IMPACTS OF ENVIRONMENTAL TURBULENCE AND ENTREPRENEURIAL ORIENTATION ON NURSES' PRODUCTIVITY IN A CANADIAN HEALTH-CARE ORGANIZATION

By

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ABSTRACT

This study involves an investigation into the impacts of environmental turbulence and entrepreneurial orientation on the productivity of management and nonmanagement nurses in a nonprofit health-care organization. The study also examines adaptive leadership characteristics of management and nonmanagement nurses, in relation to the mixes of environmental turbulence and entrepreneurial orientation best suited to achieving high productivity at the edge of chaos. The quantitative study involved a randomly selected sample of 300 nurses. Environmental turbulence was captured through five dimensions: financial climate, interunit competition, occupational requirements, legislative activities, and technological change. Entrepreneurial orientation was captured through three dimensions: innovation, risk taking, and proactiveness. Employee productivity was captured through six dimensions: challenging and meaningful work, self-management, supportive leadership, multidimensional skills, individual incentives, and group incentives. The study established adaptive leadership models for management and nonmanagement nurses in relation to the different mixes of environmental turbulence and entrepreneurial orientation dimensions best suited to achieving productivity at the edge of chaos. The study contributes to the limited body of knowledge on the impact of environmental turbulence and entrepreneurial orientation on the productivity of employees in nonprofit organizations, given their responses to complex adaptive systems.

DEDICATION

This dissertation is dedicated to Almighty God my saviour and redeemer. May his name be praised and worshiped in his glory and majesty.

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I give praise to Almighty God for his infinite mercy and for making this dissertation possible. I am constantly reminded of the challenges and adversities endured throughout the program, for which I sought divine intervention on many occasions. I thank the School of Advanced Studies at the University of Phoenix for making my dream of completing the doctoral degree a reality.

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CHAPTER 1: INTRODUCTION

Health care is publicly funded in the province of Ontario, Canada, in accordance with the prescriptions of the Canada Health Act (Health Canada, n.d.-a). The act mandates accessibility and affordability of health care for all Canadians. A recent Health Canada report revealed the Canadian health-care system has become strained due to a number of factors including fiscal constraint, the high cost of technology, and changes in labor-force demands (Health Canada, n.d.-b). The Health Canada (n.d.-b) report noted the health-care industry was the third largest employer in Canada, behind the manufacturing and retail sectors. Another report revealed the health-care industry employed 1 in 10 Canadians and nurses comprised a significant portion of labor-force participants (Canadian Institute for Health Information [CIHI], n.d.-a).

The cost of providing a publicly funded health-care system in Canada is well documented. For example, a report by CIHI revealed total health-care expenditure in Canada was $131.4 billion in 2004, with projected annual increases of 5.8 to 6.4% for subsequent years (CIHI, n.d.-c). The report also noted the Canadian total health-care expenditure was 10.3% of the gross domestic product in 2006, making it one of the highest among the Organisation for Economic Co-operation and Development countries (CIHI, n.d.-c). As a cost-saving measure, the provincial and territorial governments urged health-care establishments to seek innovative and cost-effective approaches to the delivery of health-care services.

Health-care ministers at the federal, provincial, and territorial levels have all called for the reform of the Canadian health-care system. A 2008 report by Health Canada noted Canada's health-care system has been a work in progress and ongoing reforms spanning over four decades were at their critical stages (Health Canada, n.d.-d). Health Canada stated in a follow up report that change was desirable and necessary to improve the health-care system's responsiveness to the needs of Canadians (Health Canada, n.d.-e). A commissioned report by the agency noted nurses should be considered critical to the success of the human resources aspect of the health-care reform initiative (Health Canada, n.d.-f). The report added that allocative efficiencies should be sought with respect to the innovative use of nurses in the effective delivery of health care.

Folland, Goodman, and Stano (2001) posited allocative efficiency required that participants in an aggregate market allocate inputs and outputs efficiently to the benefit of society. Shannon and French (2005) noted, "The healthcare environment is knowledge driven and human resource dependent" (p. 231). Shannon and French (2005) also noted the key to achieving health-care recovery in Canada was dependent on a proactive and innovative workforce, along with a supportive leadership structure. In the case of nurses, the leadership structure would involve management and nonmanagement nurses.

R. A. Anderson and McDaniel (1999) described the working environment of nurses as a complex adaptive system prone to environmental turbulence that results from unforeseen changes in areas such as marketplace economics, legislative activities, and technological changes. According to P. Anderson (1999), Adshead and Thorpe (2005), and Dolan, Garcia, and Auerbach (2003), complex adaptive systems are dynamic, nonlinear, nonrepetitive, deterministic forms that create emergence in the case of individual agents. In seeking innovative approaches in the utility of nurses, health-care administrators would have to emphasize more on the entrepreneurial orientation of nurses with the goal of achieving adaptive leadership during turbulent times. Accordingly, a

Health Canada report on nursing strategy noted that nursing practice should be pragmatic, innovative, and focused on a more proactive nursing management leadership style (Health Canada, n.d.-f).

Lichtenstein et al. (2006) noted where adaptive leadership is evoked in turbulent times, employees participate collaboratively as followers or leaders at "different times and for different purposes" (p. 3). Tan et al., (2005) proffered the emergence of self-organizing properties among agents of collaborative work groups, in the absence of any central control, for the greater good of all. According to Tan et al. (2005), employees perceive environmental turbulence differently, but develop positive leadership-followership regimes that coevolve for purposes of achieving greater productivity. In the context of the Canadian health-care delivery system, there is a need to explore the extent to which management and nonmanagement nurses perceive environmental turbulence and the entrepreneurial orientation adopted with respect to achieving high productivity during periods of chaos and uncertainty associated with environmental turbulence.

The current study involved an examination of the impacts of environmental turbulence and entrepreneurial orientations on the productivity of management and nonmanagement nurses. Nurses were chosen for the study because they represented the largest proportion of health-care professionals in Canada, making them critical to the development of any comprehensive reform in the Canadian health-care system (CIHI, n.d.-c). Another reason for choosing nurses for the study was that nursing managers typically share basic professional training with many of their subordinate nurses on a technical level, thereby creating significant job affinities that could promote adaptive leadership. The sample for the study was selected from the University Health Network, Toronto, Canada, and the data gathered were analyzed quantitatively using the SPSS statistical package. The University Health Network is made up of three hospitals in an alliance relationship, comprising Toronto General Hospital, Princess Margaret Hospital, and Toronto Western Hospital, which provided conditions for a robust academic inquiry.

The rest of the chapter outlines the background of the problem, purpose of study, significance of study, nature of study, and theoretical framework that guided the study. Research questions and corresponding hypotheses are stated as well. Finally, definitions for key words are presented, as well as assumptions that guided the dissertation.

Background of the Problem

A recent publication by the Canadian Institute of Health Research (n.d.) noted some frustration regarding the slow pace of bringing about effective and targeted change in the complex health-care system in Canada. In pursuit of an effective approach to the delivery of health-care services, there exists a need to explore the impacts of environmental turbulence and entrepreneurial orientation on the productivity of management and nonmanagement nurses in the nonprofit sector. This is important given the nonprofit orientation of the Canada Health Act that governs health-care delivery in Canada.

The problem is the impacts of environmental turbulence and entrepreneurial orientation on productivity in the nonprofit health-care environment were understudied in the existing literature relative to the for-profit environment. Exploratory studies in the literature focused largely on the for-profit sector in general (Bou-Wen & Chung-Jen, 2006; Covin, Green, & Slevin, 2006; Golann, 2006; Siemens, 2006; Van Zyl & Mathur-Helm, 2007; Wolff & Pett, 2006). Relatively fewer studies addressed the nonprofit sector

(Fritz, 2006; Hoke, 2006; Morris, Coombes, & Schindehutte, 2007). Policy makers and health-care administrators have expressed the need for a more focused research on the impact of environmental turbulence and entrepreneurial orientation on productivity in the nonprofit health-care environment.

Additionally, the need exists to explore the impacts of environmental turbulence, entrepreneurial orientation, and productivity based on multidimensional variables, given the nature of complex adaptive systems that characterize health-care environments. Many of the existing bodies of work have adopted a unidimensional approach to the study of environmental turbulence in which the aggregate means were applied (Covin & Slevin, 1988; Miller & Friesen, 1983), whereas growing evidence indicates individuals and groups perceive each environmental turbulence dimension differently (Wholey & Brittain, 1989; Yusuf, 2002).

Many of the existing works also applied a firm-based approach to the study of entrepreneurial orientation (for example, Gartner, 1985; Hornaday & Aboud, 1971; Lumpkin & Dess, 1996), whereas a growing need exists to examine entrepreneurial orientation on the basis of individuals that constitute work groups. The basis for the current thinking is that a person-based approach would better capture adaptive capacities of employees in their unique groups. A more focused study geared to a multidimensional, person-based approach would narrow the gap in the literature with respect to the impact of environmental turbulence and entrepreneurial orientation on productivity.

Accordingly, the current study involved an examination of the impacts of environmental turbulence and entrepreneurial orientation on the productivity of management and nonmanagement nurses based on a multidimensional and person-based approach. For purposes of the study, a multidimensional instrument was developed and distributed randomly to management and nonmanagement nurses from the three hospitals that comprise the University Health Network (Toronto General Hospital, Toronto Western Hospital, and the Princess Margaret Hospital). Respondents' opinions were scored using a 5-point Likert-type scale, and analyzed quantitatively using the SPSS statistical tool. Descriptive and correlational analyses were undertaken. The findings may help administrators and policy makers understand the impacts of environmental turbulence and entrepreneurial orientation on the productivity of nurses in the nonprofit health-care environment.

Statement of the Problem

Innovative reforms contemplated by policy makers and health-care administrators in the jurisdiction of Ontario and other Canadian provinces are complex and require an understanding of the impacts of environmental turbulence and entrepreneurial orientation on the productivity of nurses in the nonprofit health-care environment. For example, many existing studies have proven inadequate to addressing issues specific to understanding whether or not management and nonmanagement nurses in the nonprofit environment perceive environmental turbulence differently, based on a multidimensional approach to measuring the variables that constitute environmental turbulence. The need also exists to understand the nature of entrepreneurial orientation adopted by management and nonmanagement nurses in the nonprofit environment as a way to achieve high productivity during periods of environmental turbulence.

Some existing studies have (a) adopted a firm-based approach to examining impacts of environmental turbulence and entrepreneurial orientation on productivity (for example, Hornaday & Aboud, 1971; Wholey & Brittain, 1989), whereas there is a growing need for a person-based approach to such studies; (b) applied a unidimensional approach to examining items related to environmental turbulence, entrepreneurial orientation, and productivity (Covin & Slevin, 1988; Lawrence & Kraft, 1986; Miller & Friesen, 1983), whereas a multidimensional approach would have been more suited (Kendall, 2003; Hirshey & Pappas, 1993; Spence-Laschinger, Shamian, & Thompson, 2001); and (c) focused disproportionately on the study of impacts of environmental turbulence and entrepreneurial orientation on productivity in for-profit organizations (R. A. Anderson & McDaniel, 1992; Ashmos, Duchon, Hauge, & McDaniel, 2000; Brockhaus, 1980), whereas the need exists for similar studies in the nonprofit health-care environment.

Consequently, the current research addressed the need to study the impacts of environmental turbulence and entrepreneurial orientation on the productivity of management and nonmanagement nurses in the nonprofit health-care environment. The study was conducted using management and nonmanagement nurses from the University Health Network in Toronto, Canada. The organization was designated nonprofit based on the provisions of the Canada Health Act.

Purpose of the Study

The purpose of the study was to examine the impacts of environmental turbulence and entrepreneurial orientation on the productivity of management and nonmanagement nurses at the University Health Network in Toronto, Canada, acting as two separate but dependent groups. The emergence of adaptive leadership was also tested to determine coevolution between management and nonmanagement nurses within the context of complex adaptive systems. The quantitative method was applied in the study, based on a multidimensional, person-based approach. Environmental turbulence was applied as an independent variable using a five-dimensional construct: (a) financial climate, (b) interunit competition, (c) occupational requirements, (d) legislative activity, and (e) impact of technological change. Entrepreneurial orientation was also applied as an independent variable using a three-dimensional construct: (a) innovation, (b) risk taking, and (c) proactiveness. Productivity was applied as dependent variable in the study using a six-dimensional construct: (a) challenging and meaningful work, (b) self-management, (c) supportive leadership, (d) multidimensional skills, (e) preference for individual incentives, and (f) preference for group-based incentives.

Data were gathered based on a survey of random groups of management and nonmanagement nurses from the University Health Network using a research instrument developed by the researcher. Analysis of the data gathered involved descriptive, correlational, and predictive analyses using the SPSS Version 12 software package.

The Significance of the Study

A multidimensional survey instrument was developed by the researcher for use in the study, given the scarcity of relevant data in existing literature. Researchers doing similar studies in the future could apply this instrument to their work. The study may provide empirical data that could also help expand academic discourse in the area of study.

The study could lead to a greater understanding of antecedents in the development of a firm-individual-entrepreneurial orientation fit that promotes high productivity during periods of environmental turbulence. Furthermore, models produced in the study could facilitate a greater understanding of leadership-followership regimes between management and nonmanagement nurses that foster the coevolution of adaptive leadership during turbulent times. More important, the study may help policy makers and health-care administrators develop policies to attract and retain productive employees with the capacity to cope with and adapt to adverse conditions during periods of environmental turbulence.

Significance to Leadership

The study provides models that could help organizational leaders and practitioners understand how to identify and harness adaptive leadership qualities in management and nonmanagement nurses. In this regard, the findings could further the work of Lichtenstein et al. (2006), who noted leadership roles can be assumed by any agent who emerges from any one of the groups in an organization, where such an agent was driven by the achievement of adaptive outcomes for the greater good of all. The study could also provide empirical data on antecedents of job satisfaction in furtherance of the work of Erdogan and Bauer (2005), who noted effective leadership in organizations could be linked to the ability to organize and lead an innovative and productive workforce.

Nature of the Study

The quantitative approach was applied in the study, and a multidimensional survey tool developed by the researcher was used for data gathering. Existing studies were based on the mixed research method (for example, Fritz, 2006; Hoke, 2006; McGuire, 2003), as well as the qualitative design (for example, Auteri, 2001; Srivastva, 2004; Stevens, 2003). All of the studies cited were firm-based and unidimensional, as opposed to the multidimensional, person-based approach adopted in the current study.

The approach applied in the study was most appropriate for examining multiple variables of environmental turbulence, entrepreneurial orientation, and productivity among two separate but dependent employees groups (i.e., management and nonmanagement nurses) who work in complex adaptive conditions. The nature of the study was consistent with Lichtenstein et al. (2006), who asserted that in complex adaptive systems interactive roles of individuals help to enhance adaptive outcomes of the group as a whole.

Research Questions

Unlike many occupational groups, management and nonmanagement nurses share occupational affinities that stem from their common nursing training at the basic functional level. In spite of the common occupational affinity between the two groups, additional training is offered to nurses at a more senior level, such as would enable them undertake more complex and challenging managerial responsibilities.

An understanding of the predictive values of various dimensions associated with environmental turbulence and entrepreneurial orientation with respect to productivity could be useful in determining performance goals and objectives for management and nonmanagement nurses. This is important, because the differences in job training and responsibilities devolved on nurses could affect the way management and nonmanagement nurses sense impulses related to the impacts of environmental turbulence and entrepreneurial orientation on productivity. That assertion was tested in the study using a person-based, multidimensional approach.

In the study, productivity was defined based on six dimensions: (a) challenging and meaningful work, (b) self-management, (c) supportive leadership, (d) multidimensional skills, (e) preference for individual-based reward system, and (f) preference for group-based reward system. Entrepreneurial orientation was based on three dimensions: (a) innovation, (b) risk taking, and (c) proactiveness. Environmental turbulence was defined based on five dimensions: (a) uncertainty related to the financial climate, (b) uncertainty related to the level of intergroup competition, (c) uncertainty related to shifts in occupational requirements mandated by professional governing bodies, (d) uncertainty related to legislative activities, and (e) uncertainty related to technological shifts.

Three questions guided the study: (a) Are there significant relationships in the multidimensional elements that constitute environmental turbulence, entrepreneurial orientation, and productivity, as perceived by management and nonmanagement nurses? (b) Can the relationships among multiple dimensions of environmental turbulence and entrepreneurial orientation be applied as independent variables in the prediction of productivity as the dependent variable for management and nonmanagement nurses in significant ways? (c) Are there significant correlations in the perceptions held by management and nonmanagement nurses with respect to the impacts of environmental turbulence and entrepreneurial orientation on productivity that could indicate the emergence of adaptive leadership between the two groups?

The answers to the research questions contributed to the understanding of strength relationships among the dimensions of environmental turbulence, entrepreneurial orientation, and productivity as perceived by management and nonmanagement nurses. The outcome of the investigation could help policy makers and health-care administrators develop performance models that would foster adaptive leadership and enhance productivity in the health-care environment.

Null Hypotheses

To answer the research questions, the following null hypotheses were tested with productivity as the dependent variable, while environmental turbulence and entrepreneurial orientation were applied as independent variables.

Null Hypothesis $H_0$1a: There is no significant relationship among the multidimensional factors of entrepreneurial orientation (innovation, risk taking, and proactiveness) as perceived by nonmanagement nurses.

Null Hypothesis $H_0$1b: There is no significant relationship among the multidimensional factors of entrepreneurial orientation (innovation, risk taking, and proactiveness) as perceived by management nurses.

Null Hypothesis $H_0$2a: There is no significant relationship among the multidimensional factors of environmental turbulence (uncertainty related to the financial climate, uncertainty related to the level of intergroup competition, uncertainty related to shifts in occupational requirements mandated by professional governing bodies, uncertainty related to legislative activities, and uncertainty related to technological shifts) as perceived by nonmanagement nurses.

Null Hypothesis $H_0$2b: There is no significant relationship among the multidimensional factors of environmental turbulence (uncertainty related to the financial climate, uncertainty related to the level of intergroup competition, uncertainty related to shifts in occupational requirements mandated by professional governing bodies, uncertainty related to legislative activities, and uncertainty related to technological shifts) as perceived by management nurses.

Null Hypothesis $H_0$3a: There is no significant relationship among the multidimensional factors of productivity (challenging and meaningful work, self-management, supportive leadership, multidimensional skills, preference for individual-based reward system, and preference for group-based reward system) as perceived by nonmanagement nurses.

Null Hypothesis $H_0$3b: There is no significant relationship among the multidimensional factors of productivity (challenging and meaningful work, self-management, supportive leadership, multidimensional skills, preference for individual-based reward system, and preference for group-based reward system) as perceived by management nurses.

Null Hypothesis $H_0$4a: There is no significant predictive relationship among multiple dimensions of entrepreneurial orientation and environmental turbulence when applied as independent variables in the prediction of productivity satisfiers for nonmanagement nurses.

Null Hypothesis $H_0$4b: There is no significant predictive relationship among multiple dimensions of entrepreneurial orientation and environmental turbulence when applied as independent variables in the prediction of productivity satisfiers for management nurses.

Null Hypothesis $H_0$5: There is no significant difference between the means for management and nonmanagement nurses based on relationships among the multidimensions of environmental turbulence, entrepreneurial orientation, and productivity that may indicate the emergence of adaptive leadership at the edge of chaos.

The analyses to test the hypotheses involved (a) multiple correlational analyses to establish strength relationships among the multiple dimensions of environmental turbulence, entrepreneurial orientation, and productivity with respect to management and nonmanagement nurses based on two-tailed analysis of the Pearson correlation values; (b) multiple regression analyses to determine significant predictors among the independent variables entrepreneurial orientation and environmental turbulence, and assess their influence on the dependent variable productivity with respect to management and nonmanagement nurses, at the $p < .05$ significance level; and (c) *t*-test analyses to determine whether the differences between management and nonmanagement nurses' perception of environmental turbulence, entrepreneurial orientation, and productivity could be supported or rejected at the $p < .05$ significance level.

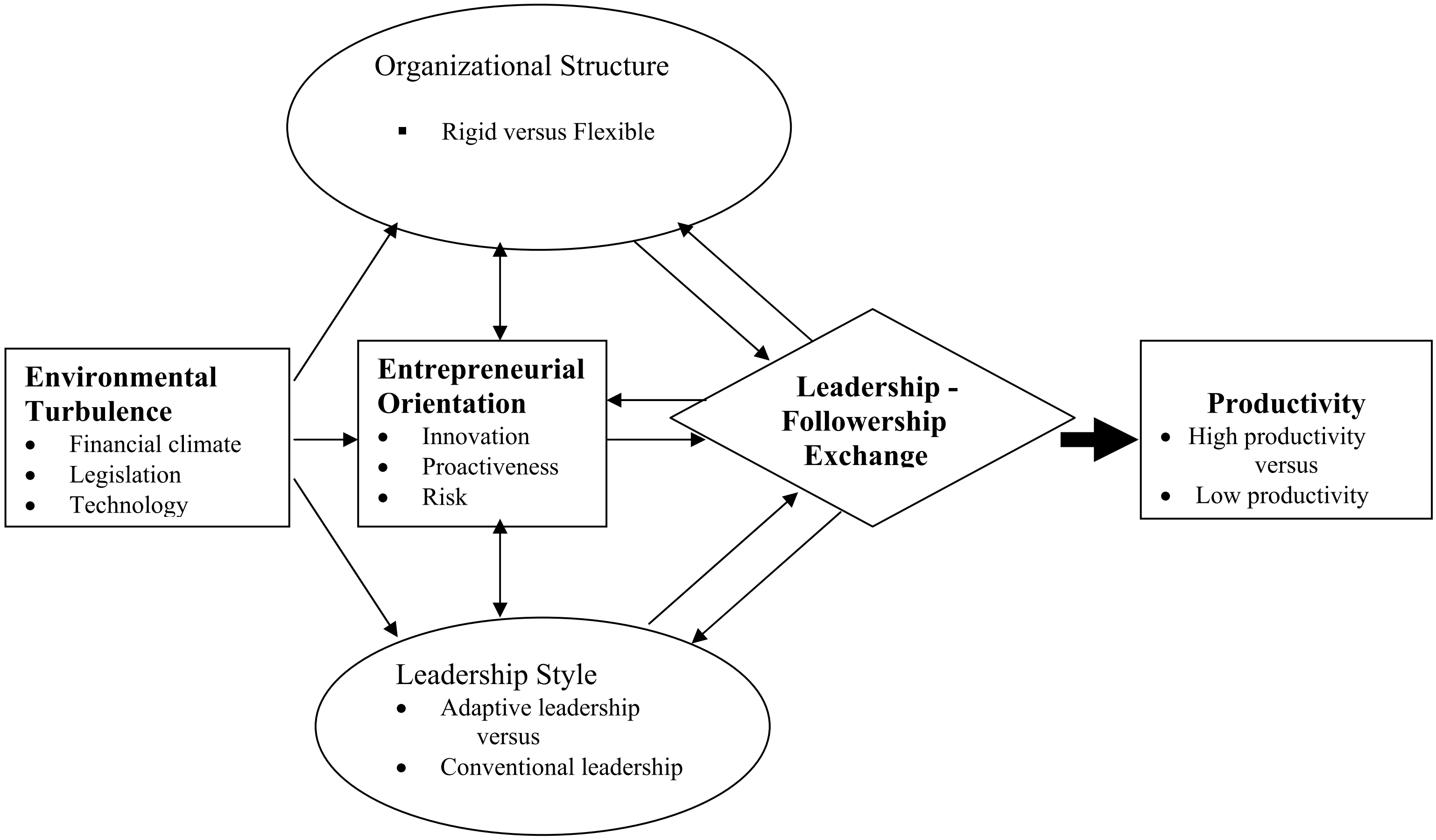
Theoretical Framework

Major theoretical areas that guided the study included environmental turbulence, entrepreneurship, productivity, complex adaptive systems, adaptive leadership, and antichaos theories. The theoretical framework presented in Figure 1 could help in understanding the dynamics that govern the relationships among the multidimensions of environmental turbulence, entrepreneurial orientation, and productivity in the nonprofit health-care environment. The discussion that follows presents the theoretical framework in terms of productivity as the dependent variable, while entrepreneurial orientation and environmental turbulence are presented as independent variables.

Dependent Variable

Existing studies indicate a positive influence of entrepreneurial orientation on productivity (for example, Covin & Slevin, 1991; Dess, Lumpkin, & McKee, 1999; Kreiser, Marino, & Weaver, 2002a; Lumpkin & Dess, 1996). A key problem, however, continues to be how to define and measure productivity more accurately, which is an ongoing debate with respect to whether unidimensional or multidimensional tools should be applied in measuring productivity. The debate, by extension, hinges on the question of whether to measure value-addedness of employees as individuals or group contributors, especially in complex adaptive systems that evoke adaptive leadership.

A defining point in the debate is reflective of Hirschey and Pappas (1993), who purported that the forces of productivity in organizations have several components and should be measured using multidimensional tools. Ma et al. (2003) pointed out that financial and nonfinancial indicators should be applied for purposes of measuring productivity based on the balanced scorecard approach. Ma et al. (2003) also suggested financial metrics should include return on investment, cost-of-unit innovation, and economic value-addedness, as well as nonfinancial metrics such as employee satisfaction and patient recovery rates.



ure 1. Conceptualization of the relationship between environmental turbulence, entrepreneurial orientation, and productivity, ba adaptive leadership theory and leadership-followership exchange.

During the 1980s, Williams and Johnson posited that nursing productivity should be calculated in terms of input and output factors (as cited in Moody, 2004). According to Moody (2004), many health-care organizations continued to misapply the economic principle with respect to allocative efficiencies of nurses. Many health-care administrators had badly misconstrued economic concepts to mean do more with less staff or simply do more with the same resources without due regard for the satisfaction derived by employees. The ill effects from such moves led to increased levels of dissatisfaction on the part of nurses, which in turn affected productivity.

Freeman (2001) purported productivity in the health-care environment was not easy to measure objectively in terms of hard numbers, given the level of emotional care demanded by patients. Freeman (2001) indicated that satisfaction and motivation of nurses should be of primary importance in promoting high performance. Freeman's (2001) opinion was consistent with the view of the American Nurses Association (as noted in Best & Thurston, 2004), which proposed that job satisfaction should be applied as a nurse-sensitive indicator with respect to measuring nurses' contributions toward the achievement of quality health-care delivery. McNeese-Smith (2001) also noted nurses with higher job satisfaction and job-related skills had significantly higher performance ratings than their coworkers.

The theoretical framework developed in the current study (see Figure 1) used satisfaction as a proxy for productivity, consistent with Fritz (2006), Kendall (2003), and Spence-Laschinger et al. (2001), who applied satisfaction as a proxy and performance as a dependent variable. The proxy approach adopted in the current study was also premised on the indirect relationship between satisfaction, motivation, and productivity, consistent with Milkovich, Newman, and Cole (2005). Maslow (1970) suggested the use of appropriate satisfiers to achieve desired levels of motivation in employees and thus productivity.

The model depicted in Figure 1 was premised on the outcome-based interaction between management and nonmanagement nurses, which could support the emergence of adaptive leadership through an effective leadership-followership exchange between the two groups. It is conceived that under such conditions, management and nonmanagement nurses could find mutually beneficial solutions to unique challenges facing the organization. In the current study, the productivity variable was defined by six dimensions related to satisfaction: (a) challenging and meaningful work, (b) self-management, (c) supportive leadership, (d) multidimensional skills, (e) preference for individual-based reward system, and (f) preference for group-based reward system, with the first four comprising nonmonetary forms.

Independent Variables

Environmental turbulence and entrepreneurial orientation were examined in the dissertation as independent variables, consistent with the call in the literature for further studies related to the impacts of these variables on productivity (for example, Ashmos, Duchon, Hauge, & McDaniel, 2000; Weaver, Dickson, Gibson, & Turner, 2002). One such call for further studies was articulated during the Academy of Health annual research meeting in 2003, where the following was noted: “There is value in understanding research on work environments more generally, but research very specific to nursing is needed too” (as cited in Hope, 2004, p. 3).

In the model presented in Figure 1, forces of environmental turbulence were conceived as multidimensional, rather than unidimensional. The external factors included factors such as financial climate, legislation, and technological change. Covin and Slevin (1988) noted levels of external hostility and environmental dynamism affected the success of firms. In contrast, internal uncertainties were conceived in terms of turbulence-inducing sources such as organizational misalignment in terms of ineffective structure, interunit competition, and inequitable compensation systems.

Organizations deal differently with forces associated with turbulence. For example, White and Begun (1998) noted, "Economic realities of the day have forced health care providers to respond with leaner and flatter structure . . . in order to improve quality outcomes" (p. 3). Miller (1983) posited that to cope with environmental hostility, organizations generally responded by using technocrats to create innovative products based on highly differentiated and diverse contingencies. Miller (1983) explained that the "more dynamic and hostile the environment, the more firms will be entrepreneurial . . . and that organizational structure will influence entrepreneurship" (p. 775).

The conceptualized model in Figure 1 depicted the dynamics in the relationship between environmental turbulence, entrepreneurial orientation, and productivity in the nonprofit health-care environment based on a multidimensional approach. The approach is different from many of the models in the existing literature, which dealt with the forces of environment turbulence, entrepreneurial orientation, and productivity based on unidimensional approach (for example, Beaumont, 1997; Herzlinger, 2004; Ogum, 1990). R. A. Anderson and McDaniel (1992) exemplified another important distinction between the conceptualization applied in the current study and the existing body of literature.

Although R. A. Anderson and McDaniel (1992) focused on external factors such as suppliers, financial climate, government and regulatory control, public versus political domain, and external relationships, their study did not address internal dynamics between work groups such as management and nonmanagement nurses.

Accordingly, the environmental turbulence variable was captured in the current study as an independent variable comprising five dimensions: (a) uncertainty related to the financial climate, (b) uncertainty related to the level of intergroup competition, (c) uncertainty related to shifts in occupational requirements mandated by profession governing bodies, (d) uncertainty related to legislative activities, and (e) uncertainty related to technological change. Entrepreneurial orientation was captured as the other independent variable, comprising three dimensions: (a) innovation, (b) risk taking, and (c) proactiveness.

In the existing literature, researchers discussed the positive impacts of environmental turbulence and entrepreneurship on productivity in the for-profit environment (Birkinshaw, 1995; Covin & Miles, 1999; Wiklund, 1999). Relatively fewer studies were conducted with respect to the nonprofit environment, mainly outside of nursing (Morris, Coombes, & Schindehutte, 2007; Van Zyl & Mathur-Helm, 2007). Some researchers opposed the study of entrepreneurial orientation in relation to nurses; for example, McCuen (2006) contended that entrepreneurship in nursing should be dealt with from the standpoint of external entrepreneurship. McCuen's (2006) argument was rooted in the for-profit environment and cannot be extended to the current study, given the focus on the nonprofit health-care environment.

In the model depicted in Figure 1, it was conceived that a flexible organizational structure, along with a supportive leadership style, would be more conducive for entrepreneurial orientation to flourish. Flexibility and a supportive leadership style could promote the sort of creativity and innovation needed to achieve adaptive outcomes among employee groups. Adaptive leadership culture could also be maintained by promoting innovation, proactiveness, and risk taking through sustained efforts.

To better understand entrepreneurial orientation as conceptualized in Figure 1, one has to reflect contextually on the definition of terms provided in the current study, consistent with many of the views espoused in the literature. For example, McClelland and Liberman (1949) offered need for achievement as a narrow definition of entrepreneurship with respect to business owners. Schultz (1975) noted the term entrepreneur should not be limited to business owners but should also include "people who supply labour services for hire . . . and reallocate their services in response to changes in the value of the work they do" (p. 827). The definition of entrepreneurial orientation used in the current study was more consistent with Schultz (1975) and Sharma and Christman (1999).

Palmer (1971) applied risk taking, innovating, and decision making as distinguishing traits between entrepreneurs and nonentrepreneurs and offered trait as a way to test for entrepreneurship. Brockhaus (1980) defined entrepreneur as "a major owner or manager of a business venture who is not employed elsewhere" (p. 510). Brockhaus' (1980) definition extended entrepreneurship to include managers as agents of the business owner. Gartner (1985) expanded the scope of entrepreneurship to include an integrated measure of dimensions comprising (a) characteristics of the individual, (b) the organization, (c) the environment, and (d) business processes.

Sharma and Christman (1999) provided a definition for entrepreneurship that included "individuals or groups of individuals, acting independently or as part of a corporate system, which create new organizations, or instigate renewal or innovation within an existing organization" (p. 7). Dealing with the innovative aspect, Kreiser et al. (2002a) purported that the "use of aggregated measures of entrepreneurial orientation may conceal the true nature of the relationship that exists between each of the sub-dimensions" (p. 77). Kreiser et al. (2002a) proposed that innovation, risk taking, and proactiveness should be applied as independent factors for measuring entrepreneurial orientation. Although the works of many of these authors were important, the approach adopted by Kreiser et al. (2002a) was more reflective of the measurement of entrepreneurial orientation adopted in the current study.

Entrepreneurial orientation was captured as an independent variable based on a multidimensional construct comprising (a) innovation, (b) risk taking, and (c) proactiveness. Accordingly, the model depicted in Figure 1 was premised on the assumption that the right entrepreneurial orientation fit of employees could prompt employees to act in a manner consistent with high productivity when faced with complex and turbulent conditions. Also central to conceptualization is the assumption that positive leadership-followership exchange could support the cultivation of adaptive leadership culture as an emergent form in complex adaptive systems.

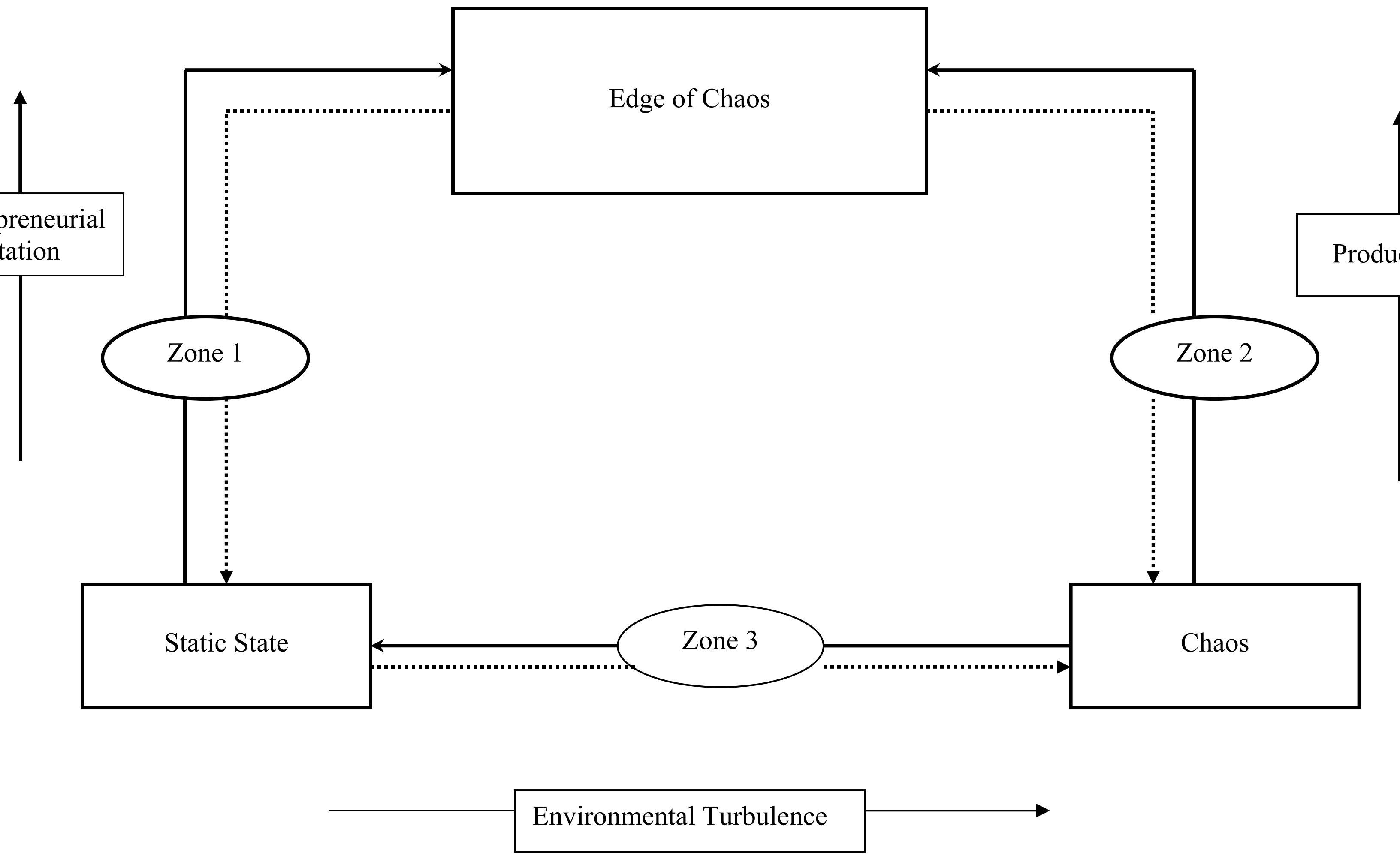
Lichtenstein et al. (2006) explained that in complex adaptive systems, the notion of leadership generally extended to include "innovative, contextual interactions that occur across an entire social system" (p. 2). Accordingly, the model presented in Figure 1 was premised on the systems adjustment that could take place in organizational dynamics when adaptive leadership is evoked. Lichtenstein et al. (2006) noted the relationship between agents should not be defined hierarchically, but rather as interactions among groups in complex adaptive systems, where employees participate as followers or leaders at "different times and for different purposes" (p. 3). Tan et al. (2005) discussed self-organizing properties associated with complex adaptive systems, which exist in the absence of any central control.

Consistent with Tan et al. (2005), positive interaction between management and nonmanagement nurses was implied in Figure 1, in which case employees could work as agents of their respective groups but focus invariably on attaining the objectives of the organization as a whole. Such interactions could promote high performance on the part of employee groups that function under an environment of positive adaptation. In contrast, negative adaptation could occur where no value is added along with a particular leadership-followership exchange.

Working environments of nurses typically range from relatively stable to chaotic. In the current study, it is conceived that the professional training of nurses is geared generally toward the achievement of positive adaptation in order to provide quality health-care services to patients. Lansing (2003) concluded professionals who work in chaotic environments use their professional training to mediate or alleviate fallouts from the chaos that surrounds them. Lansing (2003) referred to this concept as antichaos theory, and the conceptualization presented in Figure 2 is based on that precept.

