.26	-1.77***	.27
Size (log)	.15*	.07	.12	.08	.32***	.06
Profit Status	.20	.19	.09	.25	.52**	.15
Hospital	.00	.20	-.15	.26	.05	.15
Entrepreneurial Orientation(EO)	-.05	.08	-.15	.14	.66***	.12
Ability to Pay (% Medicaid)					.11***	.02
Ability to Pay (% Medicare)			-.03	.04		
EO * Ability to Pay (Medicaid)					-.02***	.00
EO * Ability to Pay (Medicare)			.00	.01		
Constant	.94^	.52	1.59^	.91	-1.67**	
F	1.89				9.91***	
R-square	.13				.52	
Note: (how innovation adoption is measured)	PROTOCOL of 3 treatments summed		PROTOCOL of 3 treatments summed		PROTOCOL of 3 treatments summed	

^ p < .10
* p < .05
** p < .01
*** p < .001

Note: Analyses were conducted using pairwise deletion of cases.

Table 9

Entreprenurial Orientation Scale (modified from Covin & Slevin, 1989)

Each of the following items consists of a pair of statements representing two extremes of different methods of managing a treatment center. In each item, a score of 1 indicates that a center is best described by the statement on the left; a score of 7 indicates that a center is best described by the statement on the right. For each item, please circle the number on the scale that best represents the management methods used at this treatment center.

a.	Managers in this center favor a a strong emphasis on the tried and true	1 2 3 4 5 6 7	Managers in this center favor a strong emphasis on innovation.
b.	This center has provided no new provided many new services services since 1998.	1 2 3 4 5 6 7	This center has provided many new services since 1998.
c.	Changes in services have been mostly minor in nature .	1 2 3 4 5 6 7	Changes in services en have been quite extensive.
d.	This center is seldom the first center to introduce new services, administrative techniques, etc.	1 2 3 4 5 6 7	This center is often the first center to introduce new services, administrative techniques, etc.
e.	This center seeks to avoid competitive clashes.	1 2 3 4 5 6 7	This center typically adopts a very competitive posture.
f.	Managers at this center have a strong proclivity for low-risk projects.	1 2 3 4 5 6 7	Managers at this center have a strong proclivity for high-risk projects.
g.	Managers at this center believe that at this center believe that it's best to achieve the center's objectives gradually via careful, incremental behavior.	1 2 3 4 5 6 7	Managers at this center have a strong proclivity for high-risk projects.
h.	When confronted with decision-making situations, this center typically adopts a cautious posture in order to minimize the probability of making costly decisions.	1 2 3 4 5 6 7	When confronted with decision-making situations, this center Typically adopts a bold, aggressive posture in order to maximize the probability of exploiting potential opportunities.

TABLE 10

Questions for phone interview with random sample of treatment centers.

ID/Name of center______________________________________
City, State____
Contact____
Phone____

1) To what extent do you believe the staff at this center is familiar with

   a) Motivational Enhancement Therapy (0 – 5) __________ (W3v2512)
   b) Naltrexone (0 – 5) ____________(W3v2509)
   c) LAAM (0 – 5) ______________(W3v2506)
   (levo-alpha-acetyl-methadol)

2) (W3v2858) Do any of the patients treated at this center currently receive Motivational Enhancement Therapy (MET)? 1 – Yes; 0 No; 8 =N/A-not familiar (W3v2512 < 2)

3) (W3v2859) Does this center have a written protocol for the administration of MET? 1 = Yes; 0 = No; 8 N/A-not familiar (W3v2512 < 2) or does not use (W3V2858 = 0)

4) (W3v2722) Do any of the patients treated at this center currently receive Naltrexone? 1 – Yes; 0 No; 8 =N/A-not familiar (W3v2509 < 2)

5) (W3v2723) Does this center have a written protocol for the administration of Naltrexone? 1 = Yes; 0 = No; 8 N/A-not familiar (W3v2509 < 2) or does not use (W3V2722 = 0)

6) (W3v2586) Does this center currently use LAAM? 1 – Yes; 0 No; 8 =N/A-not familiar (W3v2506 < 2) or center does not treat opiate addicted patients