Consistent with antichaos theory, three zones of leadership-followership exchanges were advanced in Figure 2 with respect to emergent events between management and nonmanagement nurses. Accordingly, the relative mixes for each of the three leadership-followership exchanges presented in Figure 2 were based on the degree of chaos or stability. Tan et al. (2005) noted that most innovations generally occurred at the edge of chaos. In the model presented in Figure 2, it was conceptualized that positive adaptive leadership would occur in Zones 1 and 2, given higher levels of entrepreneurial orientation and productivity. The model also depicted the effects of sustained environmental turbulence in which organizations respond to forces associated with the edge of chaos. The assumption is that organizations would nest their performance at the edge of chaos and not regress into chaos.

In antichaos theory, Lansing (2003) envisaged a situation whereby the self-organizing properties of interactive groups would prompt members to work together across boundary lines to the extent needed to steer the organization away from chaos into the edge of chaos. It is conceptualized in Figure 2 that three zones of leadership-followership exchanges underlie the interactive events that occur between management and nonmanagement nurses. Invariably, the events are governed by mediating forces of entrepreneurial orientation, environmental turbulence, and productivity that support high performance in Zones 1 and 2.



ure 2. Leadership-followership exchanges as antecedents of environmental turbulence, entrepreneurial orientation, and ductivity, displaying zones of intergroup collaboration premised on antichaos theory.

Zone 1 of leadership-followership exchange occurs in areas of low to high entrepreneurial orientation, low to high productivity, and low environmental turbulence, where the state of desired change originates from a static state and advances toward the edge of chaos. Zone 2 of leadership-followership exchange occurs in areas of low to high entrepreneurial orientation, low to high productivity, and high environmental turbulence, where the state of desired change originates from a chaotic state and advances toward the edge of chaos. Zone 3 of leadership-followership exchange occurs in areas of low entrepreneurial orientation, low productivity, and high environmental turbulence, where the state of desired change originates from a chaotic state and advances toward a static state.

Definition of Terms

Environmental Turbulence

Environmental turbulence is unsettling forces generated from both internal and external spheres of organizational interaction. Accordingly, the effects of environmental forces were measured in the current study based on five dimensions: (a) uncertainty related to the financial climate, (b) uncertainty related to the level of interunit competition, (c) uncertainty related to shifts in occupational requirements mandated by professional governing bodies, (d) uncertainty related to legislative activities, and (e) uncertainty related to technological shifts.

The definition adopted in the current study expanded on the definition offered by R. A. Anderson and McDaniel (1992), which although focused on external factors such as financial climate, government and regulatory control, public domain, political assets, and external relationships, did not adequately reflect the intergroup dynamics associated with leadership-followership regimes among groups such as management and nonmanagement nurses.

Entrepreneurial Orientation

Entrepreneurial orientation is the propensity of an individual to apply adaptive skills involving the use of innovative methods and the ability to generate new ideas, apply new approaches in a bold and calculated manner, and take forward-looking actions proactively while considering long-range impacts on the organization. Accordingly, effects of entrepreneurial orientation were measured in the current study as (a) innovation, (b) proactiveness, and (c) risk taking. The definition is consistent with Stevenson and Jarillo (1990), Kreiser et al. (2002a), and Schultz (1975). The definition is also closely aligned with the definition of entrepreneurship offered by Sharma and Christman (1990), who noted, "Entrepreneurs are individuals or group of individuals acting independently or as part of a corporate system, and create new organizations or instigate renewal or innovation within an existing organization" (p. 7).

Employee Productivity

Employee satisfaction was applied as a proxy for employee performance in the current study. The use of proxy is well established in the literature where, for example, Fritz (2006) applied growth as a proxy for performance. In conceiving the definition adopted in the current study, an indirect relationship was assumed between motivation and job satisfaction, consistent with McNeese-Smith (2001) and Ma et al. (2003) who established a positive relationship between satisfaction and the motivation of nurses to perform. In the context of the current study, satisfaction was assumed to have a positive influence on productivity, consistent with McShane (2006) and Milkovich and Newman (2005).

Leadership-Followership Exchange

Leadership-followership exchange is the leadership or followership roles assumed by individual employees who work as management and nonmanagement nurses. Leadership was applied within the context of complex adaptive systems associated with the working environment of nurses. The definition adopted in the current study cast leadership-followership exchange as an emergent event, consistent with Lichtenstein et al. (2006). According to Lichtenstein et al. (2006), under this sort of leadership-followership dynamic, employees could assume leadership or followership roles at different times and for different purposes based on their capacity to achieve adaptive outcomes for the greater good of all.

Nursing Stream of Work

Nursing stream of work was defined as the line of work undertaken by management and nonmanagement nurses, who act in regulated or unregulated capacities and who, at a minimum, completed the basic nursing program leading to a diploma or baccalaureate degree in nursing offered by recognized institutions of learning. Given occupational affinities common to the nursing stream of work, the assumption was made that all nurses, even at the level of managers and advanced nursing professionals, have acquired foundational training in basic nursing practice, consistent with the established standards of the Canadian Nurses Association (n.d.-c)

Nonmanagement Nurses

Nonmanagement nurses are regulated professional nurses who act as health-care providers or interventionists on a full- or part-time basis and are designated as a registered nurse, licensed or registered practical nurse, or registered psychiatric nurse. Nursing assistants were excluded from the nonmanagement group of nurses. Nursing assistants are unregulated, and did not meet inclusion criteria established for the study. The definition adopted is consistent with similar provisions by the Advisory Committee on Health Human Resources, which defined nurses as including registered nurses, registered psychiatric nurses, and licensed practical nurses (Health Canada, n.d.-f).

Management Nurses

Management nurses were defined as full- or part-time employees with advanced nursing background and experience who undertook one or a combination of responsibilities including assigning, supervising, and evaluating the work of other employees; having input or directly allocating and managing a financial budget; managing or leading project teams; or analyzing and recommending on health-care policy matters. Accordingly, the study included nursing unit managers and supervisors as well as advanced nursing practitioners and educators in this category. Foundationally, the definition took into consideration higher educational levels and experience of incumbents, which allowed them to leverage their expertise and competencies necessary to undertake complex challenges.

Assumptions

The researcher assumed that participants in the study understood instructions provided on the self-administered questionnaire. It was also assumed that the participants completed the instrument accurately and honestly based on individual opinions. In this regard, it was assumed participants were highly professional given foundational educational levels of a college diploma or baccalaureate degree at a minimum. It was further assumed the research instrument was appropriate and fit for the purpose for which it was intended. To this extent, the researcher-generated instrument was tested extensively for reliability and construct validity prior to being administered to the main survey group. Lastly, it was assumed that satisfaction would serve as an appropriate proxy for employee motivation, and thus productivity, consistent with existing literature.

Limitations

Initially it was feared the competing demand for nurses' time could limit the response rate to the questionnaire, given that they work hectic schedules in pressure-laden environments. It was also feared that the strict confidentiality guidelines and layers of internal administrative protocol that govern health-care workers could hamper the data-gathering process. For reasons of confidentiality, employee satisfaction was applied as a proxy for productivity in the current study, consistent with Fritz (2006).

A more profound limitation was the scarce literature on the impact of environmental turbulence and entrepreneurial orientation on productivity of nurses in nonprofit environments. This limitation prompted the development of the researcher-generated instrument for the purposes of the study. To ensure appropriate validity and reliability of the instrument, Cronbach's alpha scores were obtained consistent, with Baktas & Akdemir (2008) and Kartal & Ozsoy (2007).

Delimitation

The study was restricted to the University Health Network, which could potentially limit the generalizability. However, potential limitations were averted through the randomization of samples gathered from the three hospitals that comprised University Health Network (i.e., Toronto General Hospital, Princess Margaret Hospital, and Toronto Western Hospital). The study was also restricted to the nursing stream at the University Health Network, though many of the other allied health-care occupational streams could potentially serve as participants of similar studies. Lastly, the survey was based on a self-reporting approach that asked each participant to report on his or her beliefs rather than rely on observations by the researcher or other external interventionists.

Summary

Chapter 1 presented a background to the problem that the existing literature on the impact of environmental turbulence and entrepreneurial orientation on productivity focused largely on the for-profit environment (for example, Bou-Wen & Chung-Jen, 2006; Covin et al., 2006; Siemens, 2006; Van Zyl & Mathur-Helm, 2007; Wolff & Pett, 2006). Similarly, existing studies were predominantly firm-based (for example, Hornaday & Aboud, 1971; Wholey & Brittain, 1989), which rendered their measurement tools inappropriate for the person-based variables examined in the current study.

Chapter 1 revealed the existing body of work on environmental turbulence, entrepreneurial orientation, and productivity was largely unidimensional by design, and scores were aggregated rather than treated independently (for example, Covin & Slevin, 1988; Lawrence & Kraft, 1986; Miller, 1983; Miller & Friesen, 1983). The multidimensional approach applied in the current study was more appropriate to the leadership-followership schema association with adaptive leadership. Given the shortfalls in the existing literature, the researcher developed a measurement tool that was tested and refined prior to its application to a sample of management and nonmanagement nurses from the University Health Network.

Chapter 1 included an outline of the nature of the study, as well as the research questions and hypotheses. Theoretical frameworks were established as conceptual models that depicted leadership-followership exchange zones that emerged between management and nonmanagement nurses. The models took into account various forces of entrepreneurial orientation, environmental turbulence, and productivity as displayed through a range of stable to chaotic environments. The conceptual models were consistent with Lichtenstein et al. (2006) and served as embodiments of the concept of adaptive leadership. According to the conceptualized models, interdependent roles of participants in leadership-followership exchanges could facilitate the achievement of adaptive outcomes through innovation, proactiveness, and risk taking (Kreiser et al., 2002 b; Lansing, 2003; Lichtenstein et al., 2006; Tan et al., 2005).

An exhaustive literature research was carried out in support of the theoretical framework that shaped the conceptualized models presented. In all, over 200 peer-reviewed articles, doctoral dissertations, textbooks, and electronic publications by professional associations and practitioners were reviewed. Chapter 2 presents a detailed review of the literature relevant to the current study.

CHAPTER 2: REVIEW OF THE LITERATURE

Health care is publicly funded in the province of Ontario, Canada, like most provincial and territorial jurisdictions in accordance with the prescriptions of the Canada Health Act, which mandates accessibility and affordability of health care for all Canadians. A recent Health Canada report revealed the Canadian health-care system has become strained due to a number of factors, including fiscal constraint, high cost of technology, and changes in labor force demands (Health Canada, n.d.-e). These factors often manifest as turbulence in the environment for which organizations must find effective coping mechanisms (Wiklund, 1999). Solymossy (2000) noted individuals with entrepreneurial orientation have the risk taking and proactiveness propensities required to help their organization innovate and adapt to environmental turbulence.

To help organizations develop appropriate coping mechanisms, there is a need to explore the existing body of literature on the impact of environmental turbulence and entrepreneurial orientation on productivity. The focus of the current study was to examine such a relationship among the variables in the nonprofit health-care environment. In the preceding chapter, issues were raised with respect to the paucity of research information on the impact of environmental turbulence, entrepreneurial orientation, and productivity in the nonprofit health-care environment.

Some researchers have lamented the lack of consensus on the metrics with which environmental turbulence, entrepreneurial orientation, and productivity dimensions were measured (for example, Covin & Slevin, 1991; Gartner, 1988; Kreiser et al., 2002a; Miller & Friesen, 1982; Naman & Slevin, 1993; Stevenson & Jarillo, 1990). Chandler (2001) suggested the need for a focused study in the health-care environment that should explore causality in the relationships among environmental turbulence, entrepreneurship, and productivity. In this chapter, a review of the literature is presented that includes a discussion on environmental turbulence and entrepreneurial orientation as independent variables and productivity as dependent variable.

Independent Variables

Numerous researchers have written on the subjects of environmental turbulence (for example, Polley, 1997; Yusuf, 2002) and entrepreneurial orientation (Sharma & Christman, 1999; Siemens, 2006; Van Zyl & Mathur-Helm, 2007). Some researchers suggested the need for more studies that focused on the relationships among environmental turbulence and entrepreneurial orientation as determinants of performance (for example, Ashmos et al., 2000; Weaver et al., 2002). A review of the literature revealed various approaches adopted by researchers with respect to examining the impact of environmental turbulence and entrepreneurial orientation on productivity.

Some studies involved a unidimensional approach to examining the variables, while other researchers applied a multidimensional approach. Many of the studies investigated the impact of environmental turbulence on entrepreneurial orientation of organizations at the firm level. None of the existing studies specifically examined the impact of entrepreneurial orientation and environmental turbulence on the productivity of management and nonmanagement nurses in the nonprofit health-care environment.

A key part of the impetus for the current study was to understand adaptive capacities of management and nonmanagement nurses through the forms of leadership-followership exchanges that emerge between employees in the two groups. The working environment of nurses is considered complex and adaptive (P. Anderson, 1999), and is even more so in the case of the University Health Network, which provided the sample for the study. The organization consists of three major hospitals in an alliance relationship, each with a diverse focus in their health-care delivery specialization.

Perception and response to environmental turbulence stimuli could become more complex under conditions of alliance relationships involving highly specialized network organizations. Some interorganizational networks were presented in the literature, with much of the studies focusing on alliances and networks at the firm level (for example, Cravens, Shipp, & Cravens, 1993; Ford, Wells, & Bailey, 2004). None of the studies involved comprehensive studies on intraorganizational multidisciplinary relationships at the individual or group levels. And certainly none of the studies involved an examination of the variables with respect to management and nonmanagement nurses in the nonprofit health-care environment.

A multidisciplinary approach to the study of nursing groups was necessary for two reasons. First is the emphasis on collaborative health-care delivery given that nurses are increasingly compelled to work collaboratively with other professionals within and outside of nursing. White and Begun (1998) noted, “Nursing is recognizing the insularity of the profession and there is the need to form partnerships and alliances with other professionals in creating community-based health system” (p. 42). The second reason is the paucity of business research geared to the health-care environment, forcing nurses to adopt and apply foreign concepts from other areas of science and business on which they must rely for greater understanding. For example, more research activities on the subject of the impact of environmental turbulence and entrepreneurial orientation on productivity have been undertaken with respect to other disciplines such as business and organizational behavior, while research activities related to the health-care area remain scarce.

The paucity of research in health care with respect to entrepreneurial orientation, environmental turbulence, and performance outcomes was evidenced in the findings of the policy round table at the Academy Health 2003 Annual Research Meeting which stated,

> While there is copious research on team and team effectiveness, it is much less in health care than in other business environments. We need more because we are going to be forced to function more as teams, even though it is difficult sometimes to get health care professionals to work that way. (as cited in Hope, 2004, p. 3)

In expressing the need for more research, the Academy Health 2003 Annual Research Meeting also noted "there is value in understanding research on work environments more generally, but research very specific to nursing is needed too" (as cited in Hope, 2004, p. 3). The following is a review of the literature on environmental turbulence and entrepreneurial orientation.

Environmental Turbulence

The business climate related to the health-care industry is generally turbulent (R. A. Anderson & McDaniel, 1999; Madison, 2004), and turbulence and uncertainties arise from unforeseen changes in areas such as marketplace economics, legislative activities, technological changes, and consequently health-care administrative policies. The *Oxford English Dictionary* defined turbulence as anything that is indistinguishable and without form. Dolan et al. (2003) noted the word turbulence had its root in physics, and the term was generally applied in relation to high-intensity liquid forms that displayed random variations in time and space. Dolan et al. (2003) also noted that turbulence is applied in other subject areas as well to describe such things as unexpected changes, uncertainty, and lack of control associated with complex decisions and interdependencies.

The new economic reality has exerted an enormous pressure on the health-care system, which is continuously challenged with regard to providing quality health-care services to consumers in a cost-effective manner. Chan and Lynn (1998) noted, for example, that the health-care funding system that was once protected in Ontario and the rest of Canada for over 30 years started to unravel in the 1990s, bringing about a "stark new reality" (p. 1). Environmental turbulence constitutes a business risk that organizations have sought to abate by promoting entrepreneurial orientation.

Scott (1998) explained that organizations act to align their structures in order to fit the challenges posed by the external milieu. In response to the current economic situation in the health-care environment, which started in the early 1990s, employers were forced to lay off substantial numbers of health-care workers, including nurses, as a way to achieve stabilization through cost-abatement. This is consistent with the findings of White and Begun (1998), who noted, "Economic realities of the day have forced health care providers to respond with leaner and flatter structure . . . in order to improve quality outcomes" (p. 3). The problem is turbulence can be nonlinear and complex, requiring adaptive and comprehensive solutions.

Many researchers have called for the examination of open and adaptive structures in relation to complex systems (for example, P. Anderson, 1999; Ashmos et al., 2000; Dervitsiotis, 2003; Gupta & Govindarajan, 2004; Scott, 1998; Thompson, 1967; Weaver et al., 2002), and nonlinearity in environmental conditions (for example, R. A. Anderson & McDaniel, 2000; Arndt & Bigelow, 2000; Draman, 2004; Lanza, 2000; Montgomery, 2003; Montuori, 2000; Snowden, 2004; White & Begun, 1998; Yusuf, 2002). These studies all applied a firm-based approach and to that extent pointed to the need for a focused study on how organizations perceived threats and opportunities as viewed by both individuals and collectives in work teams to help organizations respond effectively to environmental turbulence. This need is perhaps more evident in the health-care environment where employees are increasingly urged to work collaboratively in multidisciplinary teams.

To adapt effectively to the new reality, health-care providers view themselves as part of a larger industry striving for survival within a complex adaptive system. Such considerations led many health-care organizations to form alliances and networks to allow for economies of scale (Madison, 2004). The network compositions vary widely and are dependent on each other for survival. There is a need to understand forces of environmental turbulence to develop an effective approach to survivability. The body of work on unidimensional and multidimensional approaches to the study of environmental turbulence is presented in the sections that follow.

Unidimensional Approach to the Study of Environmental Turbulence

Miller (1983) adopted the organic organization concept as a unidimensional approach to environmental turbulence. Based on the unique and central roles played by executives and organizational planners and their loci of control, Miller (1983) posited that in order to cope with environmental hostility, organizations should adapt by responding through the use of diverse contingencies. Miller (1983) noted the "more dynamic and hostile the environment, the more firms will be entrepreneurial . . . and that structure will importantly influence entrepreneurship" (p. 775).

Miller and Friesen (1983) defined dynamism as uncertainty characterized by the unpredictability of the actions of customers and competitors, and hostility as the degree of threat to the company from the intensity of competition and the upswing and downswing of the firm's principal industry. Although Miller and Friesen (1983) pointed to the use of subcomponents of environmental variables such as the degree of dynamism, hostility, and heterogeneity, the view was that these subcomponents should be aggregated, making them one and the same. However, the dimensions were only applicable at the firm level, as opposed to the person and group levels, which were more suited to answering the question posed in the current study.

Lawrence and Kraft (1986) developed a unidimensional environmental uncertainty model based on the relationship between the perceived and real environmental uncertainties. The model illustrated the extent to which managers proactively managed uncertainty and positioned the firm to influence its environment. Lawrence and Kraft (1986) posited that external environmental forces combined with internal conditions "have some impacts on performance" (p. 780). The model espoused by Lawrence and Kraft (1986) advanced the realization that strategic and structural decisions are important in fostering organizational performance. These decisions resided with managers to the exclusion of subordinates.

Covin and Slevin (1988) noted that levels of external hostility and environmental dynamism affected the success of firms. Covin and Slevin (1988) posited that high-performance firms had structures that matched the style of top management. In contrast, low-performance firms had structures that mismatched top management style. Covin and Slevin (1988) reported a positive effect on performance with respect to organically structured firms, contrary to the negative effects reported for mechanically structured firms. This particular approach, like those discussed so far, only addressed performance-related issues at the firm level to the exclusion of individual or occupational group levels.

A common theme emerged in the body of work presented, in terms of the unidimensionality in approach. The observation is that much of the pioneering work in the area of environmental turbulence appeared to be leader-centered and organization specific, which resulted in a focus of research at the firm level rather than an individual and group-centered approach to the study. The tenets of many of the early research works rested in exploring ways to enhance leadership abilities and administrative control. As organizations evolved from mechanistic to organic, many researches started to explore a multidimensional approach to studying environmental turbulence. The next section contains a discussion on relevant literature on multidimensional studies.

Multidimensional Approach to the Study of Environmental Turbulence

Much of the research involving the multidimensional approach to environmental turbulence was conducted from the late 1980s onward. Wholey and Brittain (1989) noted the conventional summary measures of instability did not capture all dimensions of environmental variation. Wholey and Brittain (1989) presented one of the early works in which this sort of argument was advanced. According to Wholey and Brittain (1989), the response of an organization to environmental turbulence depended on the longitudinal variation of the particular source of turbulence. Wholey and Brittain (1989) went on to state that the longitudinal experience of a particular organization over time allowed it to organize itself accordingly in areas such as product knowledge and related process, budget allocation, personnel, and other production factors.

The work of Wholey and Brittain (1989) built on the efforts of earlier researchers such as Dess and Beard (1984), who proposed the use of munificence, heterogeneity, and instability; Child (1972), who proposed temporaneity, magnitude, and predictability; and Hannan and Freeman (1977), who proposed the use of fine-grain-coarse-grain, concavity-convexity continua, and then predictability. While taking these findings into consideration, Wholey and Brittain (1989) purported that in sum, environmental turbulence measures only captured the amplitude of turbulence. On a broader scale, Wholey and Brittain (1989) posited that environmental turbulence consisted of the frequency, amplitude, and predictability components. Wholey and Brittain (1989) hypothesized that frequency, amplitude, and unpredictability were independent dimensions of environmental variation.

Unlike prior research efforts, which relied on management's perception of environmental turbulence on a unidimensional basis, Wholey and Brittain (1989) contended that objective measures should include amplitude, frequency, predictability, and instability as independent dimensions. Although the approach proposed by Wholey and Brittain (1989) was based on multidimensional measures, the focus of measurement nested in the financial domain solely, which made the approach unsuited to the nonmonetary focus in the current study given the nonprofit designation of the University Health Network.

In complementing the work of Wholey and Brittain (1989), Covin and Slevin (1991) also proposed a multidimensional model for measuring external dimensions of environmental turbulence, which included environmental technological sophistication, environmental dynamism, environmental hostility, and industry life-cycle stage. Covin and Slevin (1991) posited that the external environmental dimensions impacting the firm were an important concept in understanding the entrepreneurial stance assumed by the firm in response. Covin and Slevin (1991) argued against the germinal works of prior authors such as Bygrave and Churchill (1989), Hannan and Freeman (1977), Khandwalla (1987), Miller (1983), and Pfeffer and Salancik (1978), which did not completely exhaust the possibilities given the unidimensional approach Covin and Slevin (1991) adopted. Covin and Slevin (1991) instead proposed a bidirectional approach to the study of environmental turbulence as a unique approach of looking at their multidimensionality.

In subscribing to the bidirectional approach, Covin and Slevin (1991) noted, “Just as environmental conditions may prompt entrepreneurial postures, such postures could also induce a change in environmental condition as well, bringing about a ‘bi-directional relationship’” (p. 4). Covin and Slevin (1991) contended that on the whole, environmental conditions would likely have a greater impact on entrepreneurial orientation than vice versa, when viewed as independent variables. Although the bidirectional finding of Covin and Slevin (1991) was a significant contribution, the study did not take into account the deterministic properties of complex adaptive systems, which was more suited to the health-care environment that was the subject of the current study.

In a study on the impact of environmental turbulence on the design of nursing homes, R. A. Anderson and McDaniel (1992) proposed a multidimensional approach to measuring components of environmental elements independent of one another. The focus of R. A. Anderson and McDaniel’s (1992) research study was to ascertain the relationships between environmental turbulence and decentralization, participation, and professionalism. Although R. A. Anderson and McDaniel's (1992) study was conducted in relation to the activities of registered nurses primarily, the framework was based on a model in which the directors of nursing provided responses to the questions, to the exclusion of the nurses they supervised. The environmental elements consisted of suppliers, financial, government, and regulatory control. They also included public/political domain and external relationships.

The shortfalls in the R. A. Anderson and McDaniel (1992) approach were numerous in the context of the current study. First, R. A. Anderson and McDaniel (1992) relied on the perception of management and the nursing home administrators solely, who completed the questionnaires based on their beliefs. That approach was adopted in place of soliciting direct responses from the nurses with respect to their individual beliefs and attitudes. Second, the research focused on nursing homes operated solely in the for-profit environment.

Solymossy (2000) provided a different approach that included the study of the individual. Solymossy (2000) assessed environmental influence in terms of four dimensions, turbulence, hostility, complexity, and magnificence, while studying the relationship between individuals, venture, and environmental factors of success. Solymossy (2000) found that the principal elements of the study—the individual, firm, and environment—were all correlated, thereby supporting a multidimensional framework. Solymossy (2000) also reported evidence that suggested an "individual's attitudes had twice the effect upon the economic success of the venture than did the firm's characteristics . . . and conversely the firm's characteristics had twice the influence upon satisfaction of the entrepreneur as did individual attitudes" (p. 79). The expectation in the current study was for convergent forces to bring individual and firm forces in alignment with one another for purposes of achieving a highly productive and mutually beneficial output.

An important aspect of Solymossy (2000) was the assumption that all things being equal, a group of satisfied employees can be motivated to achieve high performance, thereby helping the organization attain productivity and profit objectives. To achieve that end, Solymossy (2000) further proposed that strange attractors would play a vital role in bridging the otherwise mutually exclusive objectives that exist between agents and principals. Accordingly, one of the precepts in the construct of the current study was that strange attractors would underlie the shared value systems that bind agents from different groups of employees.

Expanding on the findings by Solymossy (2000), Weaver et al. (2002) also proposed a multidimensional approach to environmental turbulence, but that work was based on four dimensions: general economy, technological volatility, competition, and inability to move into international markets. Weaver et al. (2002) relied on a combination of unidimensional measurements previously developed by Covin and Slevin (1988), Khandwalla (1977), and Miller and Friesen (1982) as a basis for the development of a combined multidimensional framework. That formed the basis for some of the arguments by detractors against the approach adopted by Weaver et al. (2002).

Detractors of the Weaver et al. (2002) approach purported that although the approach may have been based on a multidimensional approach, it was considered weak in the context of a true multidimensional construct for two primary reasons. First, Weaver et al.'s (2002) environmental turbulence measure was based on the perception of the manager, which had the potential to create adverse influence. Some of the managers' beliefs could be at divergence with the beliefs of the subordinate employees. Second, the dimension of the inability to move into international markets addressed a barrier to international markets. The problem is that such a dimension cannot be applied in the case of organizations that operate in noninternational markets.

Yusuf (2002) recommended a multidimensional model for measuring environmental turbulence based on four dimensions: uncertainty from government legislation, competitive uncertainty, technology, and access to financial capital. Yusuf (2002) agreed with Cyert and March (1963), Emery and Trist (1965), Galbraith (1973), Milliken (1987), and Thompson (1967) and noted environmental constructs should focus on the issue of uncertainty, unpredictability, ambiguity, and turbulence based on strategic fit. Yusuf (2002) hypothesized that environmental uncertainty was more associated with entrepreneurial orientation in the manufacturing sector than in the commercial sector. The drawback to the Yusuf (2000) study and others reviewed in this section was the failure to emphasize the complex adaptive in which most change occurs from a business perspective. The section that follows contains a review of the relevant literature on complex adaptive systems.

Complex Adaptive Systems

Smart and Vertinsky (1984) defined complexity as the "heterogeneity and range of activities relevant to organizational operations" (p. 200). The definition hinged on the decision process that organizations navigate to cope effectively with environmental turbulence. To that extent, Smart and Vertinsky's (1984) definition was consistent with those of earlier researchers (for example, Child, 1972; W. B. Simon, 1965). External forces that are at discord with internal processes of an organization limit the organization's ability to cope, which in turn leads to a diminished capacity on the part of the organization to compete effectively in the marketplace.

The dynamic system's property of organizations enables them to respond adequately to threats or opportunities in the marketplace. According to Polley (1997), under such conditions, a state of affair is developed between stability and instability, and then back to stability. Polley (1997) went on to note that the structural form that emerges assumes a trajectory that is based on the evolution of the waves over time. Relating this to the health-care environment, Crabtree (2003) noted that primary care practices are complex adaptive systems that face the need to respond to external and internal uncertainties. Because primary care is a subsystem in the health-care environment, the same assertion can be inferred in a broader sense through much of the health-care environment.

Organizational dynamism assumes many complex forms depending on the presence or absence of environmental turbulence. In light of this, organizational pathways can be defined by the degree of stability, instability, turbulence, or chaos in the environment. A key objective in the current study was to explore environmental turbulence and productivity at the edge of chaos, and the interactions that occur between management and nonmanagement nurses within the framework of the leadership-followership schema conceptualized. A discussion on the edge of chaos follows.

The term chaos derives from the Greek word *khaos*, which means formless matter (Ray et al., 1995). According to Holden (2005), the fundamental precepts underlying chaos theory were rooted in a 6th century approach by the ancient Greeks to provide questions regarding the form and essence of life. Thietart and Forgues (1995) noted that in the context of organizational studies, researchers in the natural sciences were interested in chaos theory as a way of explaining a system of random behavior that occurred even when driven by deterministic rules.

Thietart and Forgues (1995) credited the works of natural scientists such as Allen and Sanglier (1978), Artigiani (1987), Prigogine and Stengers (1984), and Ruelle (1991) for furthering a greater understanding of how chaos could lead to order in complex adaptive systems by organizing around strange attractors. Thietart and Forgues (1995) credited Ruelle (1991) in particular for coining the term strange attractors, which was later expounded upon by the butterfly wing flap effects of Lorenz (as noted in Haigh, 2002). According to Haigh (2002), by readjusting his weather observational instruments, Lorenz posited that the flap of a butterfly's wings could lead to the creation of wind patterns with the capacity to form large storms in other parts of the world. According to Thietart and Forgues (1995), the butterfly wings phenomenon gave credence to a much earlier mathematical model posited by Hadamard (1898) in relation to complexity science.

Adshead and Thorpe (2005) pointed to the self-organizing, deterministic, and nonreversible properties of complex adaptive systems in traversing the evolutionary course from order to disorder and back to order. In complex adaptive systems, the dynamic nonlinear, nonrepetitive, deterministic forms create emergence in the case of individual interactions (P. Anderson, 1999; Dolan et al., 2003). In this regard, Polley (1997) viewed turbulence as "an extremely complex dynamic made up of a large or infinite number of sources of variation" (p. 446). In furthering this view, Dolan et al. (2003) explained that the outcome of such interactions was unpredictable, given that evolution occurred not continuously but in spurts, which in turn could bring about some disproportionality in the cause-effect relations. P. Anderson (1999) provided an opposing view that predictability was possible in the short term.

Tan et al. (2005) noted most innovations generally occur at the edge of chaos where positive forces related to self-ordering, adaptation, and emergence were manifested. Tan et al.'s (2005) assertion was consistent with P. Anderson (1999), Grobman (2005), Huaxia (2007), Polley (1997), and Ray et al. (1995). In relating chaos to the caring and nurturing work of nurses, Ray et al. (1995) defined edge of chaos as "a dynamic, holistic, and reciprocal process that drives change and creative reordering" (p. 48). Polley (1997) pointed out that such changes were transformational and resulted in a new state of order. Siding with Polley, Grobman (2005) proffered that complex adaptive systems evolved to the edge of chaos, which he described as "close to the boundary between order and disorder" (p. 371). Grobman (2005) noted it was at the edge of chaos that organizations were most creative and more receptive to innovation and transformational change.

In the context of the current study, the edge of chaos was depicted in the conceptualized models presented in Figures 1 and 2 as residing between stability and chaos. The edge of chaos was delineated as comprising Zones 1 and 2 in the leadership-followership exchange, which are characterized by high productivity and high entrepreneurial orientation. In the models presented, innovation, risk taking, and proactiveness dimensions correlate positively. It was also conceived that nonmonetary satisfiers such as challenging and meaningful work, self-management, supportive leadership, and multidimensional skills dimensions correlate positively. According to Huaxia (2007), emergent properties of complex adaptive systems generally occur at the edge of chaos, characterized by wholeness, innovation, novelty, and irreducibility in terms of output results.

In health-care environments, highly complex and technologically advanced skills are desired of employees to facilitate the innovation process. Given the growing need to embrace technology in the health-care environment, critical input factors need to be considered by organizations even in the constancy of change. Critical factors related to human input are important in determining level of activities at the edge of chaos. Vertinsky & Smart (1984) noted a variety of elements that could potentially impact organizations in this regard and explained that episodic waves of change should be timed accurately in order to respond effectively to environmental forces.

Vertinsky & Smart (1984) explained that the time, along with the form and frequency, of an episodic wave would determine the extent to which a wave maintains its crest or dissipates. Put differently, the degree to which a wave represented a threat or opportunity, and the ability of an organization to respond in a timely fashion in either case, is related to the presence of strange attractors in the organization. To the extent that strange attractors are harmonized, they could in turn influence the speed and rate of change in organizations. Consider an organization with a culture of innovation, and assuming that the organization is well positioned in terms of its intellectual capital capacity, the ability of such an organization to ride the crest of a technological wave would be greatly enhanced by strange attractors in its value system. The greater the level of strange attractors, the more effective the adaptive outcomes would be.

P. Anderson (1999) noted that in an organization "agents comprise individuals, groups, or a coalition of groups. Each agent's behaviour is dictated by a schema, a cognitive structure that determines what action the agent takes at time 't,' given its perception of the environment at time 't'" (p. 3). According to P. Anderson (1999), in a complex adaptive system, an agent's schema may be guided by a set of rules. In the case of management and nonmanagement nurses, given their common occupational affinities, the differences in their respective set of rules could range from minor to significant depending on the accountabilities and responsibilities assumed by the agents. R. A. Anderson and McDaniel (2000) explained, "Improvision is a necessary condition when unfolding of the world is uncertain and the organization must have the capacity to respond to unanticipated circumstances" (p. 90). Dolan et al. (2003) noted that in complex adaptive systems, agents' schemata are guided by their willingness to reach shared ends, generate trust, show flexibility, develop creativity and innovation, simplify structures and rules, self-organize, and maintain high-quality relationships with others.

The point about reaching shared ends in a collaborative and cross-functional group setting is consistent with Dolan et al. (2003). It is also consistent with Arndt and Bigelow (2000) who suggested that through actions of group participants, the system as a whole "acquire[s] properties that transcend the contributions of individual members" (p. 36). The collaborative and cross-functional group work was also central to the findings of P. Anderson (1999), who pointed out that complex adaptive systems operate best under (a) self-organizing networks with connectivity between agents, (b) formation of new agents by recombining elements of the previously successful agents' activities, and (c) coevolution of agents.

Having embraced some aspects of the literature reviewed so far on complex adaptive systems, a major discordance with the model advanced in the current study stems from the use of perception of others in assessing attitudes and beliefs. This approach is typified by the works of R. A. Anderson and McDaniel (1999), Ashmos et al. (2000), Chan and Lynn (1998), and Weaver et al. (2002). By gathering data related to the beliefs and attitudes of subordinates from their directors, the implicit assumption was paternalistic.

R. A. Anderson and McDaniel's (1999) study was aimed at determining the relationship between the participation of registered nurses in decision-making and performance. In doing so, R. A. Anderson and McDaniel (1999) examined the performance outcomes of nursing home operations based on the beliefs and opinions provided by management. The approach adopted in the current study was based on the direct sampling of individual employees in their roles as valued contributors to overall goals and objectives of the organization. Solymossy (2000) asserted some differences in the schema between individuals and employee groups. Solymossy (2000) explained that the seemingly divergent schemata between groups assume some congruency based on strange attractors. Such congruencies are believed to be crucial to the sort of collaboration required to function effectively in cross-functional teams.

An issue of importance in achieving efficiencies in nurse groups involves some levels of collaboration, self-evolution, self-management, innovation, risk taking, and proactiveness (Spence-Laschinger et al., 2001). It is ironic that nurses are trained to observe strict sets of professional standards, yet work under conditions thought to be the least risk-tolerant. The training of nurses emphasizes an overwhelming sensitivity to patient needs as a paramount consideration, which brings into focus the issue of requisite complementarities and interdependabilities in the various organizational tasks. These tasks are defined by rigid structures in many cases, rather than allowing for more flexibility.

Higher levels of complementarities would require a high level of interdependence between the teams or project groups to achieve maximum outputs. In the patient-centered environment of nursing, objectives are bound to vary from time to time because no two patient cases are exactly the same. This reasoning demands greater flexibility and complementarities on a case-by-case basis. Complementarities should have the objective of achieving the greater good for all.

In complex adaptive systems such as those applicable to the working conditions of nurses, patient-centered projects should generally be short range, which is consistent with Dervitsiotis (2003). Carrolla and Burton (2000) contended that to achieve high levels of competitiveness, organizations should "divide work into smaller self-contained units . . . but each unit needs to collaborate for the greater good of the organization as a whole" (p. 332). The conceptualized models presented in the current study are based on the need to adopt inter- and intraunit collaboration for the nursing workforce. Work teams should be encouraged to self-manage, and provided the opportunity to leverage their competencies.

Carolla and Burton (2000) varied the number of group members in their research as well as the degree of interdependency between them, and the findings supported their proposition that "the degree of interdependency has a curvilinear effect on task performance" (p. 320). The result has significant implications with respect to the subjects of task variety versus specialization and how organizations could enhance overall outputs through cross-functional collaboration. Carolla and Burton (2000) built on an earlier work by Gresov (1989), which found that high task variability and uncertainty correlated with increased workflow. As a result Carolla and Burton (2000) proposed higher levels of horizontal communication, rather than vertical.

Continuing on from their important contribution, Carolla and Burton (2000) proposed that for "complex tasks, decentralized structures performed better than centralized structures" (p. 324). The issue of decentralization was examined in the context of how best to induce innovation and collaboration between work teams. The objective was to ascertain environments that supported innovation and creativity.

Dervitsiotis (2003) noted that complex adaptive systems must be open and dynamic to support innovation. Dervitsiotis (2003) also pointed out that organizations that operated at the edge of chaos generally have the capacity to self-organize and coalesce collaboratively through strange attractors that reside in the shared value systems. McDaniel, Jordan, and Fleeman (2003) noted, "When health care managers take a complexity science perspective, they see the possibility that surprises can be promising opportunities for new approaches to meeting organizational goals" (p. 267).

Dooley and Van de Ven (1999) found that chaotic organizational dynamics generally influenced the type of controls or cooperation present among the work units. Along with the strategy of developing an internal coping mechanism, many organizations in the health-care environment have adopted a strategy of forming alliances with other organizations as a way of coping. Boisot and Child (1999) proposed two modes of adaptation to complex environments: (a) complexity reduction, which entailed getting to understand the complexity and acting on it directly, including attempts at environmental enactment, and (b) complexity absorption, which entailed creating options and risk-hedging strategies through alliances.

Agreeing with this reasoning, Ashmos et al. (2000) asserted, "Organizations that perceive turbulence and pursue a complexity absorption response will outperform organizations that perceive turbulence and pursue a complexity reduction response" (p. 583). The notion was that inter- and intraorganizational collaboration and networks facilitated effective adaptation. The literature on these structural forms is presented in the following section.

Interorganizational and Intraorganizational Networks and Alliances

Ashmos et al. (1996) noted organizations should consider both internal and external complexities as a concerted response to environmental turbulence. In a later study, Ashmos et al. (2000) reported "the combination of goal complexity, strategic complexity, interaction complexity, and structural complexity all represent complexity absorption managerial response to environmental complexity" (p. 583). The literature on interorganizational and intraorganizational relationships is presented in the sections that follow.

Interorganizational Relationships

The literature search sounded a call by many researchers to consider interorganizational relationships as a way to respond to environmental turbulence (for example, Cravens et al., 1993; Ford et al., 2004; Madison, 2004; Topping, 1999). The researchers purported an interorganizational relationship was central to the long-term survivability of organizations. J. C. Anderson and Narus (1991) explained that the issues of cost reduction and the potential increase in value over time should also be considered among the reasons. Cravens et al. (1993) noted interorganizational relations were vertical, which allowed partners in an alliance relationship to be more competitive in the marketplace as a result of the mutual benefits derived.

Ford et al. (2004) noted that many health-care providers formed "integrated delivery systems under the umbrella of common ownership in order to gain sustainable competitive advantage" (p. 159). Madison (2004) posited that multihospital membership systems provided enhanced patient treatments and allowed member hospitals to reduce expenditures considerably. Topping (1999) studied network relationships between academic health centers and found that the benefits accruing to members centered on the development of integrated health-care systems capable of providing a full range of health-care services at a competitive price.

In terms of configuration, Cravens et al. (1993) developed descriptors consisting of four types of interorganizational relationships based on the extent of skill or resource gaps versus environmental turbulence or diversity. Cravens et al. (1993) denoted the typologies as comprising (a) in-house strategy, characterized by a low skill or resource gap and low environmental turbulence and diversity; (b) joint venture, characterized by a low skill or resource gap and high environmental turbulence and diversity; (c) acquisition or merger, characterized by a high skill or resource gap and high environmental turbulence and diversity. The tool was considered very useful in determining the best approach to interorganizational alliance building.

Ford et al. (2004) adopted a different approach to delineating a strategic alliance. Ford et al.'s (2004) case was based on the power relationship between the members of the alliance and the degree of formalization versus informalization in the membership arrangement. Drawing on the game theory concept, Ford et al. (2004) noted that "cooperative inter-organizational relationships generally emerge based on projections about other actors' behaviours, which when unrealized can lead to sub-optimal outcomes" (p. 161). The converse of this statement would be consistent with the use of positive economic benefits as motives for the development of interorganizational relationships as described by J. C. Anderson and Naurus (1991). Ford et al. (2004) described two types of strategic alliance networks: (a) a center-sponsored star characterized by the dominance of a central actor organization that links all other actors and (b) a wheel network with no particular central actor but a formation of actors all having a one-way link to one another. The next section presents the literature on intraorganizational relationships within work units.

Intraorganizational Relationships

Barney (1995) posited "a complete understanding of sources of competitive advantage requires the analysis of a firm's internal strengths and weaknesses" (p. 49). Barney (1995) proposed that organizational managers address four areas: (a) value, (b) rareness, (c) imitability, and (d) organizational structure. These areas are important in the context of using organizational competencies as a competitive edge in the marketplace. Similarly, Ashmos et al. (2000) preferred "organizations that perceive turbulence and complex environment and pursue a complexity absorption strategy will outperform organizations that perceive turbulence and complex environment but pursue complexity reduction response" (p. 583). Ashmos et al. (2000) identified four areas to explore with respect to complex environments: (a) goal complexity, (b) strategic complexity, (c) interaction complexity, and (d) structural complexity. Taken together, the works of Barney (1995) and Ashmos et al. (2000) were important regarding issues concerning organizational development and strategies for building intraorganizational collaboration and cooperation among employees.

Dimensions Used to Measure Environmental Turbulence

The tool adopted in the current study for measuring the impact of environmental turbulence was based on a multidimensional approach. The approach served as an alternative to the largely interfirm, employer-focused tools in the existing literature. The environmental turbulence dimensions were measured using a 5-point Likert-type scale, targeting five main areas:

1. Uncertainty related to financial climate (perception of economic impact on the health-care industry, perception of economic impact on the employer, thoughts on the extent to which economic conditions might enhance career opportunity, and thoughts on the extent to which economic conditions might threaten career opportunity)

2. Uncertainty related to level of intergroup competition (arising from a preference for decentralized organizational structure, preference for size of working groups and the composition of nurses and nonnurses, preference for self-management or governance of work teams, preference for knowledge sharing between members of work teams, need for trust, need for collaboration, need for cooperation, need for participation in decision making that impacts the organization, need to develop professional relationships with team members, need to develop professional relationships with other

employees in the organization, need to build professional networks with other nurses and nursing managers inside the organization, and need to build professional networks with nonnurses and nursing managers outside the organization).

3. Uncertainty related to shift in occupational requirements mandated by professional regulatory bodies (thoughts on the professional standards governing the nursing profession, thoughts on the need for higher educational and training requirements in the profession, thoughts on the need for continuous learning, preference for cross training between team members, and preference for knowledge sharing between team members).

4. Uncertainty related to legislative activities (thoughts on the impact of current legislative acts governing the health-care industry—protective versus inhibiting, thoughts on the impact of current legislative acts governing the nursing profession—protective versus inhibiting).

5. Uncertainty related to technological shift (preference for the use of computer technology, preference for the use of technologically advanced machines and equipment, and preference for employer-paid training in the use of technology).

Entrepreneurial Orientation

The term entrepreneur was derived from the French word entrepredre, meaning to undertake, and was introduced into the economic literature in 1734 by Richard Cantillon who identified three principal contributors to economic theory: (a) the landowner, (b) the entrepreneur, (c) and the worker who rented his services to the entrepreneur (as cited in Schultz, 1975). Although there were other important studies after Cantillon, such as the works of Joseph Schumpeter, John Stuart Mills, and Frank Knight, these were based on the early economic theory that focused on the firm level. It was not until much later that researchers started to emphasize the need to take into account differences in the propensities among entrepreneurs based on their traits and behavioral characteristics.

As one of the important early studies, Mills in 1848, offered a functional definition of entrepreneurship, which included directing, controlling, superintending, and risk taking as a way of distinguishing the business owner from the typical manager of a firm (as cited in Palmer, 1971). Furthering the work of Mills, Schumpeter, in 1934, argued from an economic standpoint that the owners and managers of already established businesses should be excluded from the definition of entrepreneur because these individuals were not viewed as responsible for the creation of new business (as cited in Hornaday & Aboud, 1971). From the modest beginnings in economics, entrepreneurship studies became associated with several areas including management, business, finance, and most recently the health-care environment. The push to develop a common definition and measurement for entrepreneurship was pursued unsuccessfully. To some degree, that continues to be the case.

Numerous definitions and instruments of measurement have been advanced with respect to the term entrepreneur. McClelland et al. (1953) offered the need for achievement as a narrow definition restricted to any man who had started a business. Building on McClelland et al.'s (1953) definition, Hornaday and Aboud (1971) defined successful entrepreneur, as "a man or woman who started a business where there was none before, and who had at least eight employees, and who had been established for at least five years" (p. 143). In measuring entrepreneurship, Hornaday and Aboud (1971) applied an aggregate form of tests with dimensions including need for achievement, need for autonomy, need for aggression, recognition, independence, and leadership.

Palmer (1971) described risk taking, innovating, and decision making as distinguishing traits “between entrepreneurs and non-entrepreneurs” (p. 36) and offered these traits as credible alternatives to testing for entrepreneurship. Brockhaus (1980) defined the term entrepreneur as “a major owner and manager of a business venture who is not employed elsewhere” (p. 510), thus broadening the definition of entrepreneur to include managers. Brockhaus (1980) carried out research to measure the risk propensity of managers and major business owners and reported that the scores between entrepreneurs and nonentrepreneurs were “not significantly different from each other” (p. 517), which refuted earlier works based on risk propensity including Mills (1848, as noted in Palmer, 1971).

Miller (1983) applied four multidimensional elements to measure the entrepreneurial orientation of firms, which constituted a shift away from the prevailing trait school at the time. The instrument measured the firm’s relationship to the product market, technological innovation, risk taking, and proactiveness. Miller (1983) applied an aggregate sum of the elements in determining the entrepreneurial orientation of firms and defined the entrepreneurial firm as “one that engages in product market innovation, undertakes somewhat risky ventures, and is first to come up with proactive innovations” (p. 771). Miller (1983) posited that dynamism and hostility require innovation and noted, “the more dynamic and hostile the environment, the more firms will be entrepreneurial” (p. 775). The shift by Miller (1983) toward a firm-focused study supported an earlier effort by Miller and Friesen (1982), in which the researchers examined the differences between conservative and entrepreneurial firms while applying innovation as the dependent variable.

Rather than focusing on the individual or firm, Gartner (1985) expanded the scope of entrepreneurship to include an integrated measure of dimensions comprising (a) characteristics of the individual, (b) the organization, (c) environment, and (d) business processes. Along with the expanded definition of entrepreneurship, Gartner (1985) provided eight elements as comprising the characteristics of venture creators: need for achievement, locus of control, risk taking, job satisfaction, previous work experience, entrepreneurial parents, age, and education. Gartner's (1985) study was based on survey population comprised of students, which explained the reason for the use of predictors such as age, education, and entrepreneurial parents as a basis for distinguishing between entrepreneurs and nonentrepreneurs.

As the research on entrepreneurship progressed, interest started to grow in many areas including individual and corporate entrepreneurial orientations, which prompted Wortman (1982) to develop an integrated typology for fostering empiricism in the field of entrepreneurial research. Wortman (1982) provided a typology for classifying person-firm entrepreneurial status of organizations. Following the work of Wortman (1982) there was a move from trait to behavioral attributes of entrepreneurs.

Gartner (1988) purported the trait approach to entrepreneurial research had been unfruitful and urged a move toward the behavioral approach. Accordingly, Yusuf (2002) proposed a definition of entrepreneurship based on a behavioral-situational approach. The approach accentuated the role of individuals in an entrepreneurial role rather than the focus on managers and business owners in earlier studies. Stevenson and Jarillo (1990) defined entrepreneurship as “a process by which individuals either on their own or inside organizations pursued opportunities without regard to the resources they currently control” (p. 23).

On the subject of opportunity, Stevenson and Jarillo (1990) noted, “Not only the success rate but every amount of entrepreneurial behaviour will be a function of the employees’ subjective ability to exploit opportunities” (p. 24). From that point on, the notion of individuals other than managers and business owners as entrepreneurs became more acceptable. On that ground, Sharma and Christman (1999) expanded on the definition of entrepreneurs by noting, “Entrepreneurs are individuals or group of individuals acting independently or as part of a corporate system, and create new organizations or instigate renewal or innovation within an existing organization” (p. 7).

While Stevenson and Jarillo (1990) took the approach of individuals as a focus of their behavior-oriented study of entrepreneurship, Covin and Slevin (1991) decided to continue with the firm-level study of entrepreneurial orientation. Covin and Slevin (1991) based their definition on four dimensions, (a) risk taking, (b) competitively aggressive, (c) proactivity, and (d) product innovation, and noted, “Firm performance was a function of the organizational as well as the individual level behavior . . . could affect an organization’s actions and in many cases the two will be synonymous” (p. 2). The statement was a strong basis for the development of employer-employee entrepreneurial fit models.

The concept of entrepreneurial fit was also conveyed by Naman and Slevin (1993), who applied the aggregate scores of three dimensions to measure entrepreneurial style: (a) willingness to take business risk, (b) willingness to be proactive, and (c) willingness to innovate. In an attempt to make a link between entrepreneurial orientation and environmental turbulence, Naman and Slevin (1993) provided a model of entrepreneurial fit, which had environmental turbulence as the driving force. Naman and Slevin (1993) theorized the nature of environmental turbulence encountered impacted other variables such as entrepreneurial style, organizational structure, mission strategy, and financial performance. Building on that momentum, Lyon, Lumpkin, and Dess (2000) provided a contingency approach that incorporated process, structure, and behavior. Naman and Slevin (1993) described entrepreneurial orientation based on five elements: (a) aggressive, (b) innovative, (c) proactive, (d) risk taking, and (e) autonomy seeking. The study was consistent with similar dimensions applied in a much earlier study by Lumpkin and Dess (1996).

The three factors innovation, risk taking, and proactiveness served as common elements in relation to the body of work reviewed. However, debate exists regarding the dimensionality of entrepreneurial orientation and whether the scores for the component parts should be aggregated. For example, Lumpkin and Dess (1996) noted the subunits of entrepreneurial orientation might vary from one another. The need to reconsider entrepreneurial orientation constructs was again raised by Dess et al. (1999), who noted that entrepreneurship might benefit from new applications. The observations by Dess et al. were consistent with Covin and Slevin (1991), who noted that entrepreneurial orientation models should be tested "through independent examination of their component parts . . . as the models are composed of multiple constructs representing several levels of an organizational system" (p. 19).

Kreiser, Marino, and Weaver (2002b) purported the "use of aggregated measures of entrepreneurial orientation may conceal the true nature of the relationship that exists between each of the sub-dimensions of the construct and their important variables in the nomological network of which they are a part" (p. 77). Kreiser et al. (2002b) hypothesized that "innovation, risk taking, and proactiveness are unique sub-dimensions of an entrepreneurial orientation" (p. 76) and "the dimensions of the Covin and Slevin entrepreneurial orientation measure based on innovation, risk taking, and proactivity may vary independently of one another" (p. 77). In their conclusion, Kreiser et al. (2002b) noted the "three dimension solution received significantly better model fit than either the one dimension or two dimension solution" (p. 79).

Based on the findings of Kreiser et al. (2002b), much of the research activities in the area of entrepreneurial orientation started to apply the three dimensions of risk taking, innovation, and proactiveness independent of one another to a greater degree (for example, Weaver et al., 2002; Yusuf, 2002). Based on these precedents, the current study adopted the same approach with respect to the independent measurement of innovation, risk taking, and proactiveness, which were applied as subelements of entrepreneurial orientation a priori. The researcher opted to apply risk taking interchangeably with risk management to emphasize the need for a knowledge-based and informed decision-making approach on the part of health-care workers who operate in largely risk-averse environments. The next section presents the dimensions used to measure entrepreneurial orientation in the current study.

Dimensions Used to Measure Entrepreneurial Orientation

Three entrepreneurial orientation dimensions were applied in the current study: innovation, calculated risk taking, and proactiveness. A 5-point Likert-type scale was used to capture the scores. Definitions of the dimensions are presented below.

Innovation: thoughts on trying new approaches to doing work, thoughts on the usefulness of technology in the accomplishment of assigned tasks, and willingness to apply high technology as a means of accomplishing complex tasks.

Risk taking: propensity for trying new but promising approaches in spite of the absence of guarantees to the outcome, belief that learning is achieved through calculated risks, and propensity for exercising initiative in paths that are untested but considered promising.

Proactiveness: propensity for doing things ahead of everyone else, propensity for assessing long-range outcomes in relation to current actions, and propensity for planning ahead of time.

Dependent Variable

Productivity

Successful job performance in the workplace holds both intrinsic and extrinsic values, based on the satisfaction derived by employees. When administered effectively, such levels of satisfaction lead employees to feel a sense of accomplishment (Henderson, 1997; Long, 2002; Milkovich & Newman, 2005). These studies established that satisfaction derived by workers in the performance of work was a function of the extent to which their needs were met, which then served as a source of motivation leading to enhanced productivity. Generally, the productivity of employees is stated as a measure that expresses the ratio of output to input. For productivity to be maximized, it would have to lead to a resultant increase in output in relation to the input or a decrease in the input in the instance where no increases in output exist (Bruce, 1995). In the case of nurses, studies have shown satisfaction to be positively related to motivation and productivity (for example, Ma et al., 2003; McNeese-Smith, 2001).

One of the problems faced by health-care organizations is the nonuniversal definition of terms such as satisfaction that differ between individuals, just like productivity, which continues to be defined in an organizational-specific manner. No common practice exists across business environments on this subject. Hirschey and Pappas (1993) noted the measurement of worker productivity "is an important challenge facing all managers" (p. 376) and asserted that employers must consider productivity from a multidimensional point of view to accurately measure allocative efficiency. Many researchers have also espoused a multidimensional approach to measuring productivity specific to the work of nurses (for example, Kendall, 2003; Spence-Laschinger et al., 2001).

There was also an argument between the proponents of economic versus noneconomic approaches to measuring productivity. McNeese-Smith (2001) and Baumol, Blinder, and Scarth (1994) made economic arguments in relation to productivity. Moody (2004) viewed productivity with respect to nurses as the "efficiency with which the input of nursing tasks, along with other labour tasks, materials, and equipment are converted into goods and services delivered within the health care environment" (p. 1). Ma et al. (2003) noted that productivity could be defined in either output or input terms, as well as by the performance levels needed to achieve organizational efficiency. The value-addedness imparted is central to the issue of productivity measurement in relation to individual and group performance. This variable should therefore be measured integratively, with each value-laden dimension identified through a valid and reliable manner.

Hader (1999) posited that an integrative measure of productivity can also be determined based on the performance appraisal process. Organizations must rely on the composite assessment of performance rendered, as determined by the job doer, supervisor, or customers (Hader, 1999). Multiple modes of performance assessment are believed to add more validity to performance outcomes, based on a 360-degree approach. This is germane to nurses who interact with treating physicians, patients, and their relatives and at the same time consult with other health-care and information technology professionals. While the patterns of such encounters may not repeat themselves on a regular basis, the need exists for nurses to maintain a multidisciplinary awareness of sources that may impact their work.

The multidisciplinary approach to health-care delivery is underscored by the need to conduct direct and indirect nurse-patient activities in an efficient and timely manner. For example, productivity can be measured as time or cost expended or as a function of labor cost per unit of patient or per case served. This way it could be possible to achieve productivity increases between two measurement periods by either accomplishing the same output with diminished input or accomplishing significantly more output relative to the same input levels.

During the turbulent economic conditions that started in the early 1980s, many nurses suffered layoffs or redeployment. Although much of the literature on the productivity of nurses has adopted an economic meaning to productivity, health-care organizations do not operate purely on marketplace economic theory, especially in the nonprofit sector. Organizations in the health-care industry faced with environmental turbulence have adopted entrepreneurial orientation alignments best suited to the achievement of effective employee-employer fit.

To ensure allocative efficiency, some employers in the health-care environment have adopted various financial measurements of productivity, such as return on investment, cost of unit of innovation, and economic value addedness. Others have adopted less financial means of productivity measurement, such as the balanced scorecard. With respect to the purely financial approach, the problem is that most nurses do not work just for the monetary reward. Contrary to this assertion, most of the decisions to layoff surplus nurses are based on economic arguments.

According to Baumol et al. (1994), the retention of nurses is not tenable economically in instances when marginal cost is not at least equal to marginal utility and price. It is generally believed that nonmonetary satisfiers could be applied as motivational items to induce productivity in nurses. The next section reviews the relevant literature on employee motivation, job satisfaction, and productivity.

Motivational Theories and Job Satisfaction of Nurses

Maslow (1970) noted, “The individual is an integrated, organized whole” (p. 19). Maslow (1970) also pointed out that the appearance of a drive and the action it arouses are related in terms of the ability of organizations to motivate employees. Certain factors can induce employees to undertake the performance of a job when appropriate satisfiers are present.

The absence of appropriate satisfiers, or inappropriate ordering of inducements, could lead to dissatisfaction on the part of the employees. As nurses continue to grow professionally, the role of individuals as ambassadors of the profession is often achieved through quality patient care. Based on the work of Maslow (1970), appropriate satisfiers should be identified and put in place to achieve the desired levels of motivation on the part of individual nurses. In 1995, the American Nurses Association proposed that job satisfaction should be measured and established as a nurse-sensitive indicator that should be reflective of the contributions of nurses to the quality of patient care (cited in Best & Thurston, 2004).

Hader (1999) espoused a nursing philosophy that stated "each nurse has the personal responsibility to deliver high quality patient care. This should be founded on established nursing standards and practices, emphasizing education, leadership, practice skills and clinical competence" (p. 3). Hader (1999) went on to explain that "the registered nurse is responsible for delegating the delivery of care to others as well as motivating him/her self to deliver and maintain care that best demonstrates the mission, vision, and values . . . through professional excellence and personal concern" (p. 3). While professional excellence is important in all areas mentioned by Hader (1999), the notion of leadership demonstrable at both nonmanagement and management levels of nursing is desirable. The sort of leadership espoused by Hader (1999) is more likely if organizations would embrace adaptive leadership culture and encourage innovation on the part of employees.

The employee-environment-task relationship and the degree of entrepreneurial orientation exerted continue to receive attention in the literature. It was thought in this regard that productivity models for nurses could incorporate environmental turbulence and entrepreneurial orientation factors in an integrated manner. Dochterman et al. (2001) used the nursing intervention classification as a basis for describing actions performed by nurses and the extent to which they were entrepreneurially oriented.

Gonzalez-Torre, Adenso-Diaz, and Sanchez-Molero (2002) conducted a quantitative study of nurses' work activities and found that on average only 31% of nursing work directly related to patients, 45% related to clinical and indirect care, and 10% related to nonclinical activities. Another 10% related directly to preparing therapies, while approximately 4% was spent on indirect tasks such as correcting mistakes, counts, and so forth. Based on these findings, Gonzales-Torre et al. (2002) proposed six steps for analyzing the minimum use of nursing staff in health-care environments: (a) estimate the time needed to execute the nursing task, (b) calculate the average number of activities per patient, (c) calculate the theoretical staff based on historical data, (d) calculate the historical ratio, (e) calculate the quality of the results based on the ratio, and (f) calculate the minimum staff required.

The work of Gonzalez-Torre et al. (2002) provided some clarity with respect to variables that impact the motivation of nurses. However, mediating factors such as environmental conditions and professional and individual characteristics were not factored into the Gonzalez-Torre et al. (2002) study, making it unsuited for performance measurements at the employee level. Such differentiating factors at the employee level are particularly crucial when the Gonzalez-Torre et al. (2002) model is applied to determine staff requirements founded on allocative efficiencies.

Other facets of the relationship among motivation, productivity, and job satisfaction have been explored in the literature with respect to nurses. For example, Spence-Laschinger et al. (2001), upon studying the impact of burnout on nurses in hospitals, found that perceived autonomy, control, and physician relationships influenced job satisfaction and quantity of patient care.

Larrabee, Rosswrum, and Zhang (2003) concluded that dissatisfaction was a predictor in the decisions made by individuals regarding whether or not to leave the nursing profession. In this case, a link was established between occupational stress endured by nurses, reported cases of burning out, and the decision of nurses to leave their occupation. AbuAlRub (2004) found that perceived social support from coworkers enhanced the level of performance in nurses, which in turn decreased the level of job stress.

The shortfall in the work of AbuAlRub (2004) was addressed somewhat by the prior findings of Kendall (2003), who identified autonomy, interpersonal communication, collaboration, professional practice, administrative practice, managerial practice, status, recognition, job or task requirement, opportunity for advancement or promotion, pay, and working condition or physical environment as factors that impact employee job satisfaction. Kendall (2003) noted that “individual workers bring a variety of needs, values, and perceptions to the work environment . . . and that these may influence their job satisfaction” (p. 1).

McNeese-Smith and Crook (2003) found that nurses who were in the top one third of job satisfaction scores expressed more creativity, and many were assessed as having management inclination. Those at the bottom one third scored higher in terms of economic returns. In an earlier but related study, McNeese-Smith (2001) found that nurses with higher job satisfaction and job related skills also had significantly higher performance ratings than their coworkers. An earlier study by Pinkerton (2001) indicated that scheduling was the number one dissatisfier for management nurses. Kerfoot (2002) suggested that nursing managers should empower their subordinates in new and different ways, perhaps by having their subordinate nurses focus on managing self and managing others.

Best and Thurston (2004) found ward relationships, teamwork, and collegiality were the greatest predictors of overall satisfaction, compared to external control, autonomy, and pay. Best and Thurston (2004) also found an inverse relationship between job satisfaction and poor communication, routinization, and stress. On the dissatisfaction side, the study found age, role ambiguity, and workload to be correlated with nursing burnout. In terms of empowerment, the findings indicated a correlation with job satisfaction. Although the correlational and descriptive statistics Best and Thurston (2004) employed were useful, the statistics did not address strength relationships between productivity, environmental turbulence, and entrepreneurial orientation. The relevant literature on productivity is presented in the section that follows.

Productivity Measurement

Employee productivity was defined in the current study as the measure of work output by an individual or group of employees. With this definition, a direct relationship between employee productivity and job satisfaction was assumed in accordance with the findings of McNeese-Smith (2001) and Ma et al. (2003), which showed positive relationships between satisfaction and the motivation of nurses. The definition applied in the current study implied interchangeability between productivity and employee satisfaction as a proxy.

Employee productivity was captured in the current study based on six dimensions: (a) challenging and meaningful work, (b) self-management, (c) supportive leadership, (d) multidimensional skills, (e) preference for individual-based reward system, and (f) preference for group-based reward system. The next section describes the context and setting under which employee satisfaction and productivity could manifest.

Context

The Environment

The issue of how to provide quality health care on a sustainable basis continues to be of concern in many jurisdictions and nations around the world, including Canada. Many of the concerns relate to the high cost of maintaining quality health care for consumers. In Canada, the state of the health-care system became threatened by chronic underfunding starting in the 1980s. A recent report by Health Canada on the health-care funding levels in Canada revealed the government of Canada assumed about 72.7% of the health-care funding. The private sector environment provided the balance of 27.3% of the required funding (Health Canada, n.d.-c).

As a result of the turbulence in the financial climate, organizations have sought ways to adapt. Many have responded to turbulence through a variety of measures, which included internal restructuring and forming interorganizational networks and alliances. An example is the University Health Network, Toronto, Canada, which consists of an alliance between the Toronto General Hospital, Princess Margaret Hospital, and the Toronto Western Hospital. The next sections address specific environmental contexts such as economic, legislative, and interorganizational frameworks with respect to the University Health Network.

Economic Context

The Canadian federal government provides health-care funding to the provinces and territories, including Ontario, through the Canada Health and Social Transfer system. According to information published by Health Canada, the projected growth of the federal government transfer payments to the provinces reached $40.3 billion by 2005 and 2006 (Health Canada, n.d.-d). Another publication by Statistics Canada on health-care expenditures, by type, revealed that in 2003 the federal government of Canada spent about $121.4 billion on health care (Statistics Canada, n.d.-a). Of that amount, hospital expenditures constituted approximately $36.4 billion, physician payments totalled $15.5 billion, and drug costs were approximately $19.6 billion (Statistics Canada, n.d.-a). According to the report, the total expenditure in 2003 represented approximately a 7.1% increase from 2002. In relation to the gross domestic product, the 2003 health-care expenditure represented about 10%, which marked an increase of approximately 2.04% over the 2002 health-care expenditure level as a percentage of the gross domestic product.

The CIHI noted that the government of Canada spent an average of $3,839 per person on health care in 2003 (CIHI, n.d.-c). According to the publication, the health-care expenditure in 2003 translated to about $3,503 per person in the province of Ontario (CIHI, n.d.-c). The steady increase in the levels of health-care expenditure became a point of significant concern for successive governments in Canada, prompted by the high costs of medical technology and drug formulary that continued to outpace inflation.

The popular press reported that the financial constraints arising from the economic downturns in successive years led to the provincial governments in Canada advocating a national drug plan that should be funded largely by the federal government. The provisions of the Canada Health Act guide the health-care partnership between the federal government of Canada and its provincial counterparts. The next section addresses some of these provisions, along with related legislation enacted by the province of Ontario to capture the intent of the Canada Health Act.

Legislative Context

The Canada Health Act was passed in 1984 and replaced the Hospital Insurance and Diagnostic Services Act and the Medical Care Act. To ensure compliance, the Canada Health Act set some very stringent conditions that provinces must meet to qualify for funding under the Canada Health and Social Transfer System (Health Canada, n.d.-d). The mechanism facilitated the transfer of cash payments by the federal government to the provinces under the insured health services program, administered by Canada Health, with the aim of ensuring that Canadian citizens and residents received reasonable access to medically necessary services.

The Canada Health Act provides shared responsibility on the parts of the federal and provincial governments. As a precondition for funding under the shared arrangement, the provinces must ensure their health insurance plans are (a) run on a nonprofit basis by a public authority, (b) universal, (c) comprehensive, (d) portable, and (e) accessible (Health Canada, n.d.-e). The provinces are viewed as noncompliant in the instance of an infringement in any one of these areas. Similarly, any practices on the part of the provincial governments that allowed for extra billing and user fees are viewed as noncompliant under the Canada Health Act. Breaches on the part of the provincial governments are punishable by mandatory dollar-for-dollar deductions in the amount of transfer payments or other discretionary punishments that may be imposed by the federal government commensurate with the gravity of the offence.

To administer health-care-related transfer payments from the federal government, the provincial governments in Canada have all set up their own legislative instruments. In Ontario, the Ministry of Health and Long Term Care has jurisdiction over the legislative guidelines meant to ensure compliance. To this extent, the Ministry of Health and Long Term Care has enabled the creation of programs such as the Ontario Health Insurance Program and the Ontario Drug Plan.

The Ministry of Health and Long Term Care regulates hospitals and nursing homes and coordinates other health services in Ontario. Two separate acts were passed by the Ontario government to regulate private and public hospitals in the province: the private hospitals are regulated under the Private Hospitals Act while the public hospitals are governed by the Public Hospitals Act. The latter act applies in the case of the University Health Network, because the Toronto General Hospital, Princess Margaret Hospital, and the Toronto Western Hospital are all publicly funded. In the case of publicly funded hospitals, the Ministry of Health and Long Term Care provides incentives to promote operational efficiencies on the part of the health-care providers (Ontario Ministry of Health and Long Term Care, n.d.-a).

The Ontario Ministry of Health and Long Term Care has achieved efficiencies in the health-care system by streamlining administrative protocols, in which some cost savings were realized by interorganizational networks and alliances (Ontario Ministry of

Health and Long Term Care, n.d.-b). Section 6(3) of the Public Hospitals Act stated, "the Minister may direct the boards of two or more hospitals to amalgamate under the Corporations Act" One such example involved the University Health Network, created in 1998 under Schedule F of the Health Services Restructuring Act, as an amendment to the Ministry of Health Act. The next section discusses the University Health Network in terms of the interorganizational partnerships and network alliances within the context of the current study.

Interorganizational Context

The University Health Network was formed in 1999 as an alliance between three hospitals: the Toronto General Hospital, Princess Margaret Hospital, and the Toronto Western Hospital. According to a publication by the University Health Network, the reasons for the alliance were in response to: (a) the restructuring of health care funding; (b) availing themselves of ongoing advances in biotechnology; (c) the impact of information technology; (d) the growing role of patient as partner in health care; and (e) changing demographics of the patients (University Health Network, n.d.-b). The University Health Network was built on a partnership among members who were independent at the onset, but became interdependent and interactive with respect to the business relationship. The members' shared values consisted of caring, excellence, teamwork, innovation, integrity, and leadership and a vision to achieve global impact (University Health Network, n.d.-b).

Together the University Health Network has approximately 11,000 employees, and about 3,000 are nurses. The Ontario Hospitals Association listed approximately 41 hospitals and health centers in the Toronto area, which represented 22.4% of 183 hospitals and health centers in province of Ontario listed by the Ontario Hospital Association. Hospitals and health centers in Ontario are zoned into five regions, and the three establishments constituting the University Health Network all fall within Region 3, which includes Metro Toronto, Durham, Peel, and York (Ontario Hospital Association, n.d.).

The historical backgrounds and records of achievement of the three partners in the University Health Network are quite unique. The Toronto General Hospital dates back to 1812, founded during the war against the United States of America. The hospital is one of the premier health-care establishments in the world, with an impressive record that includes being the place where the first successful single and double lung transplants were carried out in the world and where insulin was first developed and administered in the ongoing quest to find a treatment for diabetes. As well, the Toronto General Hospital currently serves as the largest immunodeficiency clinic in Canada. In 2002-2003, the hospital had about 16,420 admissions and 28,065 emergency visits. Along with these were 9,938 surgeries, 560 kidney dialysis cases, and 233 organ transplants (Toronto General Hospital, n.d.).

Princess Margaret Hospital and the Toronto General Hospital merged their oncology services under the University Health Network arrangement to maximize their respective operations. The Princess Margaret Hospital is a teaching hospital affiliated with the University of Toronto and serves as one of the premier cancer treatment centers in the world. The hospital dates back to 1952 when it first opened as Ontario Cancer Institute. The Princess Margaret Hospital currently serves over 10,000 outpatients a year in relation to diagnosis and treatment activities.

The Princess Margaret Hospital is one of the top health care centers in the world in the area of bone marrow transplant and was the first to perform transplants between unrelated donors—allogeneic transplants. In 2002-2003, the hospital performed 170 autologous and 81 allogeneic transplants. In the same period, the hospital had 161,000 ambulatory clinic visits, 8,000 transfusion center visits, 24,600 chemotherapy visits, and 1,600 cancer day surgeries (Princess Margaret Hospital, n.d.).

The Toronto Western Hospital was founded over 100 years ago, and is the third partner in the University Health Network. The hospital is a world leader in neurosciences, while providing technologically advanced health care in the areas of musculoskeletal health and arthritis as well as community and population health. The hospital has maintained very high expertise in areas such as interventional neuroradiology, image-guided brain and spine surgery, delicate hand reconstruction, precise retinal repair, and complex arthroplasty.

The Toronto Western Hospital is a 250-bed academic health science center and serves more than 380,000 patients annually through its walk-in clinics. The hospital is a teaching hospital affiliated with the University of Toronto and conducts numerous research activities under 194 medical doctors, including world-renowned directors such as Dr. St. George-Hyslop, internationally recognized for his work on the genetics of Alzheimer's disease. In 2003-2004, the hospital performed a total of 12,000 surgeries, including 597 hip and knee replacements. During that period, ambulatory and emergency visits of 385,000 and 46,000 were recorded, respectively.

Setting

The three hospitals allied under the University Health Network are all located in the Metropolitan City of Toronto, Canada (University Health Network, n.d.-a). Toronto is the capital city of Ontario and serves as the economic engine of Canada. In 2001, Ontario had a population count of 11.5 million and a population density of 12.6 people per square mile. In the same year, Toronto had a population count of 4.7 million, with population density of 793.3 people per square mile. The median age of the residents in the City of Toronto was 36.2 years, compared to 37.2 years for the entire province of Ontario (Statistics Canada, n.d.-b).

The hospitalization figures for Ontario in 2001 were 1.1 million people, compared to 2.9 million for the country as a whole. Average length of hospital stay during the same period was 6.5 days in Ontario, compared to 7.3 days countrywide (CIHI, n.d.-b). In 2001-2002, there were 254,752 registered nurses in Canada and approximately 34.1% of the nurses worked in Ontario. Of the number of nurses employed during the 2001-2002 period, about 59.7% worked in hospitals. According to the Canadian Nurses Association (n.d.-b), the ratio of practicing registered nurses to the Canadian population in 2001-2002 was 1:136 persons.

Target Population

The University Health Network had an employee count of 11,000 in the 2002-2003 periods. The company's record indicated approximately 3,000 of the employees during this period were nursing staff, including 150 classified as management nurses, practitioners, clinicians, and specialists (University Health Network, n.d.-b). The researcher drew on a sample of 300 nurses from a frame of about 3,000 nursing staff in the three locations of the organization.

Inclusion criteria were as follows: (a) being employed by one of the three hospitals that constituted the University Health Network; (b) nonmanagement nurses, defined as full-time or part-time regulated professional nurses who act as health-care providers or interventionists and were designated as registered nurse, licensed or registered practical nurse, or registered psychiatric nurse (nursing assistants were excluded from this group of employees due to their nonregulatory status); (c) management nurses, defined as full- or part-time employees with advanced nursing backgrounds and experience, who assigned, supervised, and evaluated the work of other employees; had input or directly allocated and managed a financial budget; managed or led project teams; or analyzed and made recommendations on health-care policy matters. The management nurses group included nursing unit managers and supervisors, as well as advanced nursing practitioners.

Given that practicing nurses in Ontario share a vastly common community of interest occupationally, and are governed by the same accreditation and licensing standards administered by the Ontario Nursing Association, a simple random sampling method was applied for targeting the 300 participants from the sample frame. Burns and Bush (1998) noted the simple random sampling method guaranteed that "every member of the population has a known and equal chance of being selected; therefore, the resulting sample, no matter what the size, will be a valid representation of the population" (p. 365). Burns and Bush (1998) illustrated this by using the relationship between population size, confidence level, and the probability of selection. The formula presented by Burns and

Bush noted that the probability of selection was equal to the sample size divided by population size. In the current study, the sample size was 300, the population size was 3,000, and therefore the probability of being selected was 300/3,000 = 10%.

Conclusion

The literature revealed two schools of thought with respect to the study of environmental turbulence: a unidimensional approach and a multidimensional approach. Approaches in the existing literature focused predominantly on the for-profit sector, were firm-based, and were unidimensional in design. Scott (1998) noted organizations acted to align their structures to achieve a structural fit that could withstand challenges arising from environmental turbulence. Most of the definitions on environmental turbulence in the literature were centered on the level of hostility, dynamism, and uncertainty in the external environment (for example, Covin & Slevin, 1988; Lawrence & Kraft, 1986; Miller, 1983; Miller & Friesen, 1983).

Many of the unidimensional studies concluded that organizational performance during periods of environmental turbulence would be more favorable when strategic actions of companies are aligned with the managers' perceptions. For example, Lawrence and Kraft (1986) noted that when real versus perceived environmental uncertainties were taken into consideration, performance was higher in organizations that positioned themselves proactively in accordance with the managers' desirability of uncertainty. Covin and Slevin (1988) asserted that high-performance companies were those in which organizational structure matched the top management's style.

The literature revealed that from about the 1980s onward, there has been a shift in the approach to studying environmental turbulence. Much of the research adopted a multidimensional approach. For example, Wholey and Brittain (1989) purported conventional summary measures of instability did not capture all the dimensions associated with environmental variation. Wholey and Brittain (1989) posited dimensions of environmental instability should be measured independently in terms of their amplitude, frequency, and predictability.