7) (W3v2587) Does this center have a written protocol for the administration of LAAM? 1 = Yes; 0 = No; 8 N/A-not familiar (W3v2506 < 2) or does not use (W3V2586 = 0)

TABLE 11
Summary of Hypotheses

Hypothesis Number	Description	Supported	Not Supported	Partially Supported	Comments
1a	Higher levels of education positively related to innovation awareness			xxx	Also, supported longitudinally.
1b	Higher levels of tenure positively related to innovation awareness		xxx		
2	Tenure has inverted U-shape relationship with innovation awareness over time.		xxx		
3	EO will be positively related to innovation adoption.		xxx		
4	EO and innovation adoption positively moderated by perceived uncertainty.			xxx	Significant in the opposite direction.
5	EO and innovation adoption moderated by ability to pay	xxx			

Figure 1 -- Moderating Effects of Perceived Environmental Uncertainty on the Relationship between EO and Innovation Adoption

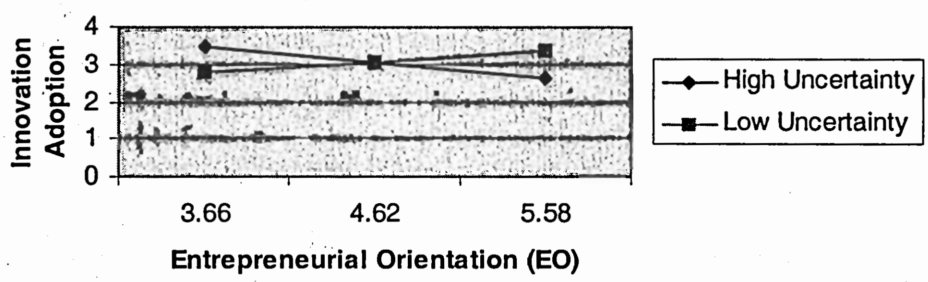
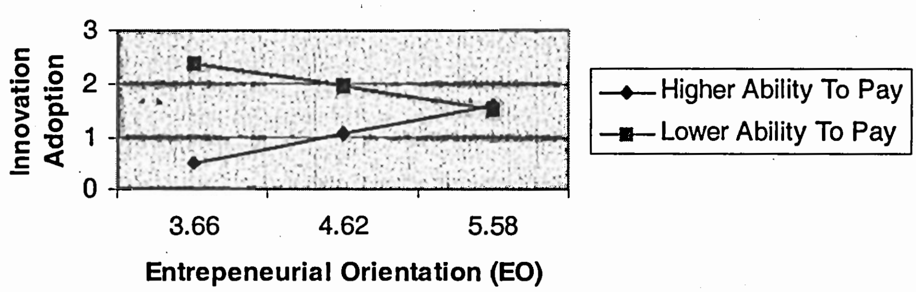


Figure 2 – Moderating Effects of Patients' Ability To Pay on the Relationship Between EO and Innovation Adoption



Vita

Carolyn Denise Davis was born in Chicago, Illinois on December 7, 1956. She received her Bachelor of Science degree from Northwestern University in June, 1978 and her Master of Business Administration degree from the University of Chicago in June, 1980. In the 1980's, she worked as a Circulation Manager for Time, Inc. and was sole proprietor of Cue to Cue Productions, a marketing and video production enterprise. In 1988, she began her 11-year tenure as a political appointee in Maryland State Government. Her positions included Deputy Chief of Staff to the Governor and Deputy Secretary of the Department of Natural Resources.

While pursuing her Ph.D. degree, she co-authored a paper, "A Tale of Passion: New Insights into Entrepreneurship From a Parenthood Metaphor," that was published in the ***Journal of Business Venturing***. She co-authored another paper with Terry C. Blum which was selected as a finalist in the Booz Allen Hamilton /Strategic Management Society PhD Fellowship Paper Competition. Carolyn was also awarded the 2002 Georgia Institute of Technology Outstanding Teaching Assistant Award, the 2003 DuPree College of Management Graduate Assistant Excellence in Undergraduate Teaching Award, the Georgia Space Grant Fellowship and the Alan and Mildred Peterson Technology Transfer Fellowship while pursuing her Ph.D. studies.