While agreeing with the multidimensional approach, Covin and Slevin (1991) proposed a measure based on technological sophistication, environmental dynamism, and industry life cycle stages. In the same vein, R. A. Anderson and McDaniel (1992) proposed multidimensional variables and included the effects of financial situation, government and regulatory control, public and political domain, and external relationships as independent measures, with respect to the health-care environment. The problem was that R. A. Anderson and McDaniel (1992) mainly focused on the for-profit sector.

Some of the later research activities were multidimensional, but focused on the firm level, just like the unidimensional approach prior. Solymossy (2000) found that the characteristics of the individual, firm, and environment all acted together as factors of success. Solymossy (2000) provided supporting evidence that indicated an individual's attitude had twice the effect upon the success of the venture as did the firm's characteristics. That finding advanced the need not only to explore environmental turbulence at the multidimensional level, but also to ensure that the contingencies governing the firm-individual-environmental fit were all understood.

The literature revealed the need to understand the relationship between environmental turbulence, entrepreneurial orientation, and productivity of nurses.

Underlying that drive was recognition of the complex adaptive systems in which nurses work (R. A. Anderson & McDaniel, 1999; Topping, 1999; White & Begun, 1998). It was also revealed that interorganizational relationships defined by alliances and networks were effective in dampening the impact of environmental turbulence externally; however, a paucity of research information existed with respect to adaptive leadership and the coevolution that emerges between management and nonmanagement nurses at the edge of chaos.

While much of the work on environmental turbulence focused on external complexities, there was also an indication of a growing body of work that suggested to be successful organizations must consider composite strategies for coping with environmental turbulence (for example, Ashmos et al., 1996, 2000). This school of thought includes finding viable solutions to internal and external complexities.

Definitions for entrepreneurship varied widely in the literature, as did the instruments of measurement. The domains of the entrepreneurship literature ranged from individual versus collectivist inclinations to creation of new venture company versus adding value to existing organizations, to business ownership versus total involvement of employees. The literature also ranged between small organizations and corporate entrepreneurship, trait versus behavioral, innovative versus conservative, and to process versus output oriented.

The early focus in entrepreneurship research was on economic contribution at the firm level (for example, Cantillo, 1734, as cited in Schumpeter, 1949) as well as the need for achievement, offered as a measurement for entrepreneurship by McClelland (1953). Two defining characteristics were advanced for entrepreneurship from the early studies:

the creation of business and the assumption of risk (for example, Mills, 1948, as cited in Schumpeter, 1949; Palmer, 1971). Early measurements for entrepreneurship were based on the trait approach, and the dimensions included the need for achievement, need for autonomy, need for aggression, recognition, independence, and leadership (Hornaday & Aboud, 1971). Palmer (1971) added dimensions such as risk taking, innovating, and decision making, while Miller (1983) added relations with the product market, technological innovation, risk taking, and proactiveness as dimensions for measuring the level of entrepreneurship at the firm level.

Stevenson and Jarillo (1990) provided a definition for entrepreneurship that focused on the process by which individuals, either on their own or inside organizations, pursued opportunities. The work by Stevenson and Jarillo (1990) set the stage for the growing acceptance in the literature for the definition of entrepreneur, which then included individuals other than managers and business owners. Sharma and Christman (1999) sided with the findings of Stevenson and Jarillo (1990) with respect to the characterization of individuals and groups other than managers and business owners as entrepreneurs.

Given the works of Stevenson and Jarillo (1990) and Sharma and Christman (1999), aspects of entrepreneurial fit between the individual and firm were pursued in a comprehensive way by Covin and Slevin (1991) and Naman and Slevin (1993), which led to the advancement of three dimensions for the measurement of entrepreneurial orientation: willingness to take business risk, willingness to be proactive, and willingness to innovate. These became the commonly accepted dimensions in the literature for the measurement of entrepreneurship. Accordingly, the three dimensions were applied in the current study, a priori. Further arguments in favor of a multidimensional approach rather than an aggregate approach to the measurement of entrepreneurship were advanced by Covin and Slevin (1991) and sided by Dess et al. (1999), Kreiser et al. (2002a), and Lumpkin and Dess (1996).

Productivity as a dependent variable was treated as an output rather than an input variable in much of the literature. Ma et al. (2003) noted that productivity could be defined in input or output terms. Hirschey and Pappas (1993) purported that worker performance must be measured from a multidimensional point of view to accurately capture the extent to which labor must be allocated efficiently to achieve satisfaction. Siding with Hirschey and Pappas (1993), the researcher adopted satisfaction as a proxy of productivity in the current study.

The literature revealed a variety of performance measures, ranging from financial to nonfinancial measures. Many of the financial metrics were based on specifications such as return on investment, cost of unit innovation, and economic value addedness. The American Nurses Association proposed that job satisfaction be applied as a nurse-sensitive indicator with respect to nurses' contribution to the quality of health care (as noted in Best & Thurston, 2004). Hader (1999) had earlier espoused the use of multidimensional productivity measurements in this regard. Based on the work of Hader (1999), Spence-Laschinger et al. (2001) found that perceived autonomy, control, and physician relationship influenced job satisfaction and the quality of patient care. Kendall (2003) also indicated that autonomy, interpersonal communication, collaboration, professional practice, status, recognition, job or task requirement, and opportunity for advancement impacted job satisfaction of employees.

McNeese-Smith (2001) noted that nurses with higher job satisfaction and job-related skills had significantly higher performance ratings than their coworkers. Based on McNeese-Smith's (2001) study, job satisfaction was applied in the current study as a proxy for productivity. Accordingly, the satisfaction factor in the current study was derived in relation to four nonmonetary reward systems that constituted satisfiers to management and nonmanagement nurses. The assumption was that with these in place, the productivity of employees would be generally enhanced, manifesting in value-addedness through superior job performance by employees.

Summary

In this chapter, an extensive review of the literature was undertaken with respect to two independent variables—environmental turbulence and entrepreneurial orientation. In addition, an exhaustive literature review was undertaken with respect to productivity as the dependent variable. Satisfaction was applied as a proxy for productivity. The reviews were undertaken within the context of the current study, which was to examine the relationship between environmental turbulence, entrepreneurial orientation, and productivity as manifested by the leadership-followership interaction between management and nonmanagement nurses. The literature review aimed to synthesize opposing views in the extant literature with respect to the focus of the current study and provide relevant theoretical conceptualizations in support of the study.

The literature revealed two opposing views with respect to studying environmental turbulence. The first was based on a unidimensional approach (for example, Covin & Slevin, 1988; Lawrence & Kraft, 1986; Miller & Friessen, 1983), and the second was based on a multidimensional approach (for example, Bygrave, 1989;

Solymossy, 2000; Weaver et al., 2002). The research on complex adaptive systems was also explored and revealed the need for open and adaptive structures (for example, P. Anderson, 1999; Ashmos et al., 2000; Dervitsiotis, 2003; Gupta & Govindarajan, 2004; Scott, 1998; Thompson, 2003; Weaver et al., 2002) and pointed to the nonlinearity of environmental factors (for example, R. A. Anderson & McDaniel, 2000; Arndt & Bigelow, 2000; Draman, 2004; Lanza, 2000; Montgomery, 2003; Montuori, 2000; White & Begun, 1998; Snowden, 2004; Yusuf, 2002).

The literature review on entrepreneurial orientation revealed several schools of thought beginning with the economic-man argument advanced by Schumpeter (1949), and the need-for-achievement school posited by McClelland (1953). Following these early works, research moved to the business ownership approach proffered by Hornaday and Aboud (1971), and then to the innovative-man approach exemplified by Palmer (1971), who considered entrepreneurship as involving risk taking, innovating, and decision-making. The individual approach adopted in the current study was more reflective of the work of Sharma and Christman (1999), who stated, “Entrepreneurs are individuals or group of individuals acting independently or as part of a corporate system, and create new organizations or instigate renewal or innovation within an existing organization” (p. 7).

The body of work on employee productivity was tied to the level of satisfaction derived by employees. Successful job performance in the workplace was found to hold both intrinsic and extrinsic values for employees, which led to the feeling of a sense of accomplishment (Henderson, 1997; Long, 2002; Milkovich & Newman, 2005). Satisfaction was tied to motivation by Maslow (1970) and in the case of the health-care environment, satisfaction was positively related to motivation and productivity (for example, Ma et al., 2003; McNeese-Smith, 2001). Given the difficulty of directly measuring employee productivity in the health-care environment, the current study adopted satisfaction as a proxy for productivity, consistent with Fritz (2006), who applied growth as a primary proxy for performance. Chapter 3 will present the methodology used to test the hypotheses advanced in the dissertation, which helped to answer the research questions posed in the study.

CHAPTER 3: METHOD

The aim of the current study was to examine the impacts of environmental turbulence and entrepreneurial orientation on the productivity of management and nonmanagement nurses in the nonprofit health-care environment. In this regard, the dissertation included an investigation of the predictive values of environmental turbulence and entrepreneurial orientation dimensions when applied as independent variables with respect to productivity as the dependent variable. Lastly, the current study included an exploration of the emergent properties of adaptive leadership between management and nonmanagement nurses in the nonprofit health-care environment within the context of complex adaptive systems. The research design and appropriateness of study are discussed in the next section.

Research Design and Appropriateness of Design

Environmental turbulence was an independent variable and defined as adverse impacts associated with five environmental turbulence dimensions. The dimensions comprised (a) uncertainty related to financial climate, (b) uncertainty related to the level of intergroup competition, (c) uncertainty related to shifts in occupational requirements mandated by professional governing bodies, (d) uncertainty related to legislative activities, and (e) uncertainty related to technological shifts. Value scores for environmental turbulence dimensions were captured based on 15 questions contained in the self-administered survey questionnaire developed by the researcher. A 5-point Likert-type scale was applied in the measurement.

Entrepreneurial orientation was the second independent variable and defined based on three dimensions: (a) innovation, (b) risk taking, and (c) proactiveness. Value scores for entrepreneurial orientation were captured based on 10 questions contained in the self-administered survey questionnaire developed by the researcher. A 5-point Likert-type scale was applied in the measurement.

Employee productivity was the dependent variable and defined based on six dimensions: (a) challenging and meaningful work, (b) self-management, (c) supportive leadership, (d) multidimensional skills, (e) preference for individual-based reward system, and (f) preference for group-based reward system. Value scores for employee productivity were captured based on 10 questions contained in the self-administered survey questionnaire developed by the researcher. A 5-point Likert-type scale was applied in the measurement.

Employee satisfaction was applied as a proxy for productivity in accordance with Ma et al. (2003) and McNeese-Smith (2001), who described a positive relationship between satisfaction and the motivation of nurses to perform. Consequently, the definition applied in the current study for employee productivity implied interchangeability with employee satisfaction. The assumption was that a satisfied employee will be more motivated to perform, all things equal.

The researcher surveyed 284 nonmanagement nurses and 16 management nurses from the University Health Network in Toronto, Ontario, Canada. Data gathered were analyzed statistically to answer three research questions and to address the corresponding hypotheses.

Research Questions

Three research questions guided the study: (a) Are there significant relationships in the multidimensional elements that constitute environmental turbulence, entrepreneurial orientation, and productivity, as perceived by management and nonmanagement nurses? (b) Can the relationships among multiple dimensions of environmental turbulence and entrepreneurial orientation be applied as independent variables in the prediction of productivity as the dependent variable for management and nonmanagement nurses in significant ways? (c) Are there significant correlations in the perceptions held by management and nonmanagement nurses with respect to the impacts of environmental turbulence and entrepreneurial orientation on productivity that could indicate the emergence of adaptive leadership between the two groups?

The answers to the research questions contribute to the understanding of strength relationships or causality among the dimensions of environmental turbulence, entrepreneurial orientation, and productivity as perceived by management and nonmanagement nurses. The outcome of the investigation could also help policy makers and health care administrators develop performance models that would foster adaptive leadership and enhance productivity in the health-care environment.

Null Hypotheses

To answer the research questions, the following null hypotheses were tested with productivity as the dependent variable, while environmental turbulence and entrepreneurial orientation were applied as independent variables.

Null Hypothesis $H_0$1a: There is no significant relationship among the multidimensional factors of entrepreneurial orientation (innovation, risk taking, and proactiveness) as perceived by nonmanagement nurses.

Null Hypothesis $H_0$1b: There is no significant relationship among the multidimensional factors of entrepreneurial orientation (innovation, risk taking, and proactiveness) as perceived by management nurses.

Null Hypothesis $H_0$2a: There is no significant relationship among the multidimensional factors of environmental turbulence (uncertainty related to the financial climate, uncertainty related to the level of intergroup competition, uncertainty related to shifts in occupational requirements mandated by professional governing bodies, uncertainty related to legislative activities, and uncertainty related to technological shifts) as perceived by nonmanagement nurses.

Null Hypothesis $H_0$2b: There is no significant relationship among the multidimensional factors of environmental turbulence (uncertainty related to the financial climate, uncertainty related to the level of intergroup competition, uncertainty related to shifts in occupational requirements mandated by professional governing bodies, uncertainty related to legislative activities, and uncertainty related to technological shifts) as perceived by management nurses.

Null Hypothesis $H_0$3a: There is no significant relationship among the multidimensional factors of productivity (challenging and meaningful work, self-management, supportive leadership, multidimensional skills, preference for individual-based reward system, and preference for group-based reward system) as perceived by nonmanagement nurses.

Null Hypothesis $H_0$3b: There is no significant relationship among the multidimensional factors of productivity (challenging and meaningful work, self-management, supportive leadership, multidimensional skills, preference for individual-based reward system, and preference for group-based reward system) as perceived by management nurses.

Null Hypothesis $H_0$4a: There is no significant predictive relationship among multiple dimensions of entrepreneurial orientation and environmental turbulence when applied as independent variables in the prediction of productivity satisfiers for nonmanagement nurses.

Null Hypothesis $H_0$4b: There is no significant predictive relationship among multiple dimensions of entrepreneurial orientation and environmental turbulence when applied as independent variables in the prediction of productivity satisfiers for management nurses.

Null Hypothesis $H_0$5: There is no significant difference between the means for management and nonmanagement nurses based on relationships among the multidimensions of environmental turbulence, entrepreneurial orientation, and productivity that may indicate the emergence of adaptive leadership at the edge of chaos.

The analyses to test the hypotheses involved (a) multiple correlational analyses to establish strength relationships among the multiple dimensions of environmental turbulence, entrepreneurial orientation, and productivity with respect to management and nonmanagement nurses based on two-tailed analysis of the Pearson correlation values; (b) multiple regression analyses to determine significant predictors among the independent variables entrepreneurial orientation and environmental turbulence, and assess their influence on the dependent variable productivity with respect to management and nonmanagement nurses, at the $p < .05$ significance level; and (c) *t*-test analyses to determine whether the differences between management and nonmanagement nurses' perception of environmental turbulence, entrepreneurial orientation, and productivity could be supported or rejected at the $p < .05$ significance level.

Population

The total population of staff at the University Health Network who perform nursing and nonnursing work was approximately 11,000 employees. Of these, 2,850 were nonmanagement nurses and 150 were management nurses, for a total survey frame of approximately 3,000 employees.

Informed Consent

Informed consent forms were designed in accordance with the University Health Network Research Ethics Board guidelines (see Appendixes A and B) and completed by selected survey participants. The consent forms provided participants with background information on the research as well as the purpose, procedure, risks, and benefits of participating. The participants were advised that participation was voluntary and that they could withdraw at any time if they chose not to participate in the study, without any penalty or loss of benefits.

Sampling Criteria

Survey participants were randomly selected from a list provided by the human resources department at the University Health Network. The groups identified for the study were selected from the employee population designated as nonmanagement nurses and the management nurses. Nonmanagement nurses were defined as regulated professional nurses who act as health-care providers or interventionists on a full- or part-time basis and are designated as a registered nurse, licensed or registered practical nurse, or registered psychiatric nurse.

Nursing assistants were excluded from the nonmanagement group of nurses. Nursing assistants are unregulated and did not meet inclusion criteria established for the study. The definition adopted was consistent with one offered by the advisory committee on health human resources, which defined nurse to include registered nurses, registered psychiatric nurses, and licensed practical nurses (Health Canada, n.d.-f).

The definition of management nurses included full- or part-time employees with advanced nursing background and experience with one or a combination of responsibilities including assigning, supervising, and evaluating the work of other employees; having input in or directly allocating and managing a financial budget; managing or leading project teams; or analyzing and recommending on health-care policy matters. Accordingly, the study included nursing unit managers and supervisors as well as advanced nursing practitioners and educators in this category. Foundationally, the definition took into consideration the high educational levels and experience of the job incumbents, which allowed them to leverage their expertise and competencies at a more complex level.

Sampling Frame

The size of the sample frame comprising management and nonmanagement nurses was computed based on the confidence interval and percentage approach espoused by Burns and Bush (1998). To calculate the proper size, three factors should be considered: (a) variability believed to be in the population, (b) the desired accuracy, and (c) level of confidence required (Burns & Bush, 1998). Based on these considerations, the following equation offered by Burns and Bush (1998) was applied in the calculation of sample size for management and nonmanagement nurses:

$$n = z^2 (pq) / e^2,$$

where n is the sample size, z is the standard error associated with the chosen level of confidence, p is the estimated variability in the population, $q = (100 - p)$, and e is the accepted error. The following assumptions were made in the determination of sample frame: $z = 1.96$, which was the value associated with 95% confidence level and $p = 80$ and $q = 20$, given low variability in the basic technical training shared by nurse. Thus, the sample frame size was calculated as follows:

$$n = 1.96^2 (80 \text{ x } 20) / 5^2 = 6144/25 = 246.$$

A final frame size of 300 was chosen, reflective of a decision to oversubscribe to account for attrition factors in the nursing stream. The reasons applied in determining the ratio of management to nonmanagement nurses are outlined next.

The records of the University Health Network indicated there were 2,850 nonmanagement nurses to 150 management nurses at the time the study commenced; the ratio of management to nonmanagement nurses was computed as 2,850/150 = 19 (i.e., 19:1). Thus, given that a total of 300 was selected, then (a) the number of management nurses sampled translated to 300 / 19 = 16; and (b) the number of nonmanagement nurses sampled translated to 300 – 16 = 284.

Confidentiality

Informed consent forms distributed to participants included a section on confidentiality. The confidentiality section stated that no personal identifiers would be gathered as a part of the study except those that pertained to position title, occupational classification, unit location, and unit phone numbers for follow-up purposes. Informational items obtained during the study were held in strict confidence, and participants' responses were assigned code numbers only. The participants were also assured that no names or personal identifiers would be used in any publication or presentations and that the researcher would not transfer any information identifying the participants outside of the United Health Network. Consequently, the researcher stored data electronically in the internal computer systems of the University Health Network and analysis was done using a computer protected by password and firewall. The computer disks and hard copies of drafts were locked up in a safety box by the researcher and will be destroyed in 7 years, in accordance with the data-gathering protocol of the United Health Network Research Ethics Board.

Geographic Location

The study involved nurses and management nurses randomly selected from the three hospitals that comprise the University Health Network, located in Toronto, Ontario, Canada. The locations were the Toronto General Hospital, Princess Margaret Hospital, and the Toronto Western Hospital.

Instrumentation

A work values survey instrument was designed specifically for the dissertation (see Appendix C). The instrument contained four parts. The first part dealt with general information such as job title, length of years in current position, management or nonmanagement status, educational level, and hospital location (see Appendix C, Section I). These sets of information were used as identifiers and descriptors in relation to occupational and educational characteristics of the sampled groups.

The second part of the instrument measured entrepreneurial orientation as an independent variable using three dimensions: innovation, risk taking, and proactiveness.

These dimensions were consistent with the findings in the extant literature on entrepreneurial orientation outlined in chapter 2. Entrepreneurial orientation in the instrument was measured using 10 elements (see Appendix C, Section II). The instrument was based on a 5-point Likert-type scale outlined in Table D1 in Appendix D.

The third part of the instrument measured environmental turbulence as an independent variable, based on five dimensions: uncertainty related to financial climate, uncertainty related to intergroup competition, shifts in occupational requirements mandated by governing bodies, uncertainties brought about by legislative activities, and uncertainties associated with technological changes. These dimensions were identified in relation to the beliefs of participants with respect to the five dimensions. Environmental turbulence was measured using 15 elements in the instrument applied (see Appendix C, Section III). The instrument was based on a 5-point Likert-type scale outlined in Table D1 in Appendix D.

The fourth part of the instrument measured employee productivity using six dimensions: challenging and meaningful work, opportunity to self-management, supportive leadership, benefits of multidimensional skills training, preference for individual-based reward system, and preference for group-based reward system. These dimensions were identified in relation to the beliefs of participants. Employee productivity was measured in the instrument using 10 elements (see Appendix C, Section IV). The instrument was based on a 5-point Likert-type scale outlined in Table D1 in Appendix D.

Validity and Reliability

The content and construct validities for the research instrument were established based on feedback, suggestions, and opinions received from two nurse practitioners in the health-care field and a human resources management professional. All the participants were carefully selected for field-testing, given their subject matter expertise. For purposes of content validity, these individuals were asked to comment on the structure and layout of the survey instrument in terms of the clarity of the survey instructions, readability, ease of understanding, question sequence, and completion time.

Based on the general comments received, more simplified words were applied in the self-administered survey questionnaire using, for example, greater syntax along with more explicit instructions to guide participants. Many of the questions were restructured to more accurately capture the perceptions of the participants, in line with the comments. To this extent, phrases such as "I believe . . ." "I feel . . ." and "I find . . ." were used in restructuring the questions to directly reflect the beliefs of respondents.

One of the field-test participants suggested some of the questions should be rephrased as well to capture the essence of the dimensions in terms of their importance and gravity. For example, ET004 was reworded from " I believe it is important . . . so that it can respond appropriately to government rules" to read "I believe it is important . . . so that it can respond appropriately to legislative changes." The reason in this case was to reflect the emphasis on the binding nature of legislation, rather than simply as a rule that should be followed. In another example, PR007 was reworded from "I feel that my professional training has provided me broad based skills to think critically through work processes, especially as these relate to job outcomes" to "I feel that my professional training has provided me multidimensional skills needed to think critically through work processes, especially as these relate to job outcomes." The essence here was to emphasize the multidimensionality of entrepreneurial orientation, as grounded in the multidimensional skills required to solve complex problems.

Construct validity of the instrument was achieved based on the comments from members of the pretest group, which allowed specific labels and codes to be applied to the various elements. Accordingly, Table D2, Appendix D, shows the research construct for the variables, along with corresponding dimensions as captured by the instrument.

Data Collection

Survey data were gathered by means of a self-administered questionnaire developed by the researcher specifically for the study (see Appendix C), and the instrument was fine-tuned with the help of a pretest group. Members of the pretest group were chosen from the health-care environment and human resources field based on their familiarity with organizational effectiveness and change management. Also important was their ability to critically assess the content and construct validity of the survey instrument. The criteria applied in selecting the pretest group were consistent with Hunt, Sparkman, and Wilcox (1982) who suggested the use of heterogeneous selection of pretest groups, and acknowledged the position of Goldthorpe (1969) who also favored the use of heterogeneous pretest sampling. Hunt, Sparkman, and Wilcox (1982) further recommended the use of pretest respondents with similarity to the target respondents where possible.

The original instrument administered to the pretest group was revised and refined three times based on the comments provided through face-to-face meetings as well as over the telephone at prearranged times conducive to the participants' schedules. The final revised version of the instrument is shown in Appendix C. The document displayed in Appendix C also reflects further comments offered by the University Health Network Research Ethics Board during the approval process. The University Health Network Research Ethics Board would not consider an application to conduct research in its facilities without prior approval, in this case by the Institutional Review Board and Academic Review Board (IRB/ARB) at the University of Phoenix, the researcher's dissertation committee, as well as University Health Network Nursing Research Committee.

Accordingly, the ARB and IRB, at the University of Phoenix granted approval for the dissertation proposal in December 2007 (see Appendix E). Following ARB/IRB approval by the University of Phoenix, the researcher applied to the University Health Network Nursing Research Committee for its approval. In December 2007, the University Health Network Nursing Research Committee granted approval for the study (see Appendix F). Following that milestone, the University Health Network Research Ethics Board then granted final approval to collect data (see Appendix G).

Upon receiving approval from the University Health Network Research Ethics Board, the instrument was further tested for internal validity by using a pilot group. The participants were sampled randomly from management and nonmanagement nurses at the University Health Network for purposes of determining the reliability and stability of the instrument. The pilot group sample was made up of 5 management nurses and 20 nonmanagement nurses selected from the three hospitals that constituted the University Health Network. The decision on the number of participants selected from the management and nonmanagement groups was based on the high degree of occupational affinity between management and nonmanagement nurses. Also of importance was the extent to which management and nonmanagement nurses shared a common technical base in their nursing training. The decision was also premised on the assumption that the increased level of homogeneity among nurses could support the generalizability of the findings.

The issue of the adequacy of time to complete the survey instrument was tested again using the pilot group. Additionally, the reliability and stability of the instrument were tested using the test-retest method to assess the quality of the response generated. Members of the pilot group also populated the main survey group in accordance with the test-retest approach adopted. Data were collected and coded using alphanumeric codes assigned to management and nonmanagement nurses. The variables, dimensions, and constituent items on the survey questionnaire were also coded alpha-numerically for ease of computation (see Table D2 in Appendix D).

The independent variable entrepreneurial orientation was represented as EO and the innovation dimension within this variable was captured using four elements associated with innovation: EO-001, EO-002, EO-003, and EO-010. The risk-taking dimension was captured using four elements associated with risk taking: EO-004, EO-005, EO-006, and EO-009. The proactiveness dimension was captured using two elements associated with proactiveness: EO-007 and EO-008.

The other independent variable, environmental turbulence, was represented as ET. The financial climate dimension within the variable was represented as FC and captured using three elements associated with financial climate: ET-001, ET-002, and ET-003. The interunit competition dimension was captured using four elements associated with inter-unit competition: ET-006, ET-007, ET-008, and ET-009. The occupational requirement dimension was captured using two elements associated with occupational requirement: ET-014 and ET-015. The legislative activity dimension was captured using two elements associated with legislative activity: ET-004 and ET-005. The technological change dimension was captured using four elements associated with technological change: ET-010, ET-011, ET-012, and ET-013.

The dependent variable, employee productivity, was represented as EP. The challenging and meaningful work dimension within the variable was captured using two elements associated with challenging and meaningful work: EP-006 and EP-009. The self-management dimension was captured using two elements associated with self-management: EP-003 and EP-004. The supportive leadership dimension was captured using two elements associated with supportive leadership: EP-005 and EP-010. The multidimensional skills dimension was captured using two elements associated with multidimensional skills: EP-007 and EP-008. The preference for group incentives dimension was captured using one element associated with the preference for group incentive: EP-001. The preference for individual incentive dimension was captured using one element associated with the preference for individual incentive: EP-002.

The main survey activities commenced after the reliability of the instrument was computed statistically based on the pilot group. The process of data collection involved the distribution of survey questionnaires to selected survey participants through the internal mail system at the University Health Network. Consent forms were included in the mail sent to selected management and nonmanagement nurses requesting their voluntary participation. The consent forms were developed based on an implied consent approach in accordance with advice received from the University Health Network Research Ethics Board, for which approval was granted in March 2008. Also, recruitment advertisements were posted throughout the three hospitals that constituted the University Health Network (see Appendix H). For double assurance, a copy of the recruitment advertisement poster was also inserted in the package sent out to the survey participants.

Completed questionnaires were returned to the researcher through the internal mail system of the University Health Network, consistent with the terms of approval granted by the University Health Network Research Ethics Board. Participants were given 2 weeks to complete the survey questionnaire, and a further week was made available to participants whose responses were not received within the 2-week period. In the questionnaire distributed, respondents were asked to rate themselves against each statement on a scale of 1 to 5, where 1 represented *strongly disagree* and 5 represented *strongly agree*.

Contact information on the participants was maintained in the form of telephone numbers for their nursing stations. Most management nurses had telephone numbers assigned to them by the University Health Network. Nonmanagement nurses did not have telephone numbers assigned to them, so it was considered more appropriate to use the nursing unit telephone numbers for all participants during the survey. Follow-up communication was necessary only in a few instances where the survey instrument was not completed appropriately or returned on a timely basis. Communication with outstanding survey participants was done solely through the internal mail system. There were 2 missing surveys from the management survey group and 10 from the nonmanagement respondents. There was an overall response rate of 96%, and all completed questionnaires received were useable.

Data Analysis

Data analysis was conducted using the SPSS Version 12.0 statistical package. The analyses used to test the hypotheses included (a) multiple correlational analyses to establish strength relationships among the dimensionality of entrepreneurial orientation, environmental turbulence, and productivity with respect to management and nonmanagement nurses, based on two-tailed analysis of the Pearson correlation values; (b) *t*-test analysis to determine whether the differences between management and nonmanagement nurses' perception of entrepreneurial orientation, environmental turbulence, and productivity could be supported or rejected at the $p < .05$ significance level; and (c) multiple regression analysis to determine significant predictors among the independent variables entrepreneurial orientation and environmental turbulence when applied in the prediction of the dependent variable productivity for management and nonmanagement nurses at the $p < .05$ significance level.

Cronbach (1951) noted that the dependability of research measurements could be ascertained through the determination of reliability coefficients. To that extent, Cronbach noted, "It has generally been stated that α gives the lower bound to the true reliability" (p. 299). Cronbach (1951) then stated "α in the common-factor concentration should be .80" (p. 322). Accordingly, the current study aimed for a total Cronbach's alpha of about 0.8, while acknowledging lower levels of Cronbach's alpha in some peer-reviewed publications. For example, Kartal and Ozsoy (2007) reported a total Cronbach's alpha of

.89 with subscales ranging from .73 to .86, while Bektas and Akdemir (2008) reported a total Cronbach's alpha of .88 and subscales ranging from .60 to .83.

To enhance acceptability of the reliability results, the SPSS package was used to calculate the figures for Cronbach's alphas with regard to the items applied in the instrument construct, in order to determine whether a particular item should be dropped or retained. Accordingly, a threshold of a Cronbach's alpha of .70 was set as a limit for determining acceptability of an item in the construct. The bar in this case fell within the established range of Cronbach's alpha in the extant literature. Results for the reliability tests are displayed in Table D5.

Factor analysis was carried out on split-half samples. The steps involved the development of a stable factor structure by ensuring a minimum sample size *N*, a minimum ratio of subjects to variables *N/p* (where *p* was the number of variables), a minimum ratio of subjects to expected factors *N/m* (where *m* was the number of expected factors), and a minimum ratio of variables to expected factors *p/m*. Ferguson and Cox (1993) suggested a sample size of at least 300, a *N/p* ratio of between 2:1 and 10:1, an *N/m* ratio of at least 6:1, and a *p/m* ratio of 2:1 as within acceptable range. In accordance with Ferguson and Cox (1993), factor analysis was carried out on a random sample from the population to support generalizability.

Item scaling was based on a 5-point Likert-type scale, which Comrey (1978) posited as being more practical in scientific inquiry. With the instrument designed around the personal beliefs and perceptions of the participants, it helped to eliminate the social responsibility response bias that often resulted when individuals tried to present themselves in a good light rather than provide an honest opinion. The appropriateness of the correlation matrix was conducted by applying the Kaiser-Meyer-Olkin (KMO) test, and a value of at least 0.5 was set as the acceptable minimum in the current study.

Some authors have suggested a KMO of .5 or higher in order to continue with factor analysis. The Bartlett test of sphericity was also applied to test the null hypothesis that no relationship exists between the variables. A Bartlett test of sphericity of less than .05 was determined as an acceptable standard in the current study. Where the two tests were successful, the researcher proceeded to factor extraction.

The purpose of the extraction was to identify and retain factors necessary to produce an adequate correlation matrix. In this regard Kaiser 1 and Scree tests were performed. The Kaiser 1 procedure targeted factors with eigenvalues greater than 1, where an eigenvalue represented an estimate of the variance associated with a factor. Factor rotation was achieved through orthogonal rotation based on the Varimax procedure and oblique rotation was based on a direct Oblimin procedure. The aim of the factor rotation was to define the variables with high loading. With the Varimax procedure, a position was sought that maximized variance across all factors in the matrix. In relation to the Oblimin procedure, a high positive delta was sought for the correlation.

Ferguson and Cox (1993) suggested that a delta equal to or less than .4 signified an orthogonal solution. Ferguson and Cox (1993) believed that a loading of .4 was sufficient to define a variable and that Varimax is “probably the best rotational procedure to adopt, unless the goal is to produce a general factor, or a higher order analysis is required, in which case oblique rotation should be used” (p. 91). Accordingly, the Varimax rotation was used in the current study.

The SPSS statistical package was used to test the null hypotheses, to determine whether the null hypotheses could be supported or rejected at the $p < .05$ significance level. A multiple regression procedure was applied in constructing the predictive models, which involved independent and dependent variables. Predictors were assessed for multicollinearity.

Summary

The research design was detailed in this chapter, which also defined the dependent and independent variables. The survey instrument was designed to capture 15 elements related to environmental turbulence, 10 elements related to entrepreneurial orientation, and 10 elements related to productivity. The tool was based on a 5-point Likert-type scale, which Comrey (1978) posited as being more practical in scientific inquiry. A field test was conducted using a carefully selected group of three individuals comprising two health care professionals and one human resources management professional. That approach was consistent with Hunt et al. (1982), who suggested the use of a heterogeneous group.

Sample size of 25 was determined for the pilot group, while a sample size of 300 was established for the main survey group. The sample was drawn from frame of 3,000. Sample size calculations were based on the formula advanced by Burns and Bush (1998). The sample size determined for the main survey was consistent with Ferguson and Cox (1993), who suggested that population size should be at least 300 for such a large frame. The data collection method, informed consent, and confidentiality protocols were conducted in accordance with the terms of approval granted by the University Health

Network Nursing Committee and the University Health Network Research Ethics Board, which were discussed in the chapter.

The quantitative research method applied was described in the chapter. In addition, the research questions and null hypothesis were outlined. The SPSS Version 12.0 statistical package was used to test the null hypotheses and compute statistical outputs for the study. Predictive models for the productivity of management and nonmanagement nurses were computed using the multiple regression step-wise procedure.

Furthermore, the approach adopted with respect to establishing reliability and validity of the research instrument was detailed. Reliability was based on a total Cronbach alpha of about .8, consistent with Cronbach (1951). Factor loading was achieved through Varimax rotation of at least .4 using orthogonal solution, consistent with Ferguson and Cox (1993). Factor extraction and retention were conducted on the samples using Kaiser 1 and Scree tests. The aim was to achieve an eigenvalue of 1, consistent with Norusis (2004). Chapter 4 displays the results obtained from the data analysis.

CHAPTER 4: RESULTS

The purpose of the study was to understand the impacts of environmental turbulence and entrepreneurial orientation on the productivity of management and nonmanagement nurses at the University Health Network, a nonprofit health-care establishment located in Toronto, Canada. The dissertation also explored the emergent properties of adaptive leadership between management and nonmanagement nurses in the United Health Network, within the context of complex adaptive systems. In this dissertation productivity was defined based on six dimensions: (a) challenging and meaningful work, (b) self-management, (c) supportive leadership, (d) multidimensional skills, (e) preference for individual-based reward system, and (f) preference for group-based reward system. Entrepreneurial orientation was defined based on three dimensions: (a) innovation, (b) risk taking, and (c) proactiveness. Environmental turbulence was defined based on five dimensions: (a) uncertainty related to the financial climate, (b) uncertainty related to the level of intergroup competition, (c) uncertainty related to shifts in occupational requirements mandated by professional governing bodies, (d) uncertainty related to legislative activities, and (e) uncertainty related to technological shifts.

Management and nonmanagement nurses from the University Health Network were surveyed to gather relevant data using the instrument developed by the researcher for purposes of the dissertation. This chapter includes a description of the samples and presents the results of the data analyses, which involved (a) multiple correlational analyses to establish strength relationships with respect to the dimensionality of entrepreneurial orientation, environmental turbulence, and productivity among management and nonmanagement nurses based on two-tailed analysis of the Pearson correlation values; (b) *t*-test analyses to determine whether the differences between management and nonmanagement nurses' perception of entrepreneurial orientation, environmental turbulence, and productivity could be supported or rejected at the $p < .05$ significance level; and (c) multiple regression analyses to determine predictors at the $p < .05$ significance level, among items of the independent variables entrepreneurial orientation and environmental turbulence when applied in the prediction of the dependent variable productivity for management and nonmanagement nurses. The study involved finding an answer to the following research questions and establishing whether the null hypotheses could be supported or rejected.

Research Questions

The dissertation was guided by three questions: (a) Are there significant relationships in the multidimensional elements that constitute environmental turbulence, entrepreneurial orientation, and productivity, as perceived by management and nonmanagement nurses? (b) Can the relationships among multiple dimensions of environmental turbulence and entrepreneurial orientation be applied as independent variables in the prediction of productivity as the dependent variable for management and nonmanagement nurses in significant ways? (c) Are there significant correlations in the perceptions held by management and nonmanagement nurses with respect to the impacts of environmental turbulence and entrepreneurial orientation on productivity that could indicate the emergence of adaptive leadership between the two groups?

The answers to the research questions have the potential to contribute to the understanding of strength relationships or causality among the dimensions of environmental turbulence, entrepreneurial orientation, and productivity as perceived by management and nonmanagement nurses. The outcome of the investigation could also help policy makers and health-care administrators develop performance models that would foster adaptive leadership and enhance productivity in the health-care environment.

Null Hypotheses

To answer the research questions, the following null hypotheses were tested with productivity as the dependent variable, while environmental turbulence and entrepreneurial orientation were applied as independent variables.

Null Hypothesis $H_0$1a: There is no significant relationship among the multidimensional factors of entrepreneurial orientation (innovation, risk taking, and proactiveness) as perceived by nonmanagement nurses.

Null Hypothesis $H_0$1b: There is no significant relationship among the multidimensional factors of entrepreneurial orientation (innovation, risk taking, and proactiveness) as perceived by management nurses.

Null Hypothesis $H_0$2a: There is no significant relationship among the multidimensional factors of environmental turbulence (uncertainty related to the financial climate, uncertainty related to the level of intergroup competition, uncertainty related to shifts in occupational requirements mandated by professional governing bodies, uncertainty related to legislative activities, and uncertainty related to technological shifts) as perceived by nonmanagement nurses.

Null Hypothesis $H_0$2b: There is no significant relationship among the multidimensional factors of environmental turbulence (uncertainty related to the financial climate, uncertainty related to the level of intergroup competition, uncertainty related to shifts in occupational requirements mandated by professional governing bodies, uncertainty related to legislative activities, and uncertainty related to technological shifts) as perceived by management nurses.

Null Hypothesis $H_0$3a: There is no significant relationship among the multidimensional factors of productivity (challenging and meaningful work, self-management, supportive leadership, multidimensional skills, preference for individual-based reward system, and preference for group-based reward system) as perceived by nonmanagement nurses.

Null Hypothesis $H_0$3b: There is no significant relationship among the multidimensional factors of productivity (challenging and meaningful work, self-management, supportive leadership, multidimensional skills, preference for individual-based reward system, and preference for group-based reward system) as perceived by management nurses.

Null Hypothesis $H_0$4a: There is no significant predictive relationship among multiple dimensions of entrepreneurial orientation and environmental turbulence when applied as independent variables in the prediction of productivity satisfiers for nonmanagement nurses.

Null Hypothesis $H_0$4b: There is no significant predictive relationship among multiple dimensions of entrepreneurial orientation and environmental turbulence when applied as independent variables in the prediction of productivity satisfiers for management nurses.

Null Hypothesis $H_0$5: There is no significant difference between the means for management and nonmanagement nurses based on relationships among the multidimensions of environmental turbulence, entrepreneurial orientation, and productivity that may indicate the emergence of adaptive leadership at the edge of chaos.

Sample Collection Procedure

The study was conducted in two parts, and therefore required the collection of two sets of samples, one from the initial pilot group and the other from a subsequent main survey group. Samples gathered from the pilot group were used to compute reliability and consistency of the instrument. Data from the main survey participants were used to compute reliability of the instrument, establish factor loading of the instrument construct, answer research questions, test hypotheses, and construct multiple regression equations for productivity models.

A sample size of 25 was determined for the pilot study group, while a sample size of 300 was established for the main survey group, within a sample frame of 3,000. The sample size was determined based on Burns and Bush (1998) and was also consistent with Ferguson and Cox (1993), who suggested that population size should be at least 300 for such a large sample frame. The data collection method, informed consent, and confidentiality protocols were conducted in accordance with the terms of approval granted by the University Health Network Nursing Committee and the University Health Network Research Ethics Board. The approval protocols were discussed in chapter 3.

The data-gathering process was similar for the pilot and main survey group participants. The method involved the distribution of survey questionnaires to randomly selected survey participants through the internal mail system of the University Health Network. Consent forms were included in the mail sent to selected management and nonmanagement nurses requesting their voluntary participation. Also, recruitment advertisements were posted throughout the three hospitals that comprised the University Health Network (Toronto General Hospital, the Princess Margaret Hospital, and the Toronto Western Hospital; see Appendix H). For double assurance, a copy of the recruitment advertisement poster was also inserted in the package of mail sent to the selected survey participants.

The completed questionnaires were returned to the researcher through the internal mailing address designated by the University Health Network Research Ethics Board. Participants were given 2 weeks to complete the survey questionnaire, and an additional week was made available to participants whose responses were not received in the first 2 weeks. In the questionnaire provided, respondents were requested to rate themselves against each statement on a scale of 1 to 5, where 1 represented *strongly disagree* and 5 represented *strongly agree*.

Information on the demographics with respect to the pilot and main survey groups, are displayed in Tables D3 and D4 (Appendix D). Overall response rate for the pilot group was 100%, while overall response rate for the main survey group was 96%. Response rates in both cases were significant and consistent with similar studies reported in the literature. For example, Haggerty et al. (2008) reported an 87% response rate, Valimaki et al. (2008) reported a response rate of 95%, and Yu, Hung, Wu, and Wang (2008) reported an 89.3% response rate.

Measure of Reliability and Consistency

Cronbach's alpha was used for computing internal consistency with respect to the variables based on data gathered from 25 participants in the pilot study. Table D5 displays the results for Cronbach's alpha computed in the study. Cronbach's alpha computed for the initial pilot study ranged from .71 to .77 with respect to the subscales, while registering a total Cronbach's alpha of .85 overall. Specifically, the initial pilot study produced Cronbach's alpha of .75 for entrepreneurial orientation, .77 for environmental turbulence, and .71 for employee productivity.

After 2 weeks, a second set of data was gathered from the pilot group for retesting to ensure stability and consistency. Cronbach's alphas derived during the retesting phase were largely comparable to the initial scores. Specifically, the retesting phase produced Cronbach's alpha of 0.75 for entrepreneurial orientation, 0.75 for environmental turbulence, and 0.70 for employee productivity. The overall Cronbach's alpha for the retesting phase was 0.81. The reliability scores obtained in the current study were consistent with Bektas and Akdemir (2008), who reported a total Cronbach's alpha of 0.88 with subscales ranging from 0.60 to 0.83, and Kartal and Ozsoy (2007), who reported a total Cronbach's alpha of 0.89 with subscales from 0.73 to 0.86.

Descriptive Statistics for Entrepreneurial Orientation

Frequency Distribution for Innovation

Four items were measured in relation to the innovation dimension: EO-001, EO-002, EO-003, and EO-010 (see Table D2). Tables D6 and D7 in Appendix D display the item scores for management nurses and nonmanagement nurses, respectively. Management scores for EO-001 ranged from 4 to 5, compared to a spread from 1 to 5 for nonmanagement nurses. Cumulatively, 100% of management respondents indicated *agree* to *strongly agree* in response to the item, compared to a lower total of 88.3% for nonmanagement participants. The mean score for management was 4.86 compared to a lower mean score of 4.37 for nonmanagement participants.

The scores for EO-002 also ranged from 4 to 5 for management participants, compared to a spread of 1 to 5 for nonmanagement. On a cumulative basis, 100% of management participants indicated *agree* to *strongly agree* in response to the item measured, as opposed to 85.8% for nonmanagement nurses. The mean score for management participants was 4.50, compared to 4.26 for nonmanagement. The range of scores for management participants with respect to EO-003 ranged from 3 to 5, compared to a range of 1 to 5 for nonmanagement participants. Cumulatively, 92.8% of management participants indicated *agree* to *strongly agree* in their response to the item, compared to 78.8% of nonmanagement participants. The mean score for management was 4.50 compared to 4.14 for nonmanagement participants.

The scores for EO-010 for management participants ranged from 3 to 5, compared to a range of 1 to 5 for nonmanagement participants. Cumulatively, 92.9% of management participants indicated *agree* to *strongly agree* in response to the item, compared to 93.4% of nonmanagement participants. The mean score for management was 4.50 compared to 4.14 for nonmanagement participants. The mean score for management was 4.43 compared to 4.00 for nonmanagement participants.

Frequency Distribution for Risk Taking

Four items were measured in relation to the risk-taking dimension: EO-004, EO-005, EO-006, and EO-009 (see Table D2). Tables D8 and D9 in Appendix D display the item scores for management and nonmanagement participants, respectively. Management scores for EO-004 ranged from 4 to 5, compared to a range of 1 to 5 for nonmanagement. Cumulatively, 100% of management participants indicated *agree* to *strongly agree* in response to the item, compared to a lower score of 75.2% for nonmanagement participants. The mean score for management participants was 4.50, compared to a lower mean score of 4.00 for nonmanagement participants.

Management scores for EO-005 ranged from 3 to 5, while the scores for nonmanagement participants ranged between 1 and 5. Cumulatively, 85.8% of management participants indicated *agree* or *strongly agree* in response to the item, compared to a lower score of 67.9% for nonmanagement. The mean score for management participants was 4.43, compared to 3.73 for nonmanagement participants.

Management's scores for EO-006 ranged from 3 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 78.8% of management participants indicated *agree* or *strongly agree* in response to the item, compared to a lower score of 55.1% for nonmanagement. The mean score was 4.07 for management participants, compared to 3.49 for nonmanagement. Scores for EO-009 ranged from 4 to 5 for management participants, compared to 1 to 5 for nonmanagement. Cumulatively, 100% of management participants indicated *agree* or *strongly agree* in response to the item, compared to a lower total of 71.9% of nonmanagement. The mean score for management participants was 4.57, compared to a lower mean score of 3.88 for nonmanagement participants.

Frequency Distribution for Proactiveness

Two items were measured in relation to proactiveness, which comprised EO-007 and EO-008 (see Table D2). Tables D10 and D11 in Appendix D display the item scores for management and nonmanagement nurses, respectively. EO-007 scores for management ranged from 3 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 85.7% of management participants indicated *agree* or *strongly agree* in response to the item, compared to a lower score of 42.7% for nonmanagement. The mean score for management was 4.14, compared to a lower mean of 3.63 for nonmanagement participants. EO-008 scores for management ranged from 3 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 92.9% of management participants indicated *agree* or *strongly agree* in response to the item, which was the same as for nonmanagement participants. The mean score for management was 4.43, compared to a higher score of 4.56 for nonmanagement.

Descriptive Statistics for Environmental Turbulence

Frequency Distribution for Challenges from Financial Climate

Three items were measured in relation to financial climate: ET-001, ET-002, and ET-003 (see Table D2). Tables D12 and D13 in Appendix D display the item scores for management and nonmanagement participants, respectively. Management scores for ET-001 ranged from 1 to 5, which was the same for nonmanagement. Cumulatively, 42.8% of management indicated *agree* to *strongly agree* in response to the item, compared to a higher score of 57.6% for nonmanagement participants. The mean score for management was 3.00, compared to a higher score of 3.54 for nonmanagement participants.

Management scores for ET-002 ranged from 1 to 5, which was the same as the score for nonmanagement. Cumulatively, 28.5% of management indicated *agree* to *strongly agree* in response to the item, compared to a higher score of 37.3% for nonmanagement participants. The mean score for management was 2.71, compared to a higher score of 3.07 for nonmanagement.

The management score for ET-003 ranged from 1 to 5, which was the same for nonmanagement participants. Cumulatively, 42.8% of management participants indicated *agree* to *strongly agree* in response to the item, compared to a higher score of 44.9% for nonmanagement. The mean score for management was 3.07, compared to a higher score of 3.31 for nonmanagement participants.

Frequency Distribution for Challenges from Interunit Competition

Four items were measured in relation to the interunit competition dimension: ET-006, ET-007, ET-008, and ET-009 (see Table D2). Tables D14 and D15 in Appendix D display the item scores for management and nonmanagement participants, respectively. Management scores for ET-006 ranged from 3 to 5, compared to 1 to 5 for nonmanagement. Cumulatively, 92.8% of management indicated *agree* to *strongly agree* in response to the item, compared to a lower score of 90.9% for nonmanagement participants. The mean score for management was 4.64, compared to a lower score of 4.54 for nonmanagement participants. Management scores for ET-007 ranged from 3 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 92.8% of management indicated *agree* to *strongly agree* in response to the item, compared to a lower score of 90.9% for nonmanagement participants. The mean score for management participants was 4.64, compared to a lower score of 4.48 for nonmanagement.

Management scores for ET-008 ranged from 3 to 5, compared to 1 to 5 for nonmanagement participants. Cumulatively, 92.9% of management indicated *agree* to *strongly agree* in response to the item, compared to a lower 69.7% of nonmanagement participants. The mean score for management was 4.57 compared to a lower score of 3.88 for nonmanagement participants. With respect to ET-009, management scores ranged from 2 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 50.0% of management indicated *agree* to *strongly agree* in response to the item, compared to a higher score of 64.6% for nonmanagement participants. The mean score for management was 3.64, compared to a lower score of 3.75 for nonmanagement participants.

Frequency Distribution for Challenges from Occupational Requirements

Two items were measured in relation to the occupational requirements dimension: ET-014 and ET-015 (see Table D2). Tables D16 and D17 in Appendix D display item scores for management and nonmanagement nurses, respectively. Management scores for ET-014 ranged from 1 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 42.8% of management indicated *agree* to *strongly agree* in response to the item, compared to a lower score of 39.4% for nonmanagement participants. The mean score for management was 2.36 compared to a higher score of 3.20 for nonmanagement participants.

In the case of ET-015, management scores ranged from 1 to 5, which was the same for nonmanagement participants. Cumulatively, 64.3% of management indicated *agree* to *strongly agree* in response to the item, compared to a higher score of 67.5% for nonmanagement participants. The mean score for management was 3.71, compared to a higher score of 3.82 for nonmanagement participants.

Frequency Distribution for Challenges from Legislative Activity

Two items were measured in relation to the legislative activity dimension: ET-004 and ET-005 (see Table D2). Tables D18 and D19 in Appendix D display the item scores for management and nonmanagement participants, respectively. ET-004 scores for management ranged from 3 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 85.7% of management respondents indicated *agree* to *strongly agree* to the item, compared to a higher score of 88.4% for nonmanagement participants. The mean score for management was 4.57 compared to a lower score of 4.41 for nonmanagement participants.

ET-005 scores for management were 4 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 100% of management indicated *agree* to *strongly agree* in response to the item, compared to a lower score of 84.7% for nonmanagement. The mean score for management was 4.57, compared to a lower score of 4.37 for nonmanagement participants.

Frequency Distribution for Challenges from Technological Change

Four items were measured in relation to the technological change dimension: ET-010, ET-011, ET-012, and ET-013 (see Table D2). Tables D20 and D21 in Appendix D display the item scores for management and nonmanagement participants, respectively. ET-010 scores for management ranged from 3 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 78.6% of management indicated *agree* to *strongly agree* in response to the item, compared to a lower score of 69.7% for nonmanagement participants. The mean score for management was 4.14, compared to a lower score of 3.79 for nonmanagement participants.

ET-011 scores for management ranged from 2 to 5, compared with 1 to 5 for nonmanagement. Cumulatively, 78.6% of management indicated *agree* to *strongly agree*, compared to a higher score of 82.9% for nonmanagement participants. The mean score for management was 4.21, compared to a higher score of 4.37 for nonmanagement participants. ET-012 scores for management ranged from 1 to 4, compared with 1 to 5 for nonmanagement participants. Cumulatively, 50.0% of management indicated *agree* to *strongly agree* in response to the item, compared to a lower score of 31.4% for nonmanagement participants. The mean score for management was 3.23, compared to a lower score of 3.01 for nonmanagement participants.

ET-013 scores for management ranged from 2 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 57.3% of management participants indicated *agree* to *strongly agree* in response to the item, compared to a higher score of 72.7% of nonmanagement participants. The mean score for management was 3.17, compared to a lower score of 3.13 for nonmanagement participants.

Descriptive Statistics for Employee Productivity

Frequency Distribution for Challenging and Meaningful Work

Two items were measured in relation to the challenging and meaningful work dimension, which consisted of EP-006 and EP-009 (see Table D2). Tables D22 and D23 in Appendix D display the item scores for management and nonmanagement participants, respectively. EP-006 scores for management ranged from 3 to 5, compared to 2 to 5 for nonmanagement participants. Cumulatively, 85.7% of management participants indicated *agree* to *strongly agree* in response to the item, compared to 88.2% for nonmanagement participants. The mean score for management was 4.36, compared to a lower score of 4.32 for nonmanagement participants.

EP-009 scores for management ranged from 4 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 100% of management participants indicated *agree* to *strongly agree* in response to the item, compared to a lower score of 80.9% of nonmanagement participants. The mean score for management was 4.5, compared to a lower score of 4.21 for nonmanagement participants.

Frequency Distribution for Self-Management

Two items were used to measure the self-management dimension for management and nonmanagement participants. The items comprised EP-003 and EP-004 (see Table D2). Tables D24 and D25 in Appendix D display the item scores for management and nonmanagement participants, respectively. Management scores for EP-003 ranged from 4 to 5, compared with 2 to 5 for nonmanagement participants. Cumulatively, 100% of management participants indicated *agree* to *strongly agree* in response to the item, compared to a lower score of 85.3% for nonmanagement. The mean score for management was 4.57, compared with a lower score of 4.29 for nonmanagement participants.

EP-004 scores for management ranged from 3 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 85.8% of management participants indicated *agree* to *strongly agree* in response to the item, compared to a lower score of 84.2% for nonmanagement participants. The mean score for management was 4.29 compared to a lower score of 4.28 for nonmanagement participants.

Frequency Distribution for Supportive Leadership

Two items were used to measure the supportive leadership dimension: EP-005 and EP-010 (see Table D2). Tables D26 and D27 in Appendix D display the item scores for management and nonmanagement participants, respectively. EP-005 scores for management ranged from 3 to 5, compared to 1 to 5 for nonmanagement participants. Cumulatively, 92.9% of management participants indicated *agree* to *strongly agree* in response to the item, compared to a higher score of 93.4% for nonmanagement participants. The mean score for management participants was 4.57, compared to a lower score of 4.51 for nonmanagement participants.

EP-010 scores for management participants ranged from 2 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 92.8% of management participants indicated *agree* to *strongly agree* in response to the item, compared to a lower score of 55.5% for nonmanagement participants. The mean score for management was 3.93, compared to a lower score of 3.42 for nonmanagement participants.

Frequency Distribution for Multidimensional Skills

Two items were used to measure the multidimensional skills dimension: EP-007 and EP-008 (see Table D2). Tables D28 and D29 in Appendix D display the item scores for management and nonmanagement participants, respectively. EP-007 scores for management ranged from 3 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 92.9% of management participants indicated *agree* to *strongly agree* in response to the item, compared with a lower score of 89.7% for nonmanagement participants. The mean score for management participants was 4.36, compared to a higher score of 4.37 for nonmanagement participants.

EP-008 scores for management ranged between 2 to 5 for management participants, compared with 1 to 5 for nonmanagement participants. Cumulatively, 42.8% of management participants indicated *agree* to *strongly agree* in response the item, compared to a higher score of 46.8% for management participants. Mean score for management was 3.21, compared to a higher score of 3.32 for nonmanagement participants.

Frequency Distribution of Group and Individual Incentives

One item was used to measure the group incentive dimension and one item was used to measure the individual incentive dimension. EP-001 was applied for measurement in the case of group incentives, while EP-002 was applied with respect to individual incentive. Table D30 in Appendix D displays the results for management and nonmanagement participants in relation to EP-001, while Table D31 in Appendix D displays the results for management and nonmanagement participants with respect to EP-002.

EP-001 scores for management ranged from 3 to 5, while scores for nonmanagement participants ranged from 1 to 5. Cumulatively, 92.9% of management indicated *agree* to *strongly agree* in response to the item, compared to a lower score of 87.5% for nonmanagement participants. The mean score for management participants was 4.57, compared to a lower score of to 4.35 for nonmanagement participants. EP-002 scores for management ranged from 2 to 5, compared with 1 to 5 for nonmanagement participants. Cumulatively, 92.9% of management participants indicated *agree* to *strongly agree*, in response to the item, compared to a lower score of 83.2% for nonmanagement participants. The mean score for management participants was 4.29, compared to a lower score of 4.26 for nonmanagement participants.

Composite Frequency Distributions for the Variables

Entrepreneurial Orientation

Statistical analyses were conducted for the mean, median, and standard deviations of the three dimensions innovation, risk taking, and proactiveness that comprised the entrepreneurial orientation variable. The results for management and nonmanagement participants are displayed in the top portions of Tables D32 and D33 in Appendix D. Of the dimensions measured for the management group, the mean score for innovation was the highest at 4.57, followed by risk taking at 4.39 and then proactiveness at 4.29. Of the dimensions for the nonmanagement group, the mean score for proactiveness was the highest at 4.24, followed by innovation at 4.19 and then risk taking at 3.77.

The total score of the entrepreneurial orientation variable indicated a higher mean for management participants with a score of 4.44 ($SD = 0.31$), compared to the lower score of 4.00 ($SD = 0.68$) for nonmanagement participants. The median score for entrepreneurial orientation with respect to the management participants was 4.50, compared to a lower median score of 4.00 for nonmanagement participants.

Environmental Turbulence

The middle portions of Tables D32 and D33 in Appendix D display the results of the summary statistics for the mean, median, and standard deviation of the environmental turbulence variables with respect to scores for management and nonmanagement participants. Of the environmental turbulence dimensions measured for the management group, the mean score for uncertainty related to legislative activities was the highest at 4.57, followed by uncertainty related to the level of intergroup competition at 4.37, uncertainty related to technological shifts at 3.59, uncertainty related to shifts in occupational requirements mandated by professional governing bodies at 3.03, and then uncertainty related to the financial climate at 2.93. Of the environmental turbulence dimensions measured for nonmanagement group, the mean score for uncertainty related to legislative activities was the highest, followed by uncertainty related to the level of intergroup competition at 4.16, uncertainty related to technological shifts at 3.74, uncertainty related to shifts in occupational requirements mandated by professional governing bodies at 3.51, and then uncertainty related to the financial climate at 3.31.

The total score of the environmental turbulence variable indicated a higher mean for nonmanagement participants with a score of 3.86 (*SD* = 0.59), compared to the lower mean score of 3.83 (*SD* = 0.38) for management participants. The median score for environmental turbulence with respect to the management participants was 3.85, compared with a higher median score of 3.92 for nonmanagement participants.

Employee Productivity

The bottom portions of Tables D32 and D33 in Appendix D display the results of the summary statistics for the mean, median, and standard deviation of employee productivity variables with respect to the scores for management and nonmanagement participants. Of the employee productivity dimensions measured for the management group, the mean score for preference for group-based reward system was the highest at 4.57, followed by challenging and meaningful work and self-management at 4.43, preference for individual-based reward system at 4.28, supportive leadership at 4.25, and then multidimensional skills at 3.78. Of the employee productivity dimensions measured for nonmanagement group, the mean score for preference for group-based reward system was the highest, followed by self-management at 4.28, challenging and meaningful work at 4.27, preference for individual-based reward system at 4.26, supportive leadership at 3.97 and then multidimensional skills at 3.84.

The total score of the environmental turbulence variable indicated a higher mean for management participants with a score of 4.26 (*SD* = 0.31), compared to the lower mean score of 4.13 (*SD* = 0.45) for nonmanagement participants. The median score for environmental turbulence with respect to the management participants was 4.25, compared with a lower median score of 4.20 for nonmanagement participants.

Factor Loading for Entrepreneurial Orientation

Ten items were originally aligned with the three dimensions described for entrepreneurial orientation, a priori (see Table D2 in Appendix D). In the a priori construct, four items (EO-001, EO-002, EO-003, and EO-010) were associated with the innovation dimension, four items (EO-004, EO-005, EO-006, and EO-009) were associated with the risk-taking dimension, and two items (EO-007 and EO-008) were associated with the proactiveness dimension. Factor analysis was done for the 10 entrepreneurial orientation items to identify the number of factors that could be used to represent interrelationships among the items.

Eigenvalues were determined for the total variance explained by each factor. It was determined that eigenvalues greater than 1 explained enough total variance to delineate a unique factor. Accordingly, a two-factor solution was extracted, with eigenvalues greater than 1 (see Tables D34 and D35 in Appendix D). The SPSS procedure applied the principal component analysis method in extracting the two factors that together explained 50.36% of the factor loading cumulatively. Varimax rotation and Kaiser normalization techniques were applied, with three converged iterations (see Table D35 in Appendix D). Accordingly, items EO-001, EO-002, EO-003, EO-010, EO-007, and EO-008 loaded on Factor 1, while items EO-004, EO-005, EO-006, and EO-009 loaded on Factor 2. The KMO procedure was carried out to measure sampling adequacy and to compare magnitudes of observed correlation coefficients in relation to the magnitudes of partial correlation coefficients. Accordingly, a KMO value of .80 was obtained for the two-factor solution for entrepreneurial orientation (see Table D36 in Appendix D). A KMO value above .5 is generally accepted as strong enough to justify proceeding with factor analysis.

Bartlett's test of sphericity was also carried out, in this case to test the hypothesis that the correlation matrix was an identity matrix (i.e., all diagonal terms were 1 and all off-diagonal terms amounted to 0). A correlation significance of less than .05 is the generally accepted standard for Bartlett's sphericity test. Accordingly, a correlation significance of .00 was obtained with respect to Bartlett's sphericity test associated with the two-factor solution for entrepreneurial orientation items (see Table D36 in Appendix D).

Factor Loading for Environmental Turbulence

Fifteen items were originally aligned with the five dimensions described for environmental turbulence, a priori (see Table D2 in Appendix D). In the a priori construct, three items (ET-001, ET-002, and ET-003) were associated with the financial climate dimension, four items (ET-006, ET-007, ET-008, and ET-009) were associated with the interunit competition dimension, two items (ET-014 and ET-015) were associated with the occupational requirement dimension, two items (ET-004 and ET-005) were associated with the legislative activity dimension, and four items (ET-010, ET-011, ET-012, and ET-013) were associated with the technological change dimension. Factor analysis was done for the 15 environmental turbulence items to identify the number of factors that could be used to represent interrelationships among the variables.

Eigenvalues were determined for the total variance explained by each factor. It was determined that eigenvalues greater than 1 explained enough total variance to delineate a unique factor. Accordingly, a four-factor solution was extracted, with eigenvalues greater than 1 (see Tables D37 and D38 in Appendix D). The SPSS procedure applied the principal component analysis method in extracting the four factors that together explained 55.36% of the factor loading cumulatively. Varimax rotation and Kaiser normalization techniques were applied with six converged iterations (see Table D38 in Appendix D).

Accordingly, items ET-006, ET-007, ET-008, ET-009, ET-015, ET-004, ET-005, and ET-013 loaded on Factor 1; items ET-002 and ET-003 loaded on Factor 2; items ET-005, ET-010, and ET-011 loaded on Factor 3; and items ET-009, ET-014, and ET-012 loaded on Factor 4. The KMO procedure was carried out to measure sampling adequacy and to compare magnitudes of observed correlation coefficients in relation to the magnitudes of partial correlation coefficients. Accordingly, a KMO value of .8 was obtained for the four-factor solution for environmental turbulence (see Table D39 in Appendix D). A KMO value above .5 is generally accepted as strong enough to justify proceeding with factor analysis.

Bartlett's test of sphericity was also carried out to test the hypothesis that the correlation matrix was an identity matrix (i.e., all diagonal terms were 1 and all off-diagonal terms amounted to 0). A correlation significance of less than .05 is the generally accepted standard for Bartlett's sphericity test. Accordingly, a correlation significance of .00 was obtained with respect to Bartlett's sphericity test associated with the four-factor solution for environmental turbulence items (see Table D39 in Appendix D).

Factor Loading for Employee Productivity

Ten items were originally aligned with the six dimensions described for employee productivity, a priori (see Table D2 in Appendix D). In the a priori construct, two items (EP-006 and EP-009) were associated with the challenging and meaningful work dimension, two items (EP-003 and EP-004) were associated with the self-management dimension, two items (EP-005 and EP-010) were associated with the supportive leadership dimension, two items (EP-007 and EP-008) were associated with the multidimensional skills dimension, one item (EP-001) was associated with the group incentive dimension, and one item (EP-002) was associated with the individual incentive dimension. Factor analysis was done for the 10 employee productivity items to identify the number of factors that can be used to represent interrelationships among the variables.

Eigenvalues were determined for the total variance explained by each factor. It was determined that eigenvalues greater than 1 explained enough total variance to delineate a unique factor. Accordingly, a three-factor solution was extracted, with eigenvalues greater than 1 (see Tables D40 and D41 in Appendix D). The SPSS procedure applied the principal component analysis method in extracting the three factors that together explained 50.38% of the factor loading cumulatively. Varimax rotation and Kaiser normalization techniques were applied, with five converged iterations (see Table D41 in Appendix D).

Accordingly, items EP-006, EP-003, EP-004, EP-005, EP-007, and EP-001 loaded on Factor 1, items EP-009 and EP-010 loaded on Factor 2, and items EP-008 and EP-002 loaded on Factor 3. The KMO procedure was carried out to measure sampling adequacy and to compare magnitudes of observed correlation coefficients in relation to the magnitudes of partial correlation coefficients. Accordingly, a KMO value of .8 was obtained for the three-factor solution for employee productivity (see Table D42 in Appendix D). A KMO value above .5 is generally accepted as strong enough to justify proceeding with factor analysis.

Bartlett's test of sphericity was also carried out to test the hypothesis that the correlation matrix is an identity matrix (i.e., all diagonal terms are 1 and all off-diagonal terms are 0). A correlation significance of less than 0.05 is the generally accepted standard for Bartlett's sphericity test. Accordingly, a correlation significance of .00 was obtained with respect to Bartlett's sphericity test associated with the two-factor solution for employee productivity items (see Table D42 in Appendix D).

Correlational Statistics

Relationship among Entrepreneurial Orientation Dimensions

The strength relationships between the three dimensions innovation, risk taking, and proactiveness associated with entrepreneurial orientation were determined using Pearson's correlation analysis, consistent with M. K. Simon and Francis (2001). According to M. K. Simon and Francis (2001), Pearson's correlation analysis is an appropriate test when the variables being investigated are continuous and can be measured using a rational scale. Two-tailed tests of significance were applied at the $p < .05$ level with respect to the Pearson correlation analysis. A two-tailed test of significance is appropriate in cases where there are positive and negative correlations between variables (Crow, Davis, & Maxfield, 1960).

Correlation matrixes for the relationships between entrepreneurial orientation–innovation EO_IN, entrepreneurial orientation–innovation EO_RT, and entrepreneurial orientation–proactiveness EO_PR for nonmanagement participants are displayed in Table D43 in Appendix D. The output indicates a positive correlation between all of the dimensions, except for the correlation between EO_PR and EO_RT, which displayed a negative correlation. Specifically, EO_IN and EO_RT correlated at 0.41 with $p = .00$ significance, EO_IN and EO_PR correlated at 0.13 with $p = .03$ significance, and EO_RT and EO_PR correlated at –0.09 with $p = .16$ significance.

Correlation matrixes for the relationships between EO_IN, EO_RT, and EO_PR for management participants are displayed in Table D44 in Appendix D. The output indicates a positive correlation between all of the dimensions, but with poor significance at the $p < .05$ level in all cases. Specifically, EO_IN and EO_RT correlated at 0.43 with $p = .12$ significance, EO_IN and EO_PR correlated at 0.48 with $p = .04$ significance, and EO_RT and EO_PR correlated at 0.12with $p = .68$ significance.

Relationship among Environmental Turbulence Dimensions

A Pearson correlation was carried out for the environmental turbulence dimensions uncertainty related to the financial climate, uncertainty related to the level of intergroup competition, uncertainty related to shifts in occupational requirements mandated by professional governing bodies, uncertainty related to legislative activities, and uncertainty related to technological shifts, with respect to the nonmanagement participants and the correlation matrix is displayed in Table D45 in Appendix D. The outputs for nonmanagement participants were all positively correlated, with a significance level at $p < .05$ in all cases. Specifically, environmental turbulence–uncertainty related to the financial climate ET_FC and environmental turbulence–uncertainty related to the level of intergroup competition ET_IC correlated at 0.21 with p

= .00 significance, ET_FC and environmental turbulence–uncertainty related to shifts in occupational requirements mandated by professional governing bodies ET_OR correlated at 0.24 with p = .00 significance, ET_FC and environmental turbulence–uncertainty related to legislative activities ET_LA correlated at 0.25 with p = .00 significance, ET_FC and environmental turbulence–uncertainty related to technological shifts ET_TC correlated at 0.15 with p = .01 significance, ET_IC and ET_OR correlated at 0.33 with p = .00 significance, ET_IC and ET_LA correlated at 0.54 with p = .00 significance, ET_IC and ET_TC correlated at 0.32 with p = .00 significance, ET_OR and ET_LA correlated at 0.20 with p = .00 significance, ET_OR and ET_TC correlated at 0.19 with p = .00 significance, and ET_LA and ET_TC correlated at 0.14 with p = .02 significance.

A Pearson correlation was also carried out for the environmental turbulence dimensions uncertainty related to the financial climate, uncertainty related to the level of intergroup competition, uncertainty related to shifts in occupational requirements mandated by professional governing bodies, uncertainty related to legislative activities, and uncertainty related to technological shifts, with respect to the management participants and the correlation matrix is displayed in Table D46 in Appendix D. The outputs for management participants were all positively correlated, except for the correlation between ET_IC and ET_FC, which was negatively correlated. The outputs indicated poor correlation at $p < .05$ in all cases except in the case of ET_FC and ET_OR, which correlated at 0.73 with p = .00 significance, and in the case of ET_IC and ET_LA, which correlated at 0.46 with significance at p = .05.

Relationship among Employee Productivity Dimensions

A Pearson correlation was carried out for the employee productivity dimensions challenging and meaningful work, self-management, supportive leadership, multidimensional skills, preference for individual-based reward system, and preference for group-based reward system with respect to the nonmanagement participants, and the correlation matrix is displayed in Table D47 in Appendix D. The outputs for nonmanagement participants were positively correlated, all with significant correlation at the $p < .05$ level, except for the correlation between productivity–supportive leadership EP_SL and productivity–multidimensional skills EP_MS, which correlated at 0.07 with $p = .28$ significance and EP_SL and productivity–individual-based reward system EP_IS, which correlated at 0.09 with $p = .13$ significance. Specifically, significant correlations at the $p < .05$ level included productivity–challenging and meaningful work EP_CM and productivity–self-management EP_SM, which correlated at 0.39 with $p = .00$ significance; EP_CM and EP_SM, which correlated at 0.36 with $p = .00$ significance; EP_CM and EP_MS, which correlated at 0.27 with $p = .00$ significance.

As well, EP_CM and productivity–group-based reward system EP_GS correlated at 0.27 with $p = .00$ significance, EP_CM and EP_IS correlated at 0.28 with $p = .00$ significance, EP_SM and EP_SL correlated at 0.19 with $p = .00$ significance, EP_SM and EP_MS correlated at 0.26 with $p = .00$ significance, EP_SM and EP_GS correlated at 0.38 with $p = .00$ significance, EP_SM and EP_IS correlated at 0.28 with $p = .00$ significance, EP_SL and EP_GS correlated at 0.21 with $p = .00$ significance, EP_MS and EP_GS correlated at 0.20 with $p = .00$ significance, EP_MS and EP_IS correlated at 0.20

with p = .00 significance, and EP_GS and EP_IS correlated at 0.15 with p = .02 significance.

A Pearson correlation was also carried out for the employee productivity dimensions with respect to the management participants, and the correlation matrix is displayed in Table D48 in Appendix D. The outputs for management participants were all positively correlated, except for EP_CM and EP_IS, which correlated at –0.14 with p = .63 significance; EP_SL and EP_IS, which correlated at –0.11 with p = .71 significance; EP_MS and EP_IS, which correlated at –0.02 with p = .94 significance; and EP_GS and EP_IS, which correlated at –0.19 with p = .53 significance. The outputs indicated poor correlation in all cases at the $p < .05$ level, except in the case of EP_CM and EP_SM, which correlated at 0.49 with p = .05 significance; EP_SM and EP_MS, which correlated at 0.64 with p = .01 significance; and EP_MS and EP_GS, which correlated at 0.56 with p = .04 significance.

Independent *t* Test Analyses

Entrepreneurial Orientation Dimensions

Independent *t* test analysis was conducted with respect to the means for the management and nonmanagement participants to determine whether the differences between management and nonmanagement nurses' perceptions of the relationship between entrepreneurial orientation, environmental turbulence, and productivity could be supported or rejected at the $p < .05$ level. In testing a null hypothesis, Norusis (2004) cautioned against type-1 error, in which a researcher could be guilty of rejecting a null that was otherwise true. To avert a type-1 error in the case of two independent-samples *t* tests, the null was rejected if the two-tailed significance level of the independent means was less than 0.05.

In Table D49 in Appendix D, the independent *t*-test results are displayed for EO_IN, EO_RT, and EO_PR along with the overall means for EO_all, for management and nonmanagement nurses. Equal variances were not assumed for the independent means. The data indicated higher figures for EO_IN, EO_RT, and EO_all mean differences between management and nonmanagement groups, while the converse was the case for EO_PR. The largest mean difference was evident in the case of EO_RT at -0.61822. The two-tailed significance levels for EO_IN, EO_RT, and EO_all were less than 0.05. The converse was the case with respect to EO_PR. In accordance with Norusis (2004), the null was rejected for EO_IN, EO_RT, and EO_all. The null was supported for EO_PR.

These outputs reflected the cautionary approach shared by management and nonmanagement nurses with respect to risk taking and the reasoned application of innovative methods in the health-care delivery system. The results also provided an indication of the greater leverage management nurses have, which was evident in the higher proactiveness often associated with managers' greater line of sight.

Environmental Turbulence Dimensions

Independent *t*-test analysis was conducted for environmental turbulence dimensions with respect to the means for the management and nonmanagement participants. In Table D50 in Appendix D the independent *t* test results are displayed for ET_FC, ET_IC, ET_OR, ET_LA, and ET_TC along with the overall means for ET_all, for all management and nonmanagement nurses. Equal variances were not assumed for the independent means.

The data indicated negative outcomes between the means for management and nonmanagement nurses in the case of ET_IC and ET_LA. Nonmanagement participants scored higher in response to the items. The result suggests that management and nonmanagement nurses conceived impacts of legislative activities and the need for interunit competition differently. The negative *t* figures for ET_IC and ET_LA could also represent a higher gravity of legislative activities and interunit competition as perceived by nonmanagement nurses, contrary to the perception of management nurses.

The two-tailed significance tests were greater than 0.05 for all environmental turbulence dimensions, as well as the overall mean for ET_all, except in the case of ET_OR, which displayed a significance of $p = .04$. In accordance with Norusis (2004), the null was rejected for ET_OR. The null was supported for ET_FC, ET_IC, ET_LA, ET_LC, and ET_all. In the case of ET_OR, the outcome represents significant commonalities in the way management and nonmanagement nurses perceived the impact of occupational requirements.

Employee Productivity Dimensions

Independent *t*-test analysis was conducted with respect to the means for the management and nonmanagement participants. The independent *t*-test results are displayed in Table D51 in Appendix D for EP_CM, EP_SM, EP_SL, EP_MS, EP_GS, and EP_IS, along with EP_all, for management and nonmanagement nurses. Equal variances were not assumed for the independent means.

The data indicated negative outcomes between the means for management and nonmanagement nurses in all cases, except for EP_MS. The results indicate that nonmanagement participants scored higher in response to the items except in the case of multidimensional skills, which could be a reflection of the vast array of skills employees must develop to successfully undertake the complex role of management. The two-tailed significance outputs were greater than 0.05 in all cases, except for EP_SL, which displayed a two-tailed output of $p = .04$ significance.

In accordance with Norusis (2004), the null hypothesis was rejected for EP_SL. The null hypotheses for EP_CM, EP_SM, EP_MS, EP_GS, EP_IS, and EP_all were supported. The results from the independent *t* test indicated a difference in the perception of complex meaningful work, self-management, multidimensional skills, group incentives, and individual incentives by management and nonmanagement nurses.

Multiple Regression Analyses

Predictive models were developed for employee productivity using the SPSS Version 12.0 statistical software based on the step-wise multiple regression method. In accordance with the multidimensional approach adopted in the current research, models were computed for each dimension associated with employee productivity, rather than relying on the unidimensional approach applied in the existing literature. Guided by the notion that nursing practice involves selfless service that goes beyond monetary reward, the focus of the current study were the nonmonetary aspects of employee productivity dimensions (i.e., challenging and meaningful work, self-management, supportive leadership, and multidimensional skills). Predictive models were not developed for the monetary dimensions of productivity (i.e., individual incentive and group incentive).

While this decision was not an attempt on the part of the researcher to minimize the importance of monetary compensation as motivational drivers, the aim was to hold the issue of monetary compensation constant and to treat monetary items as a given. Herzberg (as stated in Kacel, Miller, & Norris, 2005) posited that monetary compensation serves as a hygiene factor, whereas nonmonetary satisfiers serve as motivators. Accordingly, predictive models were developed for challenging and meaningful work, self-management, supportive leadership, and multidimensional skills with respect to management and nonmanagement nurses. The results are displayed in Tables D46 to D52 (see Appendix D).

Predictive Models for Challenging and Meaningful Work of Nonmanagement Nurses

Using the step-wise multiple regression method, two models were produced for EP_CM as a dependent variable. The outputs for the predictive models of EP_CM for nonmanagement nurses are displayed in Table D52 (see Appendix D). The step-wise multiple regression process produced two predictive models. Model 1 applied a constant and innovation as predictors of EP_CM; Model 2 applied a constant, innovation, and legislative activity as predictors of EP_CM. The independent variables in Model 1 and Model 2 were all positive, indicating that as the predicted values for the dependent variable increased, the values of independent variables also increased, making for a positive relationship. The significance for each of the coefficients in both predictive models was $p = .00$ (see Table D52 in Appendix D). The analysis of variance (ANOVA) also produced similar significance levels of $p = .00$. Accordingly, the null that there is no relationship between the dependent and independent variables was rejected for both Model 1 and Model 2.

Collinearity statistics were computed for the independent variables in Model 1 and Model 2. The tolerance and Variable Inflation Factor VIF values for the collinearity statistics are displayed in Table D52 (see Appendix D), with respect to the EP_CM predictive models for nonmanagement nurses. Tolerance values normally have a range of 0 to 1 and indicate the strength of the relationship among independent variables. When the value is closer to 1, this means an independent variable has its variability explained by other variables (Norusis, 2004).

Tolerance, VIF, and partial correlation values are displayed in Table D52 (see Appendix D). The tolerance value for EO_IN in Model 1 was 1, being the only independent variable. In the case of Model 2, the tolerance value for EO_IN was reduced to 0.793, which is the same as the tolerance value for ET_LA, indicating apparent multicollinearity between the two independent variables. The strength of the linear relationship was also apparent from the partial correlation value, which was 0.382 for EO_ON in Model 1, but reduced to 0.237 for both EO_IN and ET_LA in Model 2. The partial correlation indices displayed by each of the items is an indication of their strength in the multicollinear relationship. The VIF values displayed in Table D52 for the independent variables associated with Model 1 and Model 2 were all less than 2, which indicated no problem with collinearity in each case.

Statistical analysis for the regression coefficients and error of estimates were computed for the two EP_CM predictive models for nonmanagement nurses. The results are displayed in Table D54 (see Appendix D). To decide on the more appropriate predictive model, the *R*, *R*-square, adjusted *R*-square, and standard error of the estimate were examined with respect to Model 1 and Model 2. The proportion of variation explained by a model is represented by the *R*-square value, which was 0.146 for Model 1, compared to a higher proportion of 0.192 in Model 2. The estimate of how well a model fits another data set from the same population is represented by the adjusted *R*-square value, which was 0.143 in Model 1, compared to a higher value of 0.192 in Model 2.

The estimate of variance of the dependent variable from each value of the independent variable is represented by the standard error of the estimate, which was 0.611 in Model 1, compared to a lower value of 0.593 in Model 2. Accordingly, Model 2, EP_CM = 2.098 + 0.265 * EO_IN + 0.241 * ET_LA, with an *R*-square of 0.198, was selected. The relationship between the dependent and the independent variables in Model 2 indicated that the increased satisfaction derived by nonmanagement nurses from challenging and meaningful work in turbulent environments was positively correlated with innovation and changes presented by legislative activities.

Predictive Models for Self-Management of Nonmanagement Nurses

Using the step-wise multiple regression method, four models were produced for predicting EP_SM as a dependent variable. The outputs for the predictive models of EP_SM for the nonmanagement nurses are displayed in Table D55 (see Appendix D). The step-wise multiple regression analysis produced four predictive models. Model 1 applied a constant and legislative activity as predictors of EP_SM; Model 2 applied a constant, legislative activity, and occupational requirement as predictors of EP_SM; Model 3 applied a constant, legislative activity, occupational requirement, and innovation as predictors; Model 4 applied a constant, legislative activity, occupational requirement, innovation, and proactiveness as predictors.

The coefficients for the independent variables were positive in all cases, except in the case of EO_PR. Positive coefficients indicated that as the predicted values for the dependent variable increased, the values of independent variables also increased, making for a positive relationship. The converse was the case with respect to the negative coefficient. The significance derived for coefficients in all four predictive models was less than 0.05 (see Table D55 in Appendix D). The ANOVA for the four predictive models produced similar significance levels. Accordingly, the null that there is no relationship between the dependent and independent variables was rejected in the case of all four predictive models.

Collinearity statistics were computed for the independent variables in each of the four predictive models. Accordingly, the tolerance and VIF values of collinearity are displayed in Table D55 (see Appendix D) for the EP_SM predictive models for the nonmanagement nurses. Tolerance values normally have a range of 0 to 1 and indicate the strength of the relationship among independent variables. When the value is closer to 1, the independent variable has its variability explained by other variables (Norusis, 2004).

Tolerance, VIF, and partial correlation values are displayed in Table D55 (see Appendix D). The tolerance value for EP_LA in Model 1 was 1, being the only independent variable. The more independent variables were added going from Models 2 to 4, the more the tolerance values were reduced, which is an indication of the multicollinearity. The strength of the linear relationship between the variables was also apparent from the partial correlation values displayed in Table D55 (see Appendix D). The partial correlation for ET_LA in Model 1 was 0.305, indicating some multicollinearity between the variables. The VIF values displayed in Table D55 for independent variables associated with Models 1 to 4 were all less than 2, indicating no problem with collinearity in each case.

Statistical analyses for the regression coefficients and error of estimates were computed for the four EP_SM predictive models for nonmanagement nurses, and the results are displayed in Table D57 (see Appendix D). To decide on the more appropriate predictive model, the *R*, *R*-square, adjusted *R*-square, and standard error of the estimate were examined with respect to Models 1 to 4. The proportion of variation explained by a model is represented by the *R*-square value, which was 0.093 for Model 1, compared to higher proportions of 0.130 in Model 2, 0.147 in Model 3, and 0.161 in Model 4. The estimate of how well a model fits another data set from the same population is represented by the adjusted *R*-square value, which was 0.090 in Model 1, compared to higher values of 0.123 in Model 2, 0.138 in Model 3, and 0.148 in Model 4.

The estimate of variance of the dependent variable in relation to each of the independent variables is represented by the standard error of the estimate, which was 0.602 in Model 1, compared to lower values of 0.590 in Model 2, 0.586 in Model 3, and 0.582 in Model 4. Accordingly, Model 4, EP_SM = 2.455 + 0.155 * ET_LA + 0.147 * ET_OR + 0.171 * EO_IN – 0.021 * EO_PR, was selected with *R*-square of 0.161. The relationship between the dependent and independent variables in Model 4 indicated that the increased satisfaction derived by nonmanagement nurses from self-management in a turbulent environment was positively correlated with legislative activities, occupational requirements, and innovation, but negatively correlated with proactiveness.

Predictive Models for Supportive Leadership of Nonmanagement Nurses

Using the step-wise multiple regression method, two models were produced for predicting EP_SL as a dependent variable. The results are displayed in Table D58 in Appendix D. The step-wise multiple regression analysis produced two predictive models. Model 1 applied a constant and innovation as predictors; Model 2 applied a constant, innovation, and legislative activity as predictors.

The coefficients for the independent variables were all positive, indicating that as the predicted values for the dependent variable increased, the values of independent variables also increased, making for a positive relationship. The significance derived for each of the coefficients in both models was less than 0.05 (see Table D58 in Appendix D). The ANOVA analysis for the two predictive models also produced similar significance levels. Accordingly, the null that there is no relationship between the dependent and independent variables was rejected.

Collinearity statistics were computed for the independent variables in each of the two predictive models. Accordingly, the tolerance and VIF values of collinearity are displayed in Table D58 (see Appendix D) with respect to the EP_SL predictive models. Tolerance values normally have a range of 0 to 1 and indicate the strength of the relationship among independent variables. When the value is closer to 1, the independent variable has its variability explained by other variables (Norusis, 2004).

Tolerance, VIF, and partial correlation values are displayed in Table D58 (see Appendix D). The tolerance value for EO_IN in Model 1 was 1, being the only independent variable. As additional independent variables were added in Model 2, the tolerance value became reduced, given apparent multicollinearity between the independent variables. The strength of the linear relationship between the variables was also apparent from the partial correlation values displayed in Table D58 (see Appendix D). The partial correlation for EO_IN in Model 1 was 0.390, which decreased to a lower value in Model 2. The partial correlation index for each of the items is an indication of their strength in the multicollinear relationship between the variables. The VIF values displayed in Table D58 for the independent variables associated with Models 1 and 2 were both less than 2, indicating no problem with collinearity in each case.

Statistical analyses for the regression coefficients and error of the estimates were computed for the two EP_SL predictive models for nonmanagement nurses. The results are displayed in Table D60 (see Appendix D). To decide on the more appropriate predictive model, the *R*, *R*-square, adjusted *R*-square, and standard error of the estimate were examined with respect to Models 1 and 2. The proportion of variation explained by a model is represented by the *R*-square value, which was 0.152 for Model 1, compared to a higher proportion of 0.192 in Model 2. The estimate of how well a model fits another data set from the same population is represented by the adjusted *R*-square value, which was 0.149 in Model 1, compared to a higher value of 0.186 in Model 2.

The estimate of variance of the dependent variable in relation to each value of independent variable is represented by the standard error of the estimate, which was 0.746 in Model 1, compared to a lower value of 0.730 in Model 2. Accordingly, Model 2, EP_SL = 1.352 + 0.351 * EO_IN + 0.261 * ET_LA, was selected with an *R*-square of 0.192. The relationship between the dependent and the independent variables in Model 2 indicated that the dependent variable was positively related with increased satisfaction derived by nonmanagement nurses from supportive leadership in a turbulent environment, as well as from positive shifts in innovation and the change brought about by legislative activities.

Predictive Models for Multidimensional Skills of Nonmanagement Nurses

Using the step-wise multiple regression method, four models were produced for predicting EP_MS as a dependent variable. The results are displayed in Table D61 (see Appendix D). The step-wise multiple regression analysis produced four predictive models. Model 1 applied a constant and financial climate as predictors of EP_MS; Model 2 applied a constant, financial climate, and proactiveness as predictors of EP_MS; Model 3 applied a constant, financial climate, proactiveness, and technological change as predictors; Model 4 applied a constant, financial climate, proactiveness, technological change, and risk taking as predictors.

The coefficients for the independent variables were positive for ET_FC and ET_TC, indicating that as the predicted values for the dependent variable increased, the values of independent variables also increased, making for a positive relationship. The converse was true with the negative coefficient for EO_PR. The significance derived for each of the coefficients in all four predictive models was less than 0.05 (see Table D61 in Appendix D). The ANOVA analysis for the four predictive models also produced similar significance levels. Accordingly, the null that there is no relationship between the dependent and independent variables was rejected.

Collinearity statistics were computed for the independent variables. Accordingly, the tolerance and VIF values of collinearity are displayed in Table D61 (see Appendix D). Tolerance values normally have a range of 0 to 1 and indicate the strength of the relationship among independent variables. When the value is closer to 1, the independent variable has its variability explained by other variables (Norusis, 2004).

Tolerance, VIF, and partial correlation values for the four models are displayed in Table D61 (see Appendix D). The tolerance value for ET_FC in Model 1 was 1, being the only independent variable. As more independent variables were added in Models 2 to 4, the tolerance values decreased, which is an indication of multicollinearity between the independent variables. The strength of the linear relationship between the variables was also apparent from the partial correlation values displayed in Table D61 (see Appendix D). The partial correlation for ET_FC in Model 1 was 0.194, which diminished in Models 2 to 4 with the addition of more independent variables. The VIF values displayed in Table D61 for the independent variables associated with Models 1 to 4 were all less than 2, indicating no problem with collinearity.

Statistical analyses for the regression coefficients and error of estimates were computed for the four EP_MS predictive models. The results are displayed in Table D63 (see Appendix D). To decide on the more appropriate predictive model, the *R*, *R*-square, adjusted *R*-square, and standard error of the estimate were examined with respect to Models 1 to 4. The proportion of variation explained by a model is represented by the *R*-square value, which was 0.038 for Model 1, compared to higher proportions of 0.070 in Model 2, 0.092 in Model 3, and 0.105 in Model 4.

The estimate of how well a model fits another data set from the same population is represented by the adjusted *R*-square value, which was 0.034 in Model 1, compared to higher values of 0.063 in Model 2, 0.082 in Model 3, and 0.091 in Model 4. The estimate of variance of the dependent variable in relation to each value of independent variable is represented by the standard error of the estimate, which was 0.735 in Model 1, compared to lower values of 0.724 in Model 2, 0.717 in Model 3, and 0.713 in Model 4. Accordingly, Model 4, EP_MS = 2.905 + 0.101 * ET_FC - 0.032 * EO_PR + 0.089 * ET_TC + 0.108 * EO_RT, was selected with an *R*-square of 0.105. The relationship between the dependent and independent variables in Model 4 indicated the dependent variable was positively correlated with increased satisfaction derived by nonmanagement nurses from self-management in turbulent environments and exhibited positive influence with respect to financial climate, technological changes, and risk taking; however, the dependent variable was negatively correlated with proactiveness.

Predictive Models for Supportive Leadership of Management Nurses

The SPSS software package only generated step-wise regression analysis for the supportive leadership dimension of management nurses. Norusis (2004) explained that where independent variables are very highly related, it might not be possible to estimate a regression model for all of them. In that event, Norusis (2004) noted “SPSS will omit the offending variables from the model” (p. 530). In the case of the management group, SPSS did not produce any models for EP_CM, EP_SM, and EP_MS using the step-wise approach. The outputs for the predictive models of EP_SL for the management nurses are displayed in Table D64 (see Appendix D). The step-wise multiple regression process produced two predictive models. Model 1 applied a constant and financial climate as predictors, and Model 2 applied a constant, financial climate, and technological change as predictors.

The coefficient for the independent variable technological change was positive, indicating that as the predicted value for the dependent variable increased, the value of the independent variable also increased, making for a positive relationship. The coefficient for financial climate was negative, indicating that as the predicted value for the dependent variable increased, the independent variable decreased. The significance derived for each of the coefficients in both models was less than 0.05 (see Table D64 in Appendix D). The ANOVA analysis for the two predictive models also produced similar significance levels (see Table D65 in Appendix D). Accordingly, the null that there is no relationship between the dependent and independent variables was rejected.

Collinearity statistics were computed for the independent variables in each of the two predictive models. Accordingly, the tolerance and VIF values of collinearity are displayed in Table D64 (see Appendix D) with respect to the EP_SL predictive models. Tolerance values normally have a range of 0 to 1 and indicate the strength of the relationship among independent variables. When the value is closer to 1, other variables explain the variability of independent variable (Norusis, 2004).

Tolerance, VIF, and partial correlation values are displayed in Table D64 (see Appendix H). The tolerance value for EP_FC in Model 1 was 1, being the only independent variable. An additional independent variable was added in Model 2, and the tolerance value decreased, given apparent multicollinearity between the independent variables. The strength of the linear relationship between the variables is apparent from the partial correlation values displayed in Table D64 (see Appendix D). The partial correlation for EP_FC in Model 1 was 0.913, which was reduced to a lower figure in Model 2, again given multicollinearity between the variables. The VIF values for independent variables associated with Models 1 and 2 were both less than 2 (see Table D64 in Appendix D).The results indicated no problems with collinearity.

Statistical analyses for the regression coefficients and error of the estimates were computed for the two EP_SL predictive models. The results are displayed in Table D66. To decide on the more appropriate predictive model, the *R*, *R*-square, adjusted *R*-square, and standard error of the estimate were examined with respect to Models 1 and 2. The proportion of variation explained by a model is represented by the *R*-square value, which was 0.443 for Model 1, compared to a higher proportion of 0.859 in Model 2. The estimate of how well a model fits another data set from the same population is represented by the adjusted *R*-square value, which was 0.397 in Model 1, compared to a higher value of 0.833 in Model 2.

The estimate of variance of the dependent variable in relation to each value of the independent variable is represented by the standard error of the estimate, which was 0.332 in Model 1, compared to a lower value of 0.175 in Model 2. Accordingly, Model 2, EP_SL = 3.618 - 0.434 * ET_FC + 0.530 * ET_TC, was selected with an *R*-square of 0.859. The relationship between the dependent and the independent variables in Model 2 indicated the dependent variable was positively correlated with increased satisfaction derived by nonmanagement nurses from supportive leadership in a turbulent environment and the positive shift in technological change; however, the dependent variable was negatively correlated with poor financial climate.

Answers to Research Questions

Three questions guided the current study: (a) Are there significant relationships in the multidimensional elements that constitute environmental turbulence, entrepreneurial orientation, and productivity, as perceived by management and nonmanagement nurses? (b) Can the relationships among multiple dimensions of environmental turbulence and entrepreneurial orientation be applied as independent variables in the prediction of productivity as the dependent variable for management and nonmanagement nurses in significant ways? (c) Are there significant correlations in the perceptions held by management and nonmanagement nurses with respect to the impacts of environmental turbulence and entrepreneurial orientation on productivity that could indicate the emergence of adaptive leadership between the two groups?

The answers to the questions were investigated using nine hypotheses. The hypotheses were tested and the results for Hypotheses $H_0$1a, $H_0$1b, $H_0$2a, $H_0$2b, $H_0$3a, and $H_0$3b are presented in Table D67 and discussed below. Similarly, the results for Hypotheses $H_0$4a and $H_0$4b are presented in Table D68 and discussed below. Lastly, the results for Hypothesis $H_0$5 were presented in Tables D49 to D51 discussed earlier, but also addressed below.

Hypotheses Testing

Null Hypothesis $H_0 1a$

Null Hypothesis $H_0$1a noted, there is no significant relationship among the multidimensional factors of entrepreneurial orientation (innovation, risk taking, and proactiveness) as perceived among nonmanagement nurses. The null was rejected for the relationships between innovation and risk taking and innovation and proactiveness, which were both significant at the $p < .05$ level. The null was not rejected for the relationship between risk taking and proactiveness (see Table D67 in Appendix D).

Null Hypothesis $H_0 1b$

Null Hypothesis $H_0$1b noted, there is no significant relationship among the multidimensional factors of entrepreneurial orientation (innovation, risk taking, and proactiveness) as perceived among management nurses. The null was rejected for the relationship between innovation and proactiveness, which was significant at the $p < .05$ level. The null was not rejected for the relationships between innovation and risk taking and risk taking and proactiveness (see Table D67).

Null Hypothesis $H_0 2a$

Null Hypothesis $H_0$2a noted, there is no significant relationship among the multidimensional factors of environmental turbulence (uncertainty related to the financial climate, uncertainty related to the level of intergroup competition, uncertainty related to shifts in occupational requirements mandated by professional governing bodies, uncertainty related to legislative activities, and uncertainty related to technological shifts) as perceived among nonmanagement nurses. The null was rejected for the relationships among all of the environmental turbulence dimensions with respect to the nonmanagement nurses: financial climate and intergroup competition, financial climate and occupational requirements, financial climate and legislative activities, financial climate and technological shifts, intergroup competition and occupational requirements, intergroup competition and technological shifts, occupational requirements and legislative activities, occupational requirements and technological shifts, and legislative activities and technological shifts, which were all significant at the $p < .05$ level (see Table D67).

Null Hypothesis $H_0 2b$

Null Hypothesis $H_0$2b noted, there is no significant relationship among the multidimensional factors of environmental turbulence (uncertainty related to the financial climate, uncertainty related to the level of intergroup competition, uncertainty related to shifts in occupational requirements mandated by professional governing bodies, uncertainty related to legislative activities, and uncertainty related to technological shifts) as perceived among management nurses. The null was rejected for the relationships between financial climate and occupational requirements and intergroup competition and legislative activities, which were both significant at the $p < .05$ level. The null was not rejected for the relationships among financial climate and legislative activities, financial climate and intergroup competition, financial climate and technological shifts, intergroup competition and occupational requirements, intergroup competition and technological shifts, occupational requirements and legislative activities, occupational requirements and technological shifts, and legislative activities and technological shifts (see Table D67).

Null Hypothesis $H_0$3a

Null Hypothesis $H_0$3a noted, there is no significant relationship among the multidimensional factors of productivity (challenging and meaningful work, self-management, supportive leadership, multidimensional skills, preference for individual-based reward system, and preference for group-based reward system) as perceived among nonmanagement nurses. The null was rejected for the relationships among challenging and meaningful work and self-management, challenging and meaningful work and supportive leadership, challenging and meaningful work and multidimensional skills, challenging and meaningful work and preference for group-based reward system, challenging and meaningful work and preference for individual-based reward system, self-management and supportive leadership, self-management and multidimensional skills, self-management and preference for group-based reward system, self-management and preference for individual-based reward system, multidimensional skills and preference for group-based reward system, multidimensional skills and preference for individual-based reward system, and preference for group-based reward system and preference for individual-based reward system, which were all significant at the $p < .05$ level. The null was not rejected for the relationships between supportive leadership and multidimensional skills or supportive leadership and preference for individual-based reward system (see Table D67).

Null Hypothesis H_03b

Null Hypothesis H_03b noted, there is no significant relationship among the multidimensional factors of productivity (challenging and meaningful work, self-management, supportive leadership, multidimensional skills, preference for individual-based reward system, and preference for group-based reward system) as perceived among management nurses. The null was rejected for the relationships among challenging and meaningful work and self-management; self-management and multidimensional skills; multidimensional skills and preference for group-based reward system, which were all significant at the $p < .05$ level. The null was not rejected for the relationships among challenging and meaningful work and supportive leadership, challenging and meaningful work and multidimensional skills, challenging and meaningful work and preference for group-based reward system, challenging and meaningful work and preference for individual-based reward system, self-management and supportive leadership, self-management and preference for individual-based reward system, supportive leadership and multidimensional skills, supportive leadership and preference for group-based reward system, supportive leadership and preference for individual-based reward system, multidimensional skills and preference for individual-based reward system, and preference for group-based reward system and preference for individual-based reward system (see Table D67).

Null Hypothesis $H_0$4a

Null Hypothesis $H_0$4a noted, there is no significant predictive relationship among the multiple dimensions of entrepreneurial orientation and environmental turbulence when applied as independent variables, in the prediction of productivity satisfiers for nonmanagement nurses.

Challenging and meaningful work as satisfier. The null was rejected with respect to correlation among EP_CM and EO_IN and EP_LA, which were significant predictors at the $p < .05$ level. The best predictive model was EP_CM = 2.098 + 0.265 * EO_IN + 0.241 * ET_LA (see Table D52 in Appendix D)

Self-management as satisfier. The null was rejected with respect to the correlation among EP_SM and ET_LA, ET_OR, EO_IN, and EO_PR, which were significant predictors at the $p < .05$ level. The best predictive model was EP_SM = 2.455 + 0.155 * ET_LA + 0.147 * ET_OR + 0.171 * EO_IN – 0.021 * EO_PR (see Table D52 in Appendix D).

Supportive leadership as satisfier. The null was rejected with respect to the correlation among EP_SL and EO_IN and ET_LA, which were significant predictors at the $p < .05$ level. The best predictive model was EP_SL = 1.352 + 0.351 * EO_IN + 0.261 * ET_LA (see Table D52 in Appendix D).

Multidimensional skills as satisfier. The null was rejected for the correlation among EP_MS and EO_PR, ET_TC, ET_FC, and EO_RT, which were significant at the

$p < .05$ level. The best predictive model was EP_MS = 2.905 + 0.101 * ET_FC - 0.032 * EO_PR + 0.089 * ET_TC + 0.108 * EO_RT (see Table D52 in Appendix D).

Null Hypothesis $H_0$4b

Null Hypothesis $H_0$4b noted, there is no significant predictive relationship among the multiple dimensions of entrepreneurial orientation and environmental turbulence when applied as independent variables in the prediction of productivity satisfiers for management nurses. No significant predictors were derived for challenging and meaningful work, self-management, and multidimensional skills as satisfiers. When supportive leadership was applied as a satisfier, the null was rejected for the relationship among EP_SL and ET_FC and ET_TC, which were significant at the $p < .05$ level. The best predictive model was EP_SL = 3.618 - 0.434 * ET_FC + 0.530 * ET_TC (see Table D52 in Appendix D).

Null Hypothesis $H_0$5

Null Hypothesis $H_0$5 noted, there is no significant difference between the means for management and nonmanagement nurses based on relationships among the multidimensions of environmental turbulence, entrepreneurial orientation, and productivity that may suggest the emergence of adaptive leadership at the edge of chaos.

Entrepreneurial orientation dimensions. The *t*-test scores presented in Table D49 display the correlation between management and nonmanagement nurses with respect to the means for entrepreneurial orientation dimensions. The relationship between management and nonmanagement nurses was rejected at the $p < .05$ level, with respect to EO_IN and EO_RT. The relationship was supported with respect to EO_PR. The results indicate that EO_IN and EO_RT could foster the emergence of adaptive leadership at the edge of chaos.

Environmental turbulence dimensions. The *t*-test scores presented in Table D50 display the correlation between management and nonmanagement nurses with respect to means for environmental turbulence dimensions. The relationship between management and nonmanagement nurses was rejected at the $p < .05$ level with respect to ET_OR. The relationship was supported with respect to ET_FC, ET_IC, ET_LA, and ET_LC. The results suggest that ET_OR could foster the emergence of adaptive leadership at the edge of chaos.

Employee productivity. The *t*-test scores presented in Table D51 display the correlation between management and nonmanagement nurses with respect to the means for productivity dimensions. The relationship between management and nonmanagement nurses was rejected at the $p < .05$ level with respect to EP_SL. The relationship was supported with respect to EP_CM, EP_SM, EP_MS, EP_GS, and EP_IS. The results indicate that EP_SL could foster the emergence of adaptive leadership at the edge of chaos.

Summary

This chapter included a description of the sample-gathering approach used in the pilot and main surveys and the steps taken to ensure reliability and consistency of the survey instrument developed for the study. Stability of the instrument was established through the test-retest method, and Cronbach's alphas for the overall instrument and the subunits were within acceptable levels.

Factor loading was carried out with respect to determining items that loaded on each of the factors. The extraction of factors was done through the principal component analysis method, which yielded eigenvalues greater than 1 for factors that loaded successfully. Factor rotation was done using Varimax and KMO normalization methods, and the results were within acceptable levels. Bartlett's test of sphericity was also computed for the factor solutions within acceptable significance at the $p < .05$ level. These tests were determined to be within acceptable levels before proceeding with the statistical analysis of the main survey samples.

The chapter detailed the outputs of the descriptive statistics undertaken with respect to establishing frequency distributions of the statistical means for the entrepreneurial orientation, environmental turbulence, and employee productivity dimensions. The procedure was done for management and nonmanagement nurses. Hypotheses were established and tested to answer the research questions. Chapter 5 presents the summary of findings, the implications for leadership, and recommendations for future study.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

The purpose of the study was to understand the impacts of environmental turbulence and entrepreneurial orientation on the productivity of management and nonmanagement nurses at the University Health Network, a nonprofit health care establishment located in Toronto, Canada. A better understanding was also sought with respect to emergent properties of adaptive leadership that coevolved among management and nonmanagement nurses in the nonprofit environment, within the context of complex adaptive systems. Lichtenstein et al. (2006) explained that in complex adaptive environments, the leadership-followership exchanges that coevolve between employee groups are emergent, nonlinear, and deterministic. Tan et al. (2005) proffered that productivity is greatly enhanced at the edge of chaos because of the adaptive leadership properties assumed by employees. Conclusions are drawn in this chapter regarding whether or not the theories propounded by Lichtenstein et al. (2006) and Tan et al. (2005) are supported by the findings from the study.

A multidimensional approach was adopted for the study, and entrepreneurial orientation was captured based on three dimensions (innovation, risk taking, and proactiveness), environmental turbulence was captured through five dimensions (uncertainty related to the financial climate, uncertainty related to the level of intergroup competition, uncertainty related to shifts in occupational requirements mandated by professional governing bodies, uncertainty related to legislative activities, and uncertainty related to technological shifts), and employee productivity was captured using six dimensions (challenging and meaningful work, self-management, supportive leadership, multidimensional skills, preference for individual-based reward system, and preference for group-based reward system). Entrepreneurial orientation and environmental turbulence were independent variables applied in the prediction of satisfiers in the dependent variable productivity through a step-wise multiple regression process.

The study instrument was developed by the researcher and tested for reliability and consistency prior to being applied for purposes of data gathering. Participants were sampled randomly, and data analysis was performed using the SPSS Version 12.0 statistical software package. The results of the analyses and hypotheses tests provided appropriate answers for the research questions posed. The results were presented in chapter 4 and are discussed in this chapter as well for purposes of drawing relevant conclusions. The remainder of the chapter discusses the approach to the study, research findings, and the conclusions derived. Limitations and delimitations of the study are also presented, along with some recommendations for future study.

Conclusions

Approach to the Study of Environmental Turbulence Dimensions

A multidimensional approach was adopted for studying the impact of entrepreneurial orientation and environmental turbulence on the productivity of management and nonmanagement nurses in the nonprofit health-care environment. The aim was to further understanding regarding the use of a multidimensional approach to investigating the impacts of entrepreneurial orientation, environmental turbulence, and employee productivity. The objective was to draw relevant conclusions based on the understanding and to develop models to guide health-care practitioners and researchers in the future.

Earlier studies on the impacts of environmental turbulence and entrepreneurial orientation on productivity were unidimensional, firm-based, and focused predominantly on for-profit organizations outside of the health-care environment (for example, Lawrence & Kraft, 1986; Miller, 1983). Following earlier exploratory studies, Covin and Slavin (1991) proposed a firm-based, multidimensional approach for the measurement of environmental turbulence, which was seen as advancement over previous applications. Covin and Slavin (1991) proposed that environmental turbulence should be determined through a composite measurement of external dynamism, environmental hostility, and technological sophistication, albeit aggregately. The current study adopted a multidimensional and person-based approach, while focusing on the nonprofit health-care environment. In the paragraphs that follow, conclusions are drawn with respect to the findings on the unidimensional versus the multidimensional approach applied in the study.

In Table D45, a correlation matrix for the relationship among items that constituted environmental turbulence (uncertainty related to the financial climate, uncertainty related to the level of intergroup competition, uncertainty related to shifts in occupational requirements mandated by professional governing bodies, uncertainty related to legislative activities, and uncertainty related to technological shifts) was presented with respect to nonmanagement nurses. A similar procedure was displayed in Table D46 with respect to management nurses. From the correlation matrix displayed in Table D45, outputs for nonmanagement participants were all positively correlated, with significance levels at $p < .05$ in all cases.

Although all items correlated positively, as displayed in Table D45, the correlation coefficients between environmental turbulence items were somewhat weak for nonmanagement nurses, ranging from 0.14 for ET_LA and ET_TC to 0.54 for ET_IC and ET_LA. The significance levels for the items were strong in all cases for the nonmanagement nurses at $p < .05$. It was therefore concluded that in the case of the nonmanagement nurses, the legal and regulatory impacts on environmental turbulence were very evident through the high correlation between ET_LA and ET_TC. It could be related to the fact that technological changes are highly influenced by regulatory regimes, perhaps for added safety measure in health care activities. The impact of such regulations would be greater in nonmanagement nurses who perform many of the nursing tasks.

Much higher correlation coefficients were displayed in Table D46 for the management nurses, ranging from 0.11 for ET_TC and ET_LA to 0.73 for ET_FC and ET_OR. In the case of the management nurses, significance levels were generally weak. It was concluded that items for management nurses correlated strongly in areas involving organizational and financial matters and weakest in areas involving technological changes. This could be indicative of the managerial orientation of employees in this group.

From the findings, it was apparent that all of the environmental turbulence items did not correlate with equal coefficients for management nurses or for the nonmanagement nurses. Contrastingly, it was also found that some items did not correlate positively with respect to the management nurses, as opposed to the nonmanagement nurses. Given the nonuniform and nonuniversal responses, it was concluded that the use of person-based, multidimensional approach was more suited to the measurement of environmental turbulence. The findings did not support the use of unidimensional, firm-based environmental turbulence dimensions, as applied in many of the existing studies.

Approach to the Study of Entrepreneurial Orientation Dimensions

A multidimensional approach was adopted with respect to the study of entrepreneurial orientation, consistent with Kreiser et al. (2002a) and Yusuf (2002). However, both studies were based on private sector entities outside of the health-care environment. Kreiser et al. (2002a) purported, “The use of aggregated measures of entrepreneurial orientation may conceal the true nature of the relationships that exist between each of the sub dimensions of the construct” (p. 77). In advocating the use of innovation, risk taking, and proactiveness, Kreiser et al. (2002a) noted the “three dimension solution received significantly better model fit than either the one dimension or two dimension solution” (p. 79). However, Kreiser et al.’s (2002a) study was firm-based and focused on the for-profit environment. In the paragraphs that follow, conclusions are drawn with respect to the findings on the unidimensional versus the multidimensional approach applied in the current study.

In Table D43, a correlation matrix for the relationship among entrepreneurial orientation items (innovation, risk taking, and proactiveness) was presented with respect to nonmanagement nurses. The matrix for management nurses is displayed in Table D44. From the correlation matrix displayed in Table D43, outputs for nonmanagement participants were all positively correlated with significance levels at $p < .05$ in all cases, except for EO_PR and EO_RT, which were negatively correlated. The positive coefficients ranged from 0.13 to 0.41. It was concluded that risk taking and proactiveness were not well promoted within the highly regulated and controlled environment in which nonmanagement nurses work.

A slightly higher correlation coefficient was displayed in Table D44 for management nurses. Innovation and proactiveness factors had the highest correlation coefficient, indicating the strategic aspect of management nurses. In the case of management nurses, all three items were positively correlated, as opposed to the case of the nonmanagement nurses in which only two items correlated positively. It was concluded that the two-factor solution was more suited to the nonmanagement nurses, while the three-factor solution was the case with respect to management nurses.

Based on the evidence, the three-factor solution advocated by Marino and Weaver (2005) was supported only with respect to management nurses. Also, the findings in this dissertation indicated that all the environmental turbulence items did not correlate with equal strengths for management nurses or for nonmanagement nurses. As well, some items did not correlate positively in the case of nonmanagement nurses. It was concluded from the study that person-based, multidimensional approach was more suited to the measurement of environmental turbulence.

Approach to the Study of Employee Productivity Dimensions

A multidimensional method was adopted in the current study with respect to the study of employee productivity. Employee satisfaction was applied as a proxy for productivity in the study. The method adopted in the current study with respect to employee productivity was consistent with Moody (2004) who argued that organizations have to rethink the concept of nurse productivity in cases where productivity is aligned with a person-environment interface. Several authors have advocated the substitutability between satisfaction and productivity (for example, Henderson, 1997; Kendall, 2003; Long, 2002; Milkovich & Newman, 2005).

Some researchers have urged the use of a multidimensional approach for measuring productivity specific to nurses' work (for example, Kendall, 2003; Spence-Laschinger et al., 2001). Nothing in the existing body of work advocated the use of different factors for management and nonmanagement nurses. The existing studies were based on firm-based approach, as opposed to the person-based approach applied in the current study. There is merit to applying a person-based approach to examining the issue of job satisfaction in employees, given that individuals have unique motivational drives (Maslow, 1970).

In Table D47, a correlation matrix for the relationship among employee productivity items (challenging and meaningful work, self-management, supportive leadership, multidimensional skills, preference for individual-based reward system, and preference for group-based reward system) is presented with respect to nonmanagement nurses. A similar procedure is displayed in Table D48 with respect to management nurses. From the correlation matrix displayed in Table D47, it was found that outputs for nonmanagement participants were all positively correlated. The correlation coefficients ranged from 0.09 for EP_SL and EP_IS to 0.38 for EP_CM and EP_SM. The result suggested that challenging work may flourish more among self-managed teams of nurses, and it would be in the interest of senior management to promote more group-based compensation for nonmanagement nurses for this reason.

In the case of management nurses, many of the factors correlated positively with the exception of EP_CM and EP_IS, EP_SL and EP_IS, and EP_MS and EP_IS, which indicate individual-based incentive systems may not flourish alongside challenging work, supportive leadership, and multidimensional skills as perceived by management nurses. An explanation could be that managers generally promote knowledge sharing and team-oriented incentive systems as a way to achieve a productive workforce. Conversely, EP_GS and EP_MS corrected very strongly at 0.58 as perceived by management nurses. In this case, group incentive was strongly linked to multidimensional skills by management nurses. Just as was concluded for the nonmanagement group, it would also be in the interest of senior management to promote more group-based incentive for the management nurses.

Predictive Models for Employee Productivity

Multiple regression analyses were carried out to determine predictive models for employee productivity in the case of management and nonmanagement nurses. Employee productivity was applied as a dependent variable in the current study. Entrepreneurial orientation and environmental turbulence were applied as independent variables. In the multiple regression process, the four nonmonetary components of employee productivity (challenging and meaningful work, self-management, supportive leadership, multidimensional skills) were designated as satisfiers, given their capacity to motivate employees (Maslow, 1970). The literature is replete with supports for this assertion (for example, Ma et al., 2003; McNeese-Smith, 2001). Maslow (1970) established that the satisfaction derived by employees directly relates to the extent to which employees' needs are met. Thus, satisfied employees would be apt to be more productive.

Hirschey and Pappas (1993) noted that the measurement of productivity "is a challenge facing all managers" (p. 376) and suggested the use of a multidimensional approach to the measurement of productivity based on a composite approach. Hader (1999) pointed to the need to develop a multiple mode of performance outcomes and thus productivity. The current study examined employee satisfaction, and thus employee productivity by proxy, by applying nonmonetary items as dependent variables. In the paragraphs that follow, conclusions are drawn with respect to the findings on the influence of independent variables entrepreneurial orientation and environmental turbulence on the predictive models for satisfiers in the case of management and nonmanagement nurses.

Models for Nonmanagement Nurses

Challenging and meaningful work. Significant predictors were innovation and legislative activity. The best model derived was EP_CM = 2.098 + 0.265 * EO_IN + 0.241 * ET_LA (see Table D52), which indicated a positive influence of the innovation dimension for entrepreneurial orientation and legislative activity dimension for environmental turbulence. The conclusion was that positive legislative activities, coupled with the prevalence of positive innovative climate, could act together to promote heightened satisfaction and thus productivity on the part of nonmanagement nurses.

Self-management. Significant predictors were legislative activity, occupational requirements, innovation, and proactiveness. The best predictive model derived was EP_SM = 2.455 + 0.155 * ET_LA + 0.147 * ET_OR + 0.171 * EO_IN – 0.021 * EO_PR (see Table D55), which indicated positive influence by the legislative activity dimension for environmental turbulence and by the occupational requirements dimension for environmental turbulence, while there was a negative influence by the proactiveness dimension for entrepreneurial orientation. This model was reflective of the effects of legislative authorities and professional bodies on nonmanagement nurses, coupled with administrative controls and monitoring protocols exerted by their employer.

The conclusion was that positive legislative activities could act to induce satisfaction and thus productivity on the part of nonmanagement nurses, depending on whether they were perceived to be fair. Conversely, where proactiveness is not encouraged, this could become a source of dissatisfaction and lower productivity on the part of nonmanagement nurses.

Supportive leadership. Significant predictors were innovation and legislative activity. The best model derived was EP_SL = 1.352 + 0.351 * EO_IN + 0.261 * ET_LA (see Table D58), which indicated a positive influence by the innovation dimension for entrepreneurial orientation and by the legislative activity dimension for environmental turbulence. The conclusion was that positive legislative activities could promote innovative practices in nursing, particularly in instances where the rules were thought to be progressive.

Multidimensional skills. Significant predictors were financial climate, proactiveness, technological change, and risk taking. The best model derived was EP_MS = 2.905 - 0.101 * ET_FC – 0.032 * EO_PR + 0.089 * ET_TC + 0.108 * EO_RT (see Table D61). This indicated a positive influence by the technological change dimension for environmental turbulence and by the risk-taking dimension for entrepreneurial orientation. Conversely, the financial climate dimension, with respect to environmental turbulence and proactiveness, exhibited negative influence.

It was concluded that multidimensional skills would more likely result in greater satisfaction for nonmanagement nurses when immersed in technological change. Also, it would appear that nonmanagement nurses associated with the need for multidimensional skills to a lesser extent than management nurses.

Models for Management Nurses

No significant predictors were derived when challenging and meaningful work, self-management, and multidimensional skills were applied as dependent variables. However, SPSS was able to compute a predictive model for the supportive leadership dimension in the study for management nurses. Norusis (2004) explained the reason is that SPSS could have difficulty estimating regression models where there are very highly related independent variables.

It was concluded there was evidence of lesser variability within management nurses, given the vastly similar administrative training regime common to most managers, that is convergent and designed within the managerial locus of control. For this reason, SPSS was unable to produce predictive models for management nurses with respect to the challenging and meaningful work, self-management, and multidimensional skills dimensions. The model was only possible for the supportive leadership satisfier, in the case of management nurses. Such problems were absent in the case of nonmanagement regression models, given more variability in the group.

Supportive leadership for management nurses. Significant predictors were financial climate and technological change. The best model derived was EP_SL = 3.618 – 0.434 * ET_FC + 0.530 * ET_TC (see Table D64), which indicated a positive influence with the technological change dimension for environmental turbulence and a negative influence with the financial climate dimension for environmental turbulence. It was concluded that technological changes do support innovative nursing practice during turbulent times, and many of the novel practices would require the support of management to succeed. Conversely, when faced with financial constraints during turbulent financial times, management choices could be impacted negatively due to budget priorities. On that basis, supportive leadership on the part of management nurses was negatively correlated in the study with poor financial climate. However, on a more positive side, such events could bring about innovation and technological changes, which could enhance productivity.

Adaptive Leadership and Productivity at the Edge of Chaos

In Figure 2, a conceptualized model was presented that depicted leadership-followership exchange between management and nonmanagement nurses. The model identified three zones associated with leadership-followership exchange dynamics between management and nonmanagement nurses. The premise for the conceptualization was that greater adaptation in the leadership-followership exchange could bring about heightened entrepreneurial orientation. Similarly, high entrepreneurial orientation could also manifest as a result of greater productivity. McDonald (2000) noted, “Organizations must have the capacity to respond to unanticipated circumstances . . . when unfolding of the world is uncertain” (p. 90). Dolan, Garcia, & Auerbach (2003) noted that in complex adaptive systems, agents’ schemata should be guided by the willingness to self-organize and solve problems through creative and innovative means.

Lichtenstein et al. (2006) posited that leadership is an emergent event and the leadership role can be assumed by any agent who emerges from any group within the organization, where such an agent is driven by the desire to achieve adaptive outcomes for the greater good of all. Lichtenstein et al. (2006) explained that self and others are not separable in complex adaptive systems. Similarly, Arndt and Bigelow (2000) explained "through group actions of participants the system as a whole acquires properties that transcend the contributions of individual members" (p. 36). P. Anderson (1999) noted, "agents comprise individuals, groups or a coalition of groups" (p. 3). P. Anderson (1999) explained that the perceptions of individuals, groups, and coalitions of groups are guided by different schemata, aimed at positive adaptation and enhanced productivity. Given this premise and the results of the *t*-test analyses in this dissertation, the leadership-followership zones in Figure 2 were reconstituted to further reflect adaptive-leadership schema exhibited by management and nonmanagement nurses (see Figure 3).

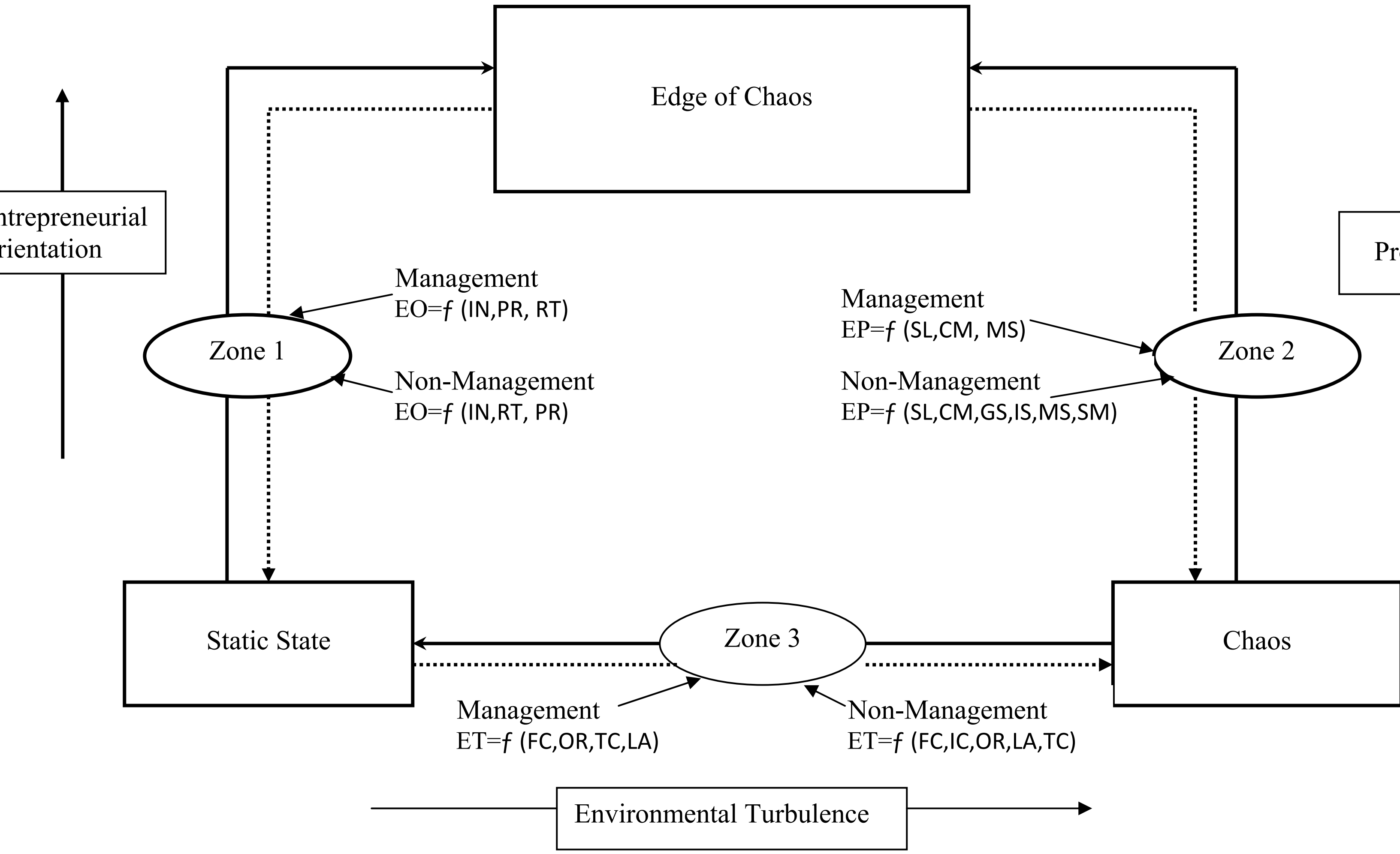
Tan et al. (2005) found that most innovations generally occurred at the edge of chaos. Lansing (2003) espoused a situation whereby self-organizing properties of interactive groups would prompt members to work together across boundaries in order to steer the organization away from chaos and toward the edge of chaos. Accordingly, Figure 3 depicts leadership-followership exchange dynamics between management and nonmanagement nurses as manifested at the edge of chaos. Conditions associated with Zones 1, 2, and 3 leadership-followership exchange are discussed below in relation to the outcomes of correlational analyses and *t* tests undertaken in the dissertation.

Zone 1, leadership-followership exchange. Zone 1 allowed for the achievement of positive adaptation that could propel an organization from a static state brought on by complacency and inaction to the edge of chaos. Low environmental turbulence and low entrepreneurial orientation characterize the static state, whereas high entrepreneurial orientation and high productivity were more associated with the edge of chaos. Based on the results, favorable conditions for management nurses was represented as EO = f (IN, PR, RT). The favorable conditions for nonmanagement nurses was represented as EO = ƒ (IN, RT, PR).

Zone 2, leadership-followership exchange. Zone 2 allowed for the achievement of positive adaptation that could propel an organization from a state of chaos brought on by high environmental turbulence and low productivity to the edge of chaos characterized by high productivity and high entrepreneurial orientation. Favorable conditions for management nurses was represented as EP = ƒ (SL, CM, MS). Favorable conditions for nonmanagement nurses was represented as ET = ƒ (SL, CM, GS, IS, MS, SM).

Zone 3, leadership-followership exchange. Zone 3 allowed for the achievement of positive adaptation that could propel an organization from a state of chaos brought on by high environmental turbulence and low productivity to a static state characterized by low environmental turbulence. Favorable conditions for management nurses was represented as ET = ƒ (FC, OR, TC, LA). Favourable conditions for nonmanagement nurses was represented as ET = ƒ (FC, IC, OR, LA, TC).

Leadership-followership dynamics in Zones 1 and 2 are critical to optimizing productivity at the edge of chaos, according to Tan et al. (2005). It is in these zones that organizations should look to harness adaptive leadership necessary to maximize productivity. According to Tan et al. (2005), it is also in these zones that satisfied and motivated employees would be more apt to perform at their peak. Furthermore, it is in these zones that the use of motivators as drivers of satisfaction in accordance with the findings of Herzberg (as cited in Kacel et al., 2005). Given these precepts, multiple regression analyses were used in the current study to construct predictive models for the productivity of management and nonmanagement nurses.



ure 3. Leadership-followership model for operating at the edge of chaos while optimizing outcomes of Zones 1 and 2 exchanges

Several authors noted that complex adaptive systems were dynamic, nonlinear, nonrepetitive, unpredictable, but deterministic and have emergent property (for example, Anderson, 1999; Dolan et al., 2003), which was consistent with the findings in the dissertation, given the low regression coefficients associated with the predictive models both in the case of management and nonmanagement nurses. The exception was the predictive model determined for the supportive leadership dimension, in the case of management nurses where the best model for EP_SL displayed an *R*-square of 0.927.

In the case of the predictive models derived for nonmanagement nurses the *R*-squares were low. The best model for EP_CM nonmanagement nurses displayed an *R*-square of 0.445, the best model for EP_SM nonmanagement nurses displayed an *R*-square of 0.401, the best model for EP_SL nonmanagement nurses displayed an *R*-square of 0.192, and the best model for EP_MS nonmanagement nurses displayed an *R*-square of 0.105.

The low *R*-squares for the predictive models in the case of nonmanagement nurses indicated weak linear relationships between the dependent variable and the predictor variables. The converse was the case for the high *R*-square output of the predictive model for EP_SL management nurses. The supportive leadership model for management nurses displayed a stronger linear property between the dependent variable and the predictor variables. Norusis (2004) explained that the closer *R*-square is to zero, the less linear the relationship. Norusis (2004) also explained that it is possible in such circumstances to obtain outputs with positive correlations, but that these may not necessarily display linear relationships.

The *R*-square values for nonmanagement nurses supported the findings in P. Anderson (1999) in terms of weak linear properties in the predictive models. Given functional accountabilities of nonmanagement nurses, which are centered more on short term tactical objectives as opposed to the longer term strategic horizons of management nurses, the researcher concluded that predictive models for the productivity of nonmanagement nurses are possible in the short term; however, the relationship derived between the predictors would be nonlinear.

Implications and Contributions of Study

At the start of the study, it was noted that research materials on the impact of environmental turbulence and entrepreneurial orientation on the productivity of employees in the nonprofit health-care environment were scarce. Existing studies applied a firm-based, unidimensional approach to studying the impact of environmental turbulence and entrepreneurial orientation on productivity in the private sector. Also, comparative data specific to management and nonmanagement nurses were not available with respect to the nonprofit health-care environment.

The study involved an investigation into the impact of environmental turbulence and entrepreneurial orientation on the productivity of management and nonmanagement nurses in a nonprofit health-care organization, with a view to contributing to the body of literature. The study involved the application of a person-based, multidimensional approach. Given the lack of available data on the subject, the researcher developed a tool to gather data. The implications of the study are discussed below.

Implications and Contributions to Academic Literature

A multidimensional tool was developed and tested for purposes of the current study, so that researchers doing similar work in the future may be able to apply the tool satisfactorily in their work. The study provided robust empirical data that could help expand academic discourse, leading to greater understanding of the productivity of management and nonmanagement employees. Central to this point is the contribution of the study with respect to how to harness entrepreneurial proclivities under conditions of uncertainty and chaos.

A unique person-based, multidimensional approach was applied in the current study, which allowed the researcher to develop predictive models for employee satisfiers. The findings indicated the notion of the existence of different satisfiers for management and nonmanagement nurses was established empirically and served as a basis for expanding the literature on the subject.

The findings in the dissertation provided support for the adaptive leadership theory under chaos and uncertainty espoused by Lichtenstein et al. (2006). The robust investigation of the impacts of environmental turbulence and entrepreneurial orientation on the productivity of management and nonmanagement nurses provided a basis for expanding the discourse on leadership-followership exchange zones that emerge in complex adaptive systems.

Implications and Contributions to Leadership

The statistical outputs reported in the current study may provide ample evidence to policy makers and senior management in organizations about the proclivities and beliefs of management and nonmanagement nurses. This understanding could help organizations develop more effective work teams in the health-care environment. The predictive models developed for the various nonmonetary drivers of motivation could help policy makers and senior management in organizations identify and apply satisfiers that could induce greater levels of motivation and productivity.

The study presented empirical evidence in support of the dynamics between management and nonmanagement nurses and expounded on factors that could facilitate adaptive leadership under conditions of chaos and uncertainty. The study also provided greater understanding of the leadership-followership exchange between members of interdependent groups, which could help policy makers and senior management in organizations organize and deploy work teams with person-organization-environment fit.

The extensive literature research undertaken in the dissertation could provide policy makers and senior administration with the evidence required to support organizational initiatives in the areas of entrepreneurial orientation, environmental turbulence, and productivity. The findings in this dissertation could also prove useful with respect to building high involvement and collaborative teams, with greater participation on the part of the workers.

Implications and Contributions to Health-Care Management

Findings from the study may allow health-care administrators to better understand dynamics that promote enhanced productivity at the edge of chaos, where innovation and creativity are also most profound. The findings in the dissertation supported the adoption of adaptive leadership between management and nonmanagement nurses, where workers from both groups could assume adaptive roles for the greater good of all. This finding could be applied by senior management in the nonprofit health-care environment, to identify areas of positive leadership-followership exchange, where individuals may assume or cede leadership for the greater good of the organization.

Given unpredictable but constant episodes of turbulence in the health-care environment in the 21st century, multiskilling should be encouraged on the part of management and nonmanagement nurses to help develop organizational capabilities needed to solve complex problems. The involvement of individual workers should be encouraged in the design of training and development strategies aimed at maximizing satisfaction on the part of employees. The research tool developed in this dissertation could be useful to organizational leaders with respect to data gathering and analysis.

Based on the findings in this dissertation, health-care administrators could pursue complexity absorption strategies as a way to achieve the adaptive capacities needed for high productivity and sustainability through turbulent periods. Under this schema, interunit collaboration should be encouraged instead of interunit competition. Risk management and proactiveness should also be encouraged on the part of both management and nonmanagement nurses.

Assumptions

The researcher assumed the survey population was well educated and could understand the written instructions provided on the consent forms and survey questionnaires. This assumption was validated as the educational levels of the survey participants evidentially ranged from college diploma to master’s degree, which allowed for greater comprehension and understanding of written instructions. The research relied solely on the questionnaire approach to data gathering, with the assumption that the tool would be sufficient to gather relevant data on the various dimensions of entrepreneurial orientation, environmental turbulence, and productivity.

To avoid any deficiencies, the researcher developed a robust questionnaire that included 10 items related to of entrepreneurial orientation dimensions, 15 items related to environmental turbulence dimensions, and 10 items related to productivity dimensions. To ensure stability of the research tool, the researcher tested the tool on a pilot group with respect to construct validity, reliability, and consistency before proceeding with data gathering. The testing phases were useful given that all returned questionnaires were useable, and provided copious information on the beliefs of the respondents.

Limitations

It was feared the hectic nature of nurses' work and tight schedules could affect the response rate. To avert such a dilemma, the researcher solicited advice from high-level hospital administrative staff and union executives with respect to an appropriate planning horizon that would yield the greatest response rate. Information received from these officials allowed the researcher to plan appropriately with respect to the survey logistics, which yielded an overall response rate of 96%. Given the scarcity of materials on the subject in the existing literature, there was an initial concern by the researcher on how to proceed with the development of a measurement tool to accurately capture the value scores for entrepreneurial orientation, environmental turbulence, and productivity.

The main concern was whether or not the tool would meet acceptable tests of reliability and be validated. After careful thought the researcher proceeded to develop the measurement tool, which was tested for construct validity through field tests and tested further for reliability and consistency by the test-retest protocol using pilot group participants. No shortfalls were observed due to the careful and detailed nature of the instrument testing, which yielded favorable levels of Cronbach's alpha values.

It was also feared that stringent confidentiality rules in the hospital environment could provide insurmountable problems with respect to issues of access. To avert the problem, the researcher went through a lengthy and protracted approval process by the University Health Network Nursing Research Committee (see approval letter in Appendix F) and the University Health Network Research Ethics Board (see approval letter in Appendix G). Based on the generous advice provided by the approval bodies, the researcher was able to avoid potential ethical and confidentiality hurdles in the process. No issues arose with respect to data integrity, due to the precautionary steps taken.

Delimitations

The study was restricted to management and nonmanagement nurses at the University Health Network, an organization involving three hospitals in an alliance relationship. The potential existed for cultural differences among the partners in the alliance to creep into the beliefs expressed by survey participants. The researcher relied on the high level of education and the professionalism of the survey participants to allay any concerns related to organizational culture creep. No evidence arose to suggest aberrant or skewed responses due to cultural incongruence.

The researcher relied on a pen-and-paper, self-reporting data gathering method rather than personal observation. The mitigating factors were the time constraints of nurses who are extremely busy and the impossible logistics of actually observing a large population of 300 survey participants in one location. The data-gathering method adopted by the researcher proved adequate, as there was no evidence of poor quality response by the survey participants. Also, the seamless distribution and return of the survey materials was aided by the advice received from senior hospital and union officials.

Nursing assistants were excluded from the survey population. The exclusion was necessary given the focus on participants from the nursing stream registered by professional nursing bodies. The exclusion of nursing assistants from the study did not have any adverse impact. On the contrary, the greater level of homogeneity in the survey population appeared to have enhanced the data quality.

The ratio of management to nonmanagement nurses selected for the survey was structured to reflect the actual ratio of managers and nonmanagers in the population frame. The decision to reflect the real manager-subordinate ratio proved relevant to the research findings, as it helped to accurately capture the leadership-followership exchange regimes between management and nonmanagement nurses.

Recommendations

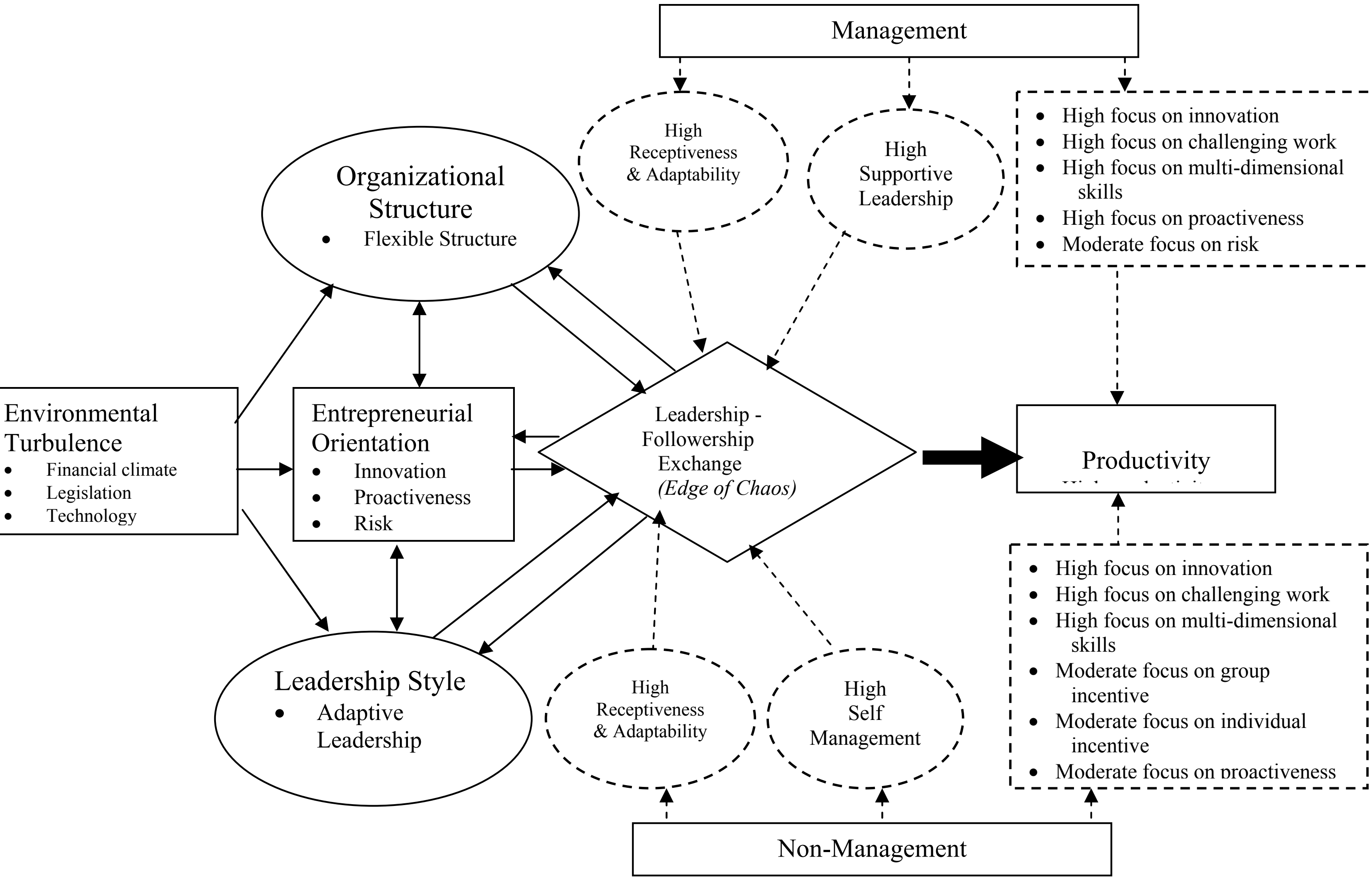
Maximizing Productivity in Complex Adaptive Systems

The framework for the model depicted in Figure 4 hinged on the data gathered and analyzed for the study. The study was based on samples gathered from management and nonmanagement nurses at the University Health Network, Toronto, Canada, a nonprofit health-care provider. Although the data applied were gathered from nursing groups in the nonprofit health-care environment, it is believed that the models presented in Figures 3 and 4 could be applicable to nursing groups in the for-profit health care environment as well. The production frontier for nurses in all cases is the provision of quality health care to consumers, regardless of whether the hospital is within the for-profit or nonprofit environment. Given this premise, there is a need to tests the model depicted in Figure 4 in health-care organizations from all jurisdictions, irrespective of their nonprofit or for-profit characterization.

There is also a need to replicate the study under conditions of chaos and uncertainty with respect to other allied health-care professionals prior to generalizing the findings. The recommendations provided below would help illuminate the leadership-followership exchange regimes that could facilitate adaptive leadership and high productivity in the working environments of management and nonmanagement nurses.

Environmental Turbulence Dimensions

Of the five environmental turbulence dimensions examined in the dissertation, it is recommended that particular attention be paid to sources of environment turbulence arising from (a) financial climate, (b) legislative activities, and (c) technological changes, given the outcomes of the correlational analyses and the strength relations associated with predictive models derived for productivity. Due to the pervasive nature of environmental turbulence in health-care environments, it is important that health-care organizations invest in systems that would alert senior administration and employee groups to potential ill-effects from impending financial climate, legislative activity, or shifts in technology that could present a threat to the organization. The key is for senior management to work collaboratively with nonmanagement staff, while enabling employees and encouraging them to channel organizational resources effectively toward the abatement of environmental turbulence.



ure 4. Model for achieving high productivity while facilitating a positive relationship between environmental turbulence, repreneurial orientation, and productivity.

The practical work environment in these terms should include a flexible organizational structure in which employees could work collaboratively and share knowledge with other members of multidisciplinary work teams. As evident in the results from the current study, when presented with the following statement, I believe it is important for an organization to structure itself effectively, so that it can respond appropriately to external as well as internal challenges, 98.4% of nonmanagement participants indicated *agree* to *strongly agree*, compared to 85.7% of management participants. The outcomes in both cases were supportive of the need for organizations to structure themselves appropriately.

Adaptive leadership should be central to the dynamics of such an environment. In this case employees could voluntarily opt for complex challenges while assuming leadership roles in their areas of strength. In the current study, the evidence supported the need for employees to acquire multidimensional skills that could help alleviate impacts of technological change. For example, when presented the statement, I feel that my professional training has provided me the necessary skills to think critically through work processes, especially as these relate to job outcomes, 92.9% of management respondents indicated *agree* to *strongly agree*, compared to 89.7% of nonmanagement participants. The high figures were a clear indication of the importance of high levels of multidimensional skills required to handle complex organizational problems.

The evidence from the current study also supported a keen awareness of regulatory activities that could affect professional practice at the employee level. For example, when presented with the statement, I find the professional standards/legislation governing nurses very insular and restrictive in terms of my ability to collaborate effectively with other allied professionals, 42.8% of management participants indicated *agree* to *strongly agree*, compared to 39.4% of nonmanagement participants. Though the figures were low generally, the response was relatively high in the case of management respondents. The higher response could indicate the inability of management to utilize the services of subordinates in an uninhibited way as agents of the employer, because of the overarching constraints of health care legislation. As a cursory point, such levels of frustration could become exacerbated even further in some cases by union restrictions as well, an issue outside the scope of the current study.

The impact of financial climate as a manifestation of environmental turbulence was evident in the current study and should be factored into matters of organizational effectiveness. For example, when presented the statement, I believe that the current economic situation in the country has constrained my employer's ability to hire more staff, even though there is an apparent need for more staff in my field of work, 56.6% of nonmanagement participants indicated *agree* to *strongly agree*, compared to 42.8% of management participants. There was some discordance in the way management and nonmanagement employees perceived the threat posed by financial climate, a point that could reside in issues of job security and economic well being of management and nonmanagement nurses.

Entrepreneurial Orientation Dimensions

When health-care organizations are faced with challenges arising from environmental turbulence, it is recommended that sustained efforts be put in place to foster entrepreneurial orientation on the part of nurses and other health-care workers. Three important entrepreneurial dimensions depicted in Figure 4 were (a) innovation, (b) proactiveness, and (c) risk management. It is recommended that organizations innovate and seek creative and novel ideas in their approach to problem solving in order to meet the challenges associated with turbulence.

High technology should be seen as an enabler, and cost effective measures should be sought in infusing new money into critical aspects of training and development initiatives, which are necessary to keep abreast of technology. As evidence, when presented with the statement, I believe that high technology environment promotes innovation, 92.8% of management respondents indicated *agree* to *strongly agree*, compared to 88.8% of nonmanagement respondents. Although management participants were more innovation inclined, the figures were quite impressive for the two groups, indicating an overall receptiveness for innovative approaches to doing work.

One factor that could enhance receptiveness to innovation is the level of education and awareness of technology and its applications within the health-care environment. Higher education should be viewed as an enabler for this reason. Data gathered in the current study indicated 100% of management respondents had at least a baccalaureate degree, while 61.68% of nonmanagement respondents had a similar level of education. Based on the finding, steps should be taken to sustain the educational levels of both management and nonmanagement employees through continuous education, which would elevate capabilities of the organization at both technical and managerial levels. As illustrated in Figure 4, adaptive leadership on the part of management and nonmanagement nurses would be vital to accomplishing organizational goals and objectives for which employees at all levels could take ownership. Employers should seek a multidisciplinary approach as a basis for organizing work groups that would engender superior participation. Under such conditions, greater levels of harmony and collaboration could be expected from employees for the greater good of all. Proactiveness should be encouraged on the part of both management and nonmanagement. Traditionally, the belief concerning the need for proactiveness tended to favor management employees given greater levels of strategic involvement in organizational affairs. The need for proactiveness at all levels is underscored by the episodic but perpetual turbulence that is prevalent in the health-care environment, and for which complexity absorption strategies are required on the part of organizations. Proactiveness could help organizations conceive effective solutions for dealing with imminent threats posed by uncertainty and chaos, as evident from the findings in this dissertation. For example, when presented with the statement, I believe planning ahead yields greater results in the long run, identical percentage of management nurses (92.9%) and nonmanagement nurses (92.9%) indicated *agree* to *strongly agree*, which underscored the need for quality outputs on the part of employees at all levels.

In spite of the identical response documented, the reality of organizational behavior generally provide senior management with a greater degree of leverage and a better line of sight in terms of the strategic planning process; however, it is recommended that steps be taken to involve nonmanagement employees at all levels in the planning process and not just at the implementation stage to ensure greater buy-in and participation on the part of nonmanagement employees charged with implementing the operation plans of the organization.

Risk management in the context of the model depicted in Figure 4 is a recommended term that should be substituted for risk taking within the context of the health-care environment. The tenets behind risk management connote planned and reasoned actions that are meant to yield greater success in spite of uncertainties and chaos. The reason for recommending a culture built on of risk management as a more positive approach than risk taking, is evident in the negative attitudes and beliefs associated with the notion of risk taking demonstrated by the finding in the dissertation. For example, when presented with the statement, Taking calculated risks in patient care has its challenges, but I believe that these are outweighed by the net benefits to the patient, only 78.6% of management participants indicated *agree* to *strongly agree*, compared to an even lower figure of 55.1% for nonmanagement participants. Based on the survey response, aversion to risk was more evident in nonmanagement participants, who perhaps felt less leveraged with respect to risky actions.

When the statement, was changed to, I believe that progressive patient care activities sometimes demand risky decisions, but these should be well thought out, the score of participants that indicated *agree* and *strongly agree* jumped to 100% for management participants, and 75.2% for nonmanagement participants. The evidence indicated that when risk management was associated with thoughtful acts, employees from both management and nonmanagement levels were willing to bring their competencies to bear on the challenges they faced. Based on the finding, risk management should be interwoven into the fabric of progressive health-care organizations, and employees at all levels should be encouraged to take calculated risks. The net effect could promote the sort of adaptive leadership required to perform at high capacity during conditions of chaos and uncertainty.

Leadership-Followership Exchange at the Edge of Chaos

In Figure 3, zones 1 and 2 in the leadership-followership continuum were associated with activities at the edge of chaos. High entrepreneurial orientation was also associated with high productivity at the edge of chaos. Tan et al. (2005) found that most innovations generally occurred at the edge of chaos. Lansing (2003) espoused a situation whereby self-organizing properties of interactive groups would prompt members to work together across boundaries to steer the organization away from chaos toward the edge of chaos. Accordingly, adaptive leadership, supportive leadership, and self-management are highly recommended as key to a healthy and sustainable leadership-followership regime at the edge of chaos based on the findings in the dissertation.

The recommendation is supported by evidence in the beliefs expressed by survey participants in the study. For example, when presented with the statement, The collegial nature of teamwork enables me to perform at a higher level, in relation to adaptive leadership needed at the edge of chaos, 100% of management participants indicated *agree* to *strongly agree*, while 85.3% of nonmanagement participants indicated *agree* to *strongly agree*. When presented with the statement, I believe that work teams should be allowed the freedom to self-manage, and have significant inputs in the scheduling of work, in relation to the self-management quality needed at the edge of chaos, a comparable score of management participants (85.8%) and nonmanagement participants (84.2%) indicated *agree* to *strongly agree*.

When presented with the statement, I find supportive leadership very motivating, and should be a necessary part of progressive work environment, in relation to supportive leadership needed at the edge of chaos, 93.4% of respondents from the nonmanagement group indicated *agree* to *strongly agree*, compared to 92.3% of management participants. Based on the finding, it is recommended that steps be taken to institute self-managed teams, where members are encouraged to take up leadership roles in areas of their strength and exert themselves entrepreneurially in a collegial environment.

High Productivity Focus at the Edge of Chaos

The model depicted in Figure 4 was aimed at attaining high productivity objectives in health-care organizations, in which all members are constructively engaged. To do this, organizations should encourage management and nonmanagement employees to work collaboratively in an environment where adaptive leadership and entrepreneurial orientation are both encouraged. Accordingly, as depicted in Figure 4, the foci of management employees should include (a) high innovation, (b) highly challenging and meaningful work, (c) a high level of multidimensionality in a skill set, (d) high proactiveness, and (e) a high risk-management capacity. On the part of nonmanagement employees, the foci should include (a) high innovation, (b) highly challenging and meaningful work, (c) a high level of dimensionality in a skill set, (d) moderate proactiveness, (e) moderate risk-management capacity, (f) moderate application of group incentives, and (g) moderate application of individual incentives.

The fundamental tenets of the model depicted in Figure 4 were consistent with the literature that indicated positive relationship between job satisfaction and productivity (Ma et al., 2003; McNeese-Smith, 2001). The fundamental tenets were also consistent with Spence-Lanschinger et al. (2001), who proffered the relationship between job satisfaction, motivation, and productivity, and Maslow (1970), who noted it is important to identify satisfiers and put them in place to achieve the desired levels of motivation and productivity. Based on the finding in the current study, it is recommended that there should be greater efforts on the part of health-care administrators and policy makers to identify satisfiers that could induce high entrepreneurial orientation and productivity.

Future Studies

The current study adopted a person-based, multidimensional approach to studying the relationship between entrepreneurial orientation, environmental turbulence, and productivity, with respect to management and nonmanagement employees at the University Health Network, a nonprofit health-care organization located in Toronto, Canada. Though the study was robust and involved the University Health Network, a large health-care organization including three hospitals in an alliance relationship (Toronto General Hospital, Toronto Western Hospital, and Princess Margaret Hospital), there is a need to replicate the study in other nonprofit organizations within the health-care sector, as well as in for-profit health-care organizations in other jurisdictions, prior to generalizing the findings. Such studies could also involve investigating the linkage between monetary satisfiers and productivity with respect to nurses and other allied health-care professionals. Researchers may consider a qualitative or mixed approach to future studies.

Summary

The study applied a person-based multidimensional approach to investigate the relationship between entrepreneurial orientation, environmental turbulence, and productivity of management and nonmanagement nurses at the University Health Network, a nonprofit health care establishment located in Toronto, Canada. A quantitative method was adopted in the study, and the researcher developed and tested the research instrument applied in the survey. IRB and ARB approvals were received from the University of Phoenix prior to proceeding with the study. Approvals were also received from the University Health Network Nursing Research Committee and the University Health Network Research Ethics Board, which authorized the collection of data for the study.

Data gathered from survey participants were analyzed using the SPSS Version 12.0 statistical package, which produced descriptive statistics as well as correlational and multiple regression outputs. The results from the analyses allowed the researcher to answer the questions and hypotheses posed in the study. Four sets of questions and hypotheses were addressed with respect to strength relationships and correlations between entrepreneurial orientation dimensions (innovation, risk taking, and proactiveness), environmental turbulence dimensions (uncertainty related to the financial climate, uncertainty related to the level of intergroup competition, uncertainty related to shifts in occupational requirements mandated by professional governing bodies, uncertainty related to legislative activities, and uncertainty related to technological shifts), and employee productivity dimensions (challenging and meaningful work, self-management, supportive leadership, multidimensional skills, preference for individual-based reward system, and preference for group-based reward system) for management and nonmanagement nurses.

Predictive models were developed for management and nonmanagement nurses using satisfiers as nonmonetary employee productivity dimensions. The procedure was based on the step-wise multiple regression analysis. A unique approach was applied that targeted four nonmonetary satisfiers (challenging and meaningful work, self-management, supportive leadership, and multidimensional skills) as dependent variables, with each producing separate predictive models with respect to management and nonmanagement nurses.

The study results showed that the dimensions for entrepreneurial orientation, environmental turbulence, and employee productivity correlated differently with respect to management and nonmanagement samples, indicating fundamental differences in the propensities and beliefs among members of the two groups. Specifically, independent *t*-test analyses rejected the hypotheses that management and nonmanagement employees were different with respect to EO_IN, EO_RT, ET_OR, and EP_SL. The hypotheses were supported with respect to EO_PR, ET_FC, ET_IC, ET_LA, ET_TC, EP_CM, EP_SM, and EP_MS.

The results of the predictive models indicated positive correlation between dependent and independent variables in all cases, except for the negative correlation between challenging and meaningful work and financial climate. There was also a negative correlation between self-management and proactiveness. The conclusion was that poor financial climate would have a negative impact on the creation of challenging and meaningful work. It is believed that a culture that deterred proactiveness in the health-care environment, could also negatively impact the productivity of self-managed teams. Correlations between the dependent and independent variables were significant for the most part at the $p < .05$ level.

The linear relationships between the predictor variables and the dependent variables were weak in all cases, given their low *R*-square values, except in the case of supportive leadership. The low *R*-square values were consistent with the findings in the literature with respect to the nonlinear and emergent properties of complex adaptive systems (for example, P. Anderson, 1999; Dolan et al., 2003). Norusis (2004) also noted that the closer the *R*-square value was to 0, the less linear the relationship between dependent and independent variables. The high *R*-square value obtained for supportive leadership was indicative of the presence of adaptive leadership within the context of the leadership-followership exchange associated with high productivity.

Lichtenstein et al. (2006) posited that for adaptive leadership to positively influence productivity at the edge of chaos, there should be positive leadership-followership exchange between members of the work groups. Tan et al. (2005) proffered that most innovations and high performance occurred at the edge of chaos. Accordingly, a model was developed in the dissertation to depict the dynamics at play with respect to the leadership-followership exchange between management and nonmanagement nurses at the edge of chaos. In the model presented, adaptive leadership, self-management, and entrepreneurial orientation were all recommended as important factors in achieving the right employee-organization fit that health-care organizations require within the context of open and flexible organizational structure to adapt positively to the impacts of environmental turbulence.

According to Lichtenstein et al. (2006), leadership is an emergent event that arises from relational interaction among agents residing within groups of employees in complex adaptive systems. In the context of the dissertation, it was concluded that adaptive outcomes could be achieved between management and nonmanagement nurses in Zones 1 and 2 of the model presented in Figure 4, consistent with Tan et al. (2005). In Zone 1, the ordering properties for management nurses in the leadership-followership exchange were defined as a function of EO = f (IN, PR, RT), and for nonmanagement nurses the ordering properties were defined as a function of EO = f (IN, RT, PR). In Zone 2, the ordering properties for management nurses in the leadership-followership exchange were defined as a function of EP = f (SL, CM, MS), and the ordering properties for nonmanagement were defined as a function of EP = f (SL, CM, GS, IS, MS, SM). In Zone 3, the ordering properties for management nurses in the leadership-followership exchange were defined as a function of ET = f (FC, OR, TC, LA), and for nonmanagement nurses the ordering properties were defined as a function of ET = f (FC, IC, OR, LA, TC).

To ensure that future researchers can replicate the findings in the dissertation, recommendations were presented in the dissertation that called for further studies by academics and policy makers that could support generalizability. The recommendations included (a) replication of the study in other nonprofit organizations within the health-care sector, as well as for-profit health-care organizations in other jurisdictions; (b) using a similar research method to investigate the linkage between monetary satisfiers and productivity with respect to nurses and other allied health care professionals; and (c) using a qualitative approach or mixed methods to examine issues related to the relationship between entrepreneurial orientation, environmental turbulence, and productivity between employee groups in health-care professionals other than nurses.

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University Health Network

Toronto General Hospital Toronto Western Hospital Princess Margaret Hospital

APPENDIX A: INFORMED CONSENT FORM - PILOT GROUP

Title: Impacts of environmental turbulence and entrepreneurial orientation on nurses' productivity in a Canadian healthcare organization.

Principal Investigator: Mr. xxx, Director, Labour Relations, UHN.

(xxx) xxx-xxxx

Co-Investigator: Mr. Albert Ototé, Doctoral Candidate, University of Phoenix.

You are being asked to take part in a pilot group research study. Please read this explanation about the study and its risks and benefits before you decide if you would like to take part. You should take as much time as you need to make your decision. You should ask the study investigators to explain anything that you do not understand and make sure that all of your questions have been answered before participating in the study. Before you make your decision, feel free to talk about this study with anyone you wish. Participation in this study is voluntary.

Background and Purpose

There is general concern that the health care delivery system in Ontario has become increasingly threatened as a result of environmental turbulence, which in turn has prompted the need to seek innovative ways of delivering quality health care that meet the changing needs of consumers. Many have called for increased adaptation on the part of health care professionals such as nurses. This has prompted the present pilot group study, aimed at examining the lenses with which management and nonmanagement nurses perceive environmental turbulence and how these perceptions shape their entrepreneurial orientation, and thus productivity during turbulent times. This study is part of a D.B.A. dissertation.

Study Design

You have been chosen randomly to participate in the pilot group of this study. You are asked to complete a self- administered questionnaire with the aid of the instructions provided. It is estimated that the questionnaire will take approximately 20 minutes to complete.

Procedure

The three dimensions measured in the study are fully described in the questionnaire, and you will be asked to score each of the statements related to the dimensions using a scale of: (1) strongly disagree, (2) somewhat disagree, (3) neither agree nor disagree, (4) somewhat agree, and (5) strongly agree.

Upon completion, the questionnaire should be inserted in the return envelop provided marked “Pilot group Research Questionnaire”, and forwarded to the principal investigator through the internal UHN mail system.

Risks Related to Being in the Study

Some questions are personal having to do with your employment and work environment. It is important that you know you do not have to answer any question you do not wish to answer, and that you can stop at any time.

Due to the sensitivity of the personal questions, the researcher will do everything possible to maintain the confidentiality of all the survey materials. No names will be collected during the survey, and no participant will be given access to the surveys of other participants. Individual results will not be published. Only group findings will be made public.

Benefits to Being in the Study

Although there may not be any direct benefit to you as an individual, the potential benefits of the research study to the healthcare environment in general, and the nursing profession in particular are numerous, including: (a) the development of effective business models for the allocative efficiencies of management and nonmanagement nurses, and (b) the development of effective coping mechanisms for management and nonmanagement nurses during turbulent times.

Voluntary Participation

Your participation in this study is voluntary. You may decide not to be in this study, or to be in the study now and then changing your mind later. You may leave the study at any time without affecting your employment status. You may refuse to answer any question you do not want to answer.

Confidentiality

Job identifiers including position title, occupational classification, and unit location will be gathered during the study. Job identifiers gathered with respect to the participants will be stored in a safe place by the investigator, under lock and key, for seven years and then destroyed through shredding. No names or personal identifying information will be used in any publication or presentations.

Questions about the Study

If you have any questions, concerns or would like to speak to the researcher for any reason, please call Mr. xxx (Principal Investigator) at (xxx) xxx-xxxx.

If you have any questions about your rights as a research participant, or have concerns about this study, call xxx, Ph.D., Chair of the University Health Network Research Ethics Board or the Research Ethics office number at (xxx) xxx-xxxx. The REB is a group of people who oversee the ethical conduct of research studies. These people are not part of the study team. Everything that you discuss will be kept confidential.

Consent

By handing in the questionnaire you consent to being part of this study. You can withdraw your consent at anytime.

APPENDIX B: INFORMED CONSENT FORM - MAIN GROUP

Title: Impacts of environmental turbulence and entrepreneurial orientation on nurses' productivity in a Canadian healthcare organization.

Principal Investigator: Mr. xxx, Director, Labour Relations, UHN.

(xxx) xxx-xxxx

Co-Investigator: Mr. Albert Ototé, Doctoral Candidate, University of Phoenix.

You are being asked to take part in a main research study. Please read this explanation about the study and its risks and benefits before you decide if you would like to take part. You should take as much time as you need to make your decision. You should ask the study investigators to explain anything that you do not understand and make sure that all of your questions have been answered before participating in the study. Before you make your decision, feel free to talk about this study with anyone you wish. Participation in this study is voluntary.

Background and Purpose

There is general concern that the health care delivery system in Ontario has become increasingly threatened as a result of environmental turbulence, which in turn has prompted the need to seek innovative ways of delivering quality health care that meet the changing needs of consumers. Many have called for increased adaptation on the part of health care professionals such as nurses. This has prompted the present study focused on examining the relationship between environmental turbulence, entrepreneurial orientation and productivity on the part of management and nonmanagement nurses.

The purpose of the present quantitative study is to determine the relationship between entrepreneurial orientation, environmental turbulence, and productivity at the employee level. The aim is to determine the lenses with which management and nonmanagement nurses perceive environmental turbulence, and how these perceptions shape their entrepreneurial orientation, and thus productivity during turbulent times. This study is part of a D.B.A. dissertation.

Study Design

You have been chosen randomly to participate in the main survey group of this study. You are being asked to complete a self- administered questionnaire with the aid of the instructions provided. It is estimated that the questionnaire will take approximately 20 minutes to complete.

Procedure

The three dimensions measured in the study are fully described in the questionnaire, and you will be asked to score each of the statements related to the dimensions using a scale of: (1) strongly disagree, (2) somewhat disagree, (3) neither agree nor disagree, (4) somewhat agree, and (5) strongly agree.

Upon completion, the questionnaire should be inserted in the return envelop provided marked “Main Survey Group Research Questionnaire”, and forwarded to the principal investigator through the internal UHN mail system.

Risks Related to Being in the Study

Some questions are personal having to do with your employment and work environment. It is important that you know you do not have to answer any question you do not wish to answer, and that you can stop at any time.

Due to the sensitivity of the personal questions, the researchers will do everything possible to maintain the confidentiality of all the survey materials. No names will be collected during the survey, and no participant will be given access to the surveys of other participants. Individual results will not be published. Only group findings will be made public.

Benefits to Being in the Study

Although there may not be any direct benefit to you as an individual, the potential benefits of the research study to the healthcare environment in general, and the nursing profession in particular are numerous, including: (a) the development of effective business models for the allocative efficiencies of management and nonmanagement nurses, and (b) the development of effective coping mechanisms for management and nonmanagement nurses during turbulent times.

Voluntary Participation

Your participation in this study is voluntary. You may decide not to be in this study, or to be in the study now and then changing your mind later. You may leave the study at any time without affecting your employment status. You may refuse to answer any question you do not want to answer.

Confidentiality

Job identifiers including position title, occupational classification, and unit location will be gathered during the study. Job identifiers gathered with respect to the participants will be stored in a safe place by the investigator, under lock and key, for seven years and then destroyed through shredding. No names or personal identifying information will be used in any publication or presentations.

Questions about the Study

If you have any questions, concerns or would like to speak to the researcher for any reason, please call Mr. xxx (Principal Investigator) at (xxx) xxx-xxxx.

If you have any questions about your rights as a research participant, or have concerns about this study, call xxx, Ph.D., Chair of the University Health Network Research Ethics Board or the Research Ethics office number at (xxx) xxx-xxxx. The REB is a group of people who oversee the ethical conduct of research studies. These people are not part of the study team. Everything that you discuss will be kept confidential.

Consent

By handing in the questionnaire you consent to being part of this study. You can withdraw your consent at anytime.

APPENDIX C: RESEARCH QUESTIONNAIRE

Title: Impacts of environmental turbulence and entrepreneurial orientation on nurses' productivity in a Canadian healthcare organization.

This survey explores your beliefs and perceptions in relation to entrepreneurial orientation, environmental turbulence, and productivity. There is no right or wrong answer to the questions. The survey is intended to capture your personal feelings with respect to the entrepreneurial orientation, environmental turbulence, and performance dimensions provided in Sections I, II and III below.

Please answer the questions to the best of your ability, insert the survey in the envelope marked "Research Questionnaire", and return the material through the internal UHN mail system to the principal investigator. By handing in the questionnaire you consent to being part of this study. You can withdraw your consent at anytime. If you have any questions, concerns or would like to speak to the researcher for any reason, please call Mr. xxx (Principal Investigator) at (xxx) xxx-xxxx.

SECTION I: GENERAL INFORMATION

This section asks about some general information related to your job title, your assigned work unit, educational background, and how long you have been in your current position. Please indicate your answers to questions 2 through 5 by using check marks as appropriate.

1. What is your job title?____

2. How long have you held your current position?

    - ○ Less than 1 year
    - ○ 1 to 5 years
    - ○ 6 to 10 years
    - ○ More than 10 years

3. What is the classification of your current position?

    - ○ Management
    - ○ Nonmanagement
    - ○ Other (please specify) _____________

4. What is your current educational level?

    - ○ Diploma
    - ○ Baccalaureate
    - ○ Masters
    - ○ Doctoral

5. In which of the hospital(s) in the University Health Network are you currently employed?

    - ○ Toronto General Hospital
    - ○ Princess Margaret Hospital
    - ○ Toronto Western Hospital

SECTION II: ENTREPRENEURIAL ORIENTATION

This section asks about your beliefs, feelings, and perception with respect to innovation, proactiveness, and calculated risk taking. Please indicate your answer to each of the questions on a scale of: (1) strongly disagree, (2) somewhat disagree, (3) neither agree nor disagree, (4) somewhat agree, and (5) strongly agree.

Item	Statement,	Respond using the scale (1 to 5), defined above
1	Exploring new ways of doing my job is some thing that appeals to me.	

2	The use of advanced technology has enhanced the way I do my job.	
3	I believe that high technology environments promote innovation.	
4	I believe that progressive patient care activities some times demand risky decisions, but these should be well thought out.	
5	I believe that in order to be successful, one must take some calculated risks.	
6	Taking calculated risks in patient care has its challenges, but I believe that these are outweighed by the net benefit to the patient.	
7	I like doing things before anyone else does.	
8	I believe planning ahead yields greater results in the long run.	
9	To be successful professionally one must be prepared to make some reasonable mistakes, but these should always serve as a learning tool.	
10	I believe I can help my employer gain competitive edge in the market place, by being achievement-oriented.	

SECTION III: ENVIRONMENTAL TURBULENCE

This section asks about your beliefs, feelings, and perceptions related to the external financial climate, internal work relationships, professional standards/legislation governing your occupation, and the impacts of technological shifts on your job and the health care environment. Please indicate your answer to each of the questions on a scale of: (1) strongly disagree, (2) somewhat disagree, (3) neither agree nor disagree, (4) somewhat agree, and (5) strongly agree.

Item	Statement,	Respond using the scale (1 to 5), defined above
1	I believe that the current economic situation in the country has constrained my employer's ability to hire more staff, even though there is an apparent need for more staff in my field of work.	
2	I believe the current state of the national economy has meant fewer opportunities for career growth in my field of work.	

3	I believe the lack of career opportunities and the possibility of "lay offs," constitute an unnecessary distraction in the work of health care workers who cannot plan too far ahead in their careers.	
4	I believe it is important for an organization to structure itself effectively, so that it can respond appropriately to external as well as internal challenges.	
5	Patient-centred health care should be at the core of the organizational structures of health care providers.	
6	I feel that my ability to fully meet patient needs can benefit greatly from an environment that allows for concerted inputs from an integrated team of interdisciplinary professionals comprising nurses and allied professionals.	
7	When health care providers form internal network of collaborative teams, this helps to strengthen productivity.	
8	I believe during difficult economic times organizational units should be encouraged to work "smart," while competing for scarce resources.	
9	An environment based on "healthy competition" between organizational units allows for creativity and innovative thinking.	
10	I feel that the nursing culture allows me sufficient leverage to collaborate effectively with other allied professionals, through skill complementarities that facilitate patient care.	
11	I believe that my nursing training has prepared me adequately to function effectively within a complex multidisciplinary team environment.	
12	I find the shift in technology related to my work daunting.	
13	With the aid of sophisticated technology, I am able to carry out integrative patient care activities more effectively.	
14	I find the professional standards/legislation governing nurses very insular and restrictive in terms of my ability to collaborate effectively with other allied professionals.	
15	My preferred work environment can be described as collectivist, rather than individualistic.	

SECTION IV: EMPLOYEE PERFORMANCE

The questions in this segment ask your beliefs, feelings, and perceptions in relation to job outcomes as manifested in employee satisfaction levels. Please indicate your answer to each of the questions on a scale of (1) strongly disagree, (2) somewhat disagree, (3) neither agree nor disagree, (4) somewhat agree, and (5) strongly agree.

Item	Statement,	Respond using the scale (1 to 5), defined above
1	I work better in collaborative teams.	
2	I like to be recognized for my personal contributions, even in a team environment.	
3	The collegial nature of teamwork enables me to perform at a higher level.	
4	I believe that work teams should be allowed the freedom to self-manage and have significant inputs in the scheduling of work.	
5	I find supportive leadership very motivating and should be a necessary part of progressive work environments.	
6	When work is complex and challenging, it allows me the opportunity to perform at a greater level.	
7	I feel that my professional training has provided me the necessary skills to think critically through work processes, especially as these relate to job outcomes.	
8	I feel overwhelmed by workload, despite my best efforts.	
9	I am motivated by the sense of self-worth that I get from doing my job.	
10	While monetary compensation is important to me, it is only an insignificant part of why I am motivated to perform at my current level.	

Thank you for participating in this survey. If you would like a summary of the survey results, please contact co-investigator Mr. Albert Ototé at oniigbi@yahoo.com

APPENDIX D: TABLES

Table D1

Rating Scales for the Values Instrument

Rating	Description
5	Strongly agree
4	Somewhat agree
3	Neither agree nor disagree
2	Somewhat disagree
1	Strongly disagree

Table D2

Construct Validity of Survey Instrument

Variables and dimensions	Element
Entrepreneurial orientation	
Innovation	EO-001
	EO-002
	EO-003
	EO-010
Risk taking	EO-004
	EO-005
	EO-006
	EO-009
Proactiveness	EO-007
	EO-008
Environmental turbulence	
Financial climate	ET-001
	ET-002
	ET-003
Interunit competition	ET-006
	ET-007
	ET-008
	ET-009

Table D2 (continued)

Variables and dimensions	Element
Occupational requirements	ET-014
	ET-015
Legislative activity	ET-004
	ET-005
Technological change	ET-010
	ET-011
	ET-012
	ET-013
Employee productivity	
Challenging and meaningful work	EP-006
	EP-009
Self-management	EP-003
	EP-004
Supportive leadership	EP-005
	EP-010
Multidimensional skills	EP-007
	EP-008
Preference for group incentives	EP-001
Preference for individual incentives	EP-002

Table D3

Demographics of Pilot Group Participants

	Management nurses (N = 5)		Nonmanagement nurses (N = 20)	
	n	%	*n*	%
Status				
Real manager	5	100	0	0
Professional	0	0	0	0
Coordinator	0	0	0	0
Registered nurse	0	0	20	100
Years in current position				
Less than 1 year	1	20	1	5
1 to 5 years	2	40	2	10
6 to 10 years	2	40	4	20
More than 10 years	0	0	13	65
Education				
Diploma	0	0	1	5
Baccalaureate	5	100	2	10
Master's	0	0	4	20
Doctorate	0	0	13	65
Location				
Toronto General	4	80	9	45
Princess Margaret	0	0	3	15
Toronto Western	1	20	8	40

Table D4

Demographics of Main Survey Group Participants

	Management nurses (N = 16)		Nonmanagement nurses (N = 284)	
	n	%	*n*	%
Status				
Real manager	8	57.14	0	0
Professional	1	7.16	0	0
Coordinator	5	35.71	0	0
Registered nurse	0	0	274	100
Years in current position				
Less than 1 year	4	28.57	78	28.47
1 to 5 years	5	35.71	47	17.15
6 to 10 years	3	21.43	41	14.96
More than 10 years	2	14.29	108	39.42
Education				
Diploma	0	0	105	38.32
Baccalaureate	12	85.71	163	59.49
Master's	2	14.29	6	2.19
Doctorate	0	0	0	0
Location				
Toronto General	9	64.29	150	54.74
Princess Margaret	3	21.43	33	12.04
Toronto Western	2	14.29	91	33.22

Table D5

Cronbach's Alpha

Dimensions	Test (N = 25)	Retest (N = 25)
Entrepreneurial orientation (10 items)	.75	.75
Environmental turbulence (15 items)	.77	.75
Employee productivity (10 items)	.71	.70
Overall (35 items)	.85	.81

Table D6

Frequency Distribution of Innovation IN Items for Management Nurses

Score	*n*	%
EO-001 (Mean = 4.86)		
4	2	14.3
5	12	85.7
EO-002 (Mean = 4.50)		
4	7	50
5	7	50
EO-003 (Mean = 4.50)		
3	1	7.1
4	5	35.7
5	8	57.1
EO-010 (Mean = 4.43)		
3	1	7.1
4	6	42.9
5	7	50.0

Table D7

Frequency Distribution of Innovation Items for Nonmanagement Nurses

Score	*n*	%
EO-001 (Mean = 4.37)		
1	7	2.6
2	3	1.1
3	22	8.0
4	91	33.2
5	151	55.1
EO-002 (Mean = 4.26)		
1	4	1.5
2	8	2.9
3	27	9.9
4	109	39.8
5	126	46.0
EO-003 (Mean = 4.14)		
1	4	1.5
2	8	2.9
3	46	16.8
4	105	38.3
5	111	40.5

Table D7 (continued)

Score	*n*	%
EO-010 (Mean = 4.00)		
1	5	1.8
2	14	5.1
3	54	19.7
4	104	38.0
5	97	35.4

Table D8

Frequency Distribution of Risk Taking Items for Management Nurses

Score	*n*	%
EO-004 (Mean = 4.50)		
4	7	50
5	7	50
EO-005 (Mean = 4.43)		
3	2	14.3
4	4	28.6
5	8	57.1
EO-006 (Mean = 4.07)		
3	3	21.4
4	7	50.0
5	4	28.6
EO-009 (Mean = 4.57)		
4	6	42.9
5	8	57.1

Table D9

Frequency Distribution for Risk Taking Items of Nonmanagement Nurses

Score	*n*	%
EO-004 (Mean = 4.00)		
1	7	2.6
2	18	6.6
3	43	15.7
4	106	38.7
5	100	36.5
EO-005 (Mean = 3.73)		
1	18	6.6
2	20	7.3
3	50	18.2
4	117	42.7
5	69	25.2
EO-006 (Mean = 3.49)		
1	16	5.8
2	27	9.9
3	80	29.2
4	108	39.4
5	43	15.7

Table D9 (continued)

Score	*n*	%
EO-009 (Mean = 3.88)		
1	17	6.2
2	23	8.4
3	37	13.5
4	96	35.0
5	101	36.9

Table D10

Frequency Distribution of Proactiveness Items for Management Nurses

Score	*n*	%
EO-007 (Mean = 4.14)		
3	2	14.3
4	8	57.1
5	4	28.6
EO-008 (Mean = 4.43)		
3	1	7.1
4	6	42.9
5	7	50.0

Table D11

Frequency Distribution of Proactiveness Items for Nonmanagement Nurses

Score	*n*	%
EO-007 (Mean = 3.63)		
1	14	5.1
2	31	11.3
3	112	40.9
4	82	29.9
5	35	12.8
EO-008 (Mean = 4.56)		
1	2	.7
2	3	1.1
3	14	5.2
4	74	27.6
5	175	65.3

Table D12

Frequency Distribution of Financial Climate Items for Management Nurses

Score	*n*	%
ET-001 (Mean = 3.00)		
1	2	14.3
2	3	21.4
3	3	21.4
4	5	35.7
5	1	7.1
ET-002 (Mean = 2.71)		
1	3	21.4
2	3	21.4
3	4	28.6
4	3	21.4
5	1	7.1
ET-003 (Mean = 3.07)		
1	1	7.1
2	4	28.6
3	3	21.4
4	5	35.7
5	1	7.1

Table D13

Frequency Distribution of Financial Climate Items for Nonmanagement Nurses

Score	*n*	%
ET-001 (Mean = 3.54)		
1	34	12.4
2	28	10.2
3	57	20.8
4	66	24.1
5	89	32.5
ET-002 (Mean = 3.07)		
1	34	12.4
2	51	18.6
3	87	31.8
4	67	24.5
5	35	12.8
ET-003 (Mean = 3.31)		
1	20	7.3
2	49	17.9
3	82	29.9
4	71	25.9
5	52	19.0

Table D14

Frequency Distribution of Interunit Competition Items for Management Nurses

Score	*n*	%
ET-006 (Mean = 4.64)		
3	1	7.1
4	3	21.4
5	10	71.4
ET-007 (Mean = 4.64)		
3	1	7.1
4	3	21.4
5	10	71.4
ET-008 (Mean = 4.57)		
3	1	7.1
4	4	28.6
5	9	64.3
ET-009 (Mean = 3.64)		
2	1	7.1
3	6	42.9
4	4	28.6
5	3	21.4

Table D15

Frequency Distribution of Interunit Competition Items for Nonmanagement Nurses

Score	*n*	%
ET-006 (Mean = 4.54)		
1	2	.7
2	5	1.8
3	18	6.6
4	68	24.8
5	181	66.1
ET-007 (Mean = 4.48)		
1	1	.4
2	5	1.8
3	19	6.9
4	86	31.4
5	163	59.5
ET-008 (Mean = 3.88)		
1	9	3.3
2	21	7.7
3	53	19.3
4	101	36.9
5	90	32.8

Table D15 (continued)

Score	*n*	%
ET-009 (Mean = 3.75)		
1	10	3.6
2	20	7.3
3	67	24.5
4	109	39.8
5	68	24.8

Table D16

Frequency Distribution of Occupational Requirements Items for Management Nurses

Score	*n*	%
ET-014 (Mean = 2.36)		
1	4	28.6
2	4	28.6
3	3	21.4
4	3	21.4
ET-015 (Mean = 3.71)		
1	1	7.1
3	4	28.6
4	6	42.9
5	3	21.4

Table D17

Frequency Distribution of Occupational Requirements Items for Nonmanagement Nurses

Score	*n*	%
ET-014 (Mean = 3.20)		
1	15	5.5
2	54	19.7
3	97	35.4
4	78	28.5
5	30	10.9
ET-015 (Mean = 3.82)		
1	8	2.9
2	17	6.2
3	64	23.4
4	112	40.9
5	73	26.6

Table D18

Frequency Distribution of Legislative Activity Items for Management Nurses

Score	*n*	%
ET-004 (Mean = 4.57)		
3	2	14.3
4	2	14.3
5	10	71.4
ET-055 (Mean = 4.57)		
4	6	42.9
5	8	57.1

Table D19

Frequency Distribution of Legislative Activity Items for Nonmanagement Nurses

Score	*n*	%
ET-004 (Mean = 4.41)		
1	3	1.1
2	7	2.6
3	22	8.0
4	84	30.7
5	158	57.7
ET-005 (Mean = 4.37)		
1	4	1.5
2	8	2.9
3	30	10.9
4	72	26.3
5	160	58.4

Table D20

Frequency Distribution of Technological Change Items for Management Nurses

Score	*n*	%
ET-010 (Mean = 4.14)		
2	1	7.1
3	2	14.3
4	5	35.7
5	6	42.9
ET-011 (Mean = 4.21)		
2	1	7.1
3	2	14.3
4	4	28.6
5	7	50.0
ET-012 (Mean = 3.23)		
1	4	28.6
2	3	21.4
3	4	28.6
4	3	21.4
ET-013 (Mean = 3.17)		
2	2	14.3
3	4	28.6
4	6	42.9
5	2	14.3

Table D21

Frequency Distribution of Technological Change TC Items for Nonmanagement Nurses

Score	*n*	%
ET-010 (Mean = 3.79)		
1	11	4.0
2	23	8.4
3	49	17.9
4	121	44.2
5	70	25.5
ET-011 (Mean = 4.37)		
1	6	2.2
2	10	3.6
3	31	11.3
4	102	37.2
5	124	45.6
ET-012 (Mean = 3.01)		
1	45	16.4
2	55	20.1
3	88	32.1
4	65	23.7
5	22	7.7

Table D21 (continued)

Score	*n*	%
ET-013 (Mean = 3.13)		
1	7	2.6
2	19	7.0
3	51	18.8
4	124	45.6
5	71	26.1

Table D22

Frequency Distribution of Challenging and Meaningful Work Items for Management Nurses

Score	*n*	%
EP-006 (Mean = 4.36)		
3	2	14.3
4	5	35.7
5	7	50.0
EP-009 (Mean = 4.50)		
4	7	50.0
5	7	50.0

Table D23

Frequency Distribution of Challenging and Meaningful Work Items for Nonmanagement Nurses

Score	*n*	%
EP-006 (Mean = 4.32)		
2	7	2.6
3	25	9.2
4	114	41.9
5	126	46.3
EP-009 (Mean = 4.21)		
1	3	1.1
2	9	3.3
3	40	14.7
4	95	34.9
5	125	46.0

Table D24

Frequency Distribution of Self-Management Items for Management Nurses

Score	*n*	%
EP-003 (Mean = 4.57)		
4	6	42.9
5	8	57.1
EP-004 (Mean = 4.29)		
3	2	14.3
4	6	42.9
5	6	42.9

Table D25

Frequency Distribution of Self-Management Items for Nonmanagement Nurses

Score	*n*	%
EP-003 (Mean = 4.29)		
2	3	1.1
3	37	13.6
4	111	40.8
5	121	44.5
EP-004 (Mean = 4.28)		
1	1	0.4
2	2	0.7
3	40	14.7
4	107	39.3
5	122	44.9

Table D26

Frequency Distribution of Supportive Leadership Items for Management Nurses

Score	*n*	%
EP-005 (Mean = 4.57)		
3	1	7.1
4	4	28.6
5	9	64.3
EP-010 (Mean = 3.93)		
2	1	7.1
4	12	85.7
5	1	7.1

Table D27

Frequency Distribution of Supportive Leadership Items for Nonmanagement Nurses

Score	*n*	%
EP-005 (Mean = 4.51)		
1	2	0.7
2	2	0.7
3	14	5.1
4	91	33.5
5	163	59.9
EP-010(Mean = 3.42)		
1	41	15.1
2	26	9.6
3	54	19.9
4	79	29.0
5	72	26.5

Table D28

Frequency Distribution of Multidimensional Skills Items for Management Nurses

Score	*n*	%
EP-007 (Mean = 4.36)		
3	1	7.1
4	7	50.0
5	6	42.9
EP-008 (Mean = 3.21)		
2	4	28.6
3	4	28.6
4	5	35.7
5	1	7.1

Table D29

Frequency Distribution of Multidimensional Skills Items for Nonmanagement Nurses

Score	*n*	%
EP-007 (Mean = 4.37)		
1	2	0.7
2	7	2.6
3	19	7.0
4	105	38.6
5	139	51.1
EP-008 (Mean = 3.32)		
1	24	8.8
2	51	18.8
3	70	25.7
4	69	25.4
5	58	21.3

Table D30

Frequency Distribution of Group and Individual Incentives Items for Management Nurses

Score	*n*	%
EP-001 (Mean = 4.57)		
3	1	7.1
4	4	28.6
5	9	64.3
EP-002 (Mean = 4.29)		
2	1	7.1
4	7	50.0
5	6	42.9

Table D31

Frequency Distribution of Group and Individual Incentive Items for Nonmanagement Nurses

Score	*n*	%
EP-001 (Mean = 4.35)		
1	1	0.4
2	8	2.9
3	25	9.2
4	99	36.4
5	139	51.1
EP-002 (Mean = 4.26)		
1	3	1.1
2	7	2.6
3	35	13.1
4	96	35.8
5	127	47.4

Table D32

Descriptive Statistics of Variable and Dimension Scores for Management Nurses

Variable and dimension	*N*	Mean	Median	*SD*
Entrepreneurial orientation	14	4.44	4.50	0.31
Innovation	14	4.57	4.50	0.37
Risk taking	14	4.39	4.50	0.41
Proactiveness	14	4.29	4.50	0.47
Environmental turbulence	14	3.83	3.85	0.38
Financial climate	14	2.93	3.00	0.88
Interunit competition	14	4.37	4.25	0.45
Occupational requirement	14	3.03	3.00	0.74
Legislative activity	14	4.57	4.75	0.51
Technological change	14	3.59	3.62	0.55
Employee productivity	14	4.26	4.25	0.31
Challenging and meaningful work	14	4.43	4.50	0.47
Self-management	14	4.43	4.50	0.47
Supportive leadership	14	4.25	4.50	0.43
Multidimensional skills	14	3.78	4.0	0.58
Group incentive	14	4.57	5.0	0.65
Individual incentive	14	4.28	4.0	0.82

Table D33

Descriptive Statistics of Variable and Dimensions Scores for Nonmanagement Nurses

Variable and dimension	*N*	Mean	Median	*SD*
Entrepreneurial orientation	274	4.00	4.00	0.68
Innovation	274	4.19	4.25	0.66
Risk taking	274	3.77	4.00	0.83
Proactiveness	274	4.24	4.00	3.67
Environmental turbulence	274	3.86	3.92	0.59
Financial climate	274	3.31	3.33	1.00
Interunit competition	274	4.16	4.25	0.67
Occupational requirement	274	3.51	3.50	0.76
Legislative activity	274	4.40	4.50	0.70
Technological change	274	3.74	3.75	1.18
Employee productivity	274	4.13	4.20	0.45
Challenging and meaningful work	274	4.27	4.50	0.66
Self-management	274	4.28	4.50	0.63
Supportive leadership	274	3.97	4.00	0.81
Multidimensional skills	274	3.84	4.00	0.75
Group incentive	274	4.35	5.00	0.80
Individual incentive	274	4.26	4.00	0.87

Table D34

Factor Analysis of Items Loading on Entrepreneurial Orientation Dimensions

Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %
1	3.529	35.288	35.288	3.529	35.288	35.288
2	1.507	15.073	50.361	1.507	15.073	50.361
3	.943	9.427	59.788			
4	.813	8.130	67.919			
5	.743	7.428	75.346			
6	.708	7.083	82.429			
7	.620	6.197	88.626			
8	.506	5.063	93.689			
9	.339	3.390	97.079			
10	.292	2.921	100.000			

Note. Extraction method: Principal component analysis.

Table D35

Factor Loading of Entrepreneurial Orientation Items

	Component	
	1	2
EO-001	.636	
EO-002	.801	
EO-003	.787	
EO-010	.477	
EO-004		.548
EO-005		.837
EO-006		.863
EO-009		.632
EO-007	.602	
EO-008	.602	

Note. Extraction method: Principal component analysis. Rotation method: Varimax with Kaiser normalization. Rotation converged in three iterations.

Table D36

Kaiser-Meyer-Olkin and Bartlett's Test of Sphericity for Entrepreneurial Orientation Items

Test	Value
Kaiser-Meyer-Olkin measure of sampling adequacy	.80
Bartlett's test of sphericity	
Approx. chi-square	749.825
df	45
Sig.	.00

Table D37

Factor Analysis of Items Loading on Environmental Turbulence Dimensions

Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	Variance%	Cumulative%	Total	Variance%	Cumulative%
1	4.030	26.868	26.868	4.030	26.868	26.868
2	1.902	12.680	39.547	1.902	12.680	39.547
3	1.207	8.045	47.592	1.207	8.045	47.592
4	1.165	7.769	55.361	1.165	7.769	55.361
5	.900	5.998	61.359			
6	.852	5.681	67.040			
7	.845	5.637	72.677			
8	.721	4.806	77.483			
9	.663	4.423	81.906			
10	.564	3.760	85.666			
11	.547	3.647	89.313			
12	.477	3.179	92.491			
13	.423	2.823	95.314			
14	.383	2.555	97.869			
15	.320	2.131	100.000			

Note. Extraction method: Principal component analysis.

Table D38

Factor Loading of Environmental Turbulence Items

	Component			
	1	2	3	4
ET-001		.795		
ET-002		.850		
ET-003		.684		
ET-006	.713			
ET-007	.718			
ET-008	.699			
ET-009	.583			.465
ET-014				.636
ET-015	.411			
ET-004	.650			
ET-005	.444		.521	
ET-010			.688	
ET-011			.795	
ET-012				.751
ET-013	.489			

Note. Extraction method: Principal component analysis.

Table D39

KMO and Bartlett's Test of Sphericity for Environmental Turbulence Items

Test	Value
Kaiser-Meyer-Olkin measure of sampling adequacy	.80
Bartlett's test of sphericity	
Approx. chi-square	1024.292
df	105
Sig.	.00

Table D40

Factor Analysis of Items Loading on Employee Productivity Dimensions

	Initial eigenvalues			Extraction sums of squared loadings		
Component	Total	Variance%	Cumulative%	Total	Variance%	Cumulative%
1	2.887	28.869	28.869	2.887	28.869	28.869
2	1.136	11.362	40.231	1.136	11.362	40.231
3	1.015	10.150	50.381	1.015	10.150	50.381
4	.921	9.215	59.596			
5	.910	9.105	68.700			
6	.731	7.306	76.006			
7	.711	7.110	83.117			
8	.612	6.119	89.235			
9	.544	5.439	94.674			
10	.533	5.326	100.000			

Note. Extraction method: Principal component analysis.

Table D41

Factor Loading of Employee Productivity Items

	Component		
	1	2	3
EP-006	.674		
EP-009		.592	
EP-003	.635		
EP-004	.611		
EP-005	.555		
EP-010		.872	
EP-007	.694		
EP-008			.814
EP-001	.502		
EP-002			.566

Note. Extraction method: Principal component analysis. Rotation method: Varimax with Kaiser normalization. Rotation converged in three iterations.

Table D42

KMO and Bartlett's Test of Sphericity for Employee Productivity Items

Test	Value
Kaiser-Meyer-Olkin measure of sampling adequacy	.80
Bartlett's test of sphericity	
Approx. chi-square	375.945
	5
df	45
Sig.	.00

Table D43

Correlation Matrix for Entrepreneurial Orientation Dimensions (Innovation, Risk Taking, and Proactiveness) of Nonmanagement Nurses

	EO_IN mean	EO_RT mean	EO_PR mean
EO_IN mean			
Pearson correlation	1	.407**	.130*
Sig. (2-tailed)		.000	.032
EO_RT mean			
Pearson correlation	.407**	1	-.085
Sig. (2-tailed)	.000		.159
EO_PR mean			
Pearson correlation	.130*	-.085	1
Sig. (2-tailed)	.032	.159	

*Significant at the .05 level. **Significant at the .01 level.

Table D44

Correlation Matrix for Entrepreneurial Orientation Dimensions (Innovation, Risk Taking, and Proactiveness) of Management Nurses

EO_IN mean			
Pearson correlation	1	.429	.480
Sig. (2 – tail)		.120	.042
EO_RT mean			
Pearson correlation	.429	1	.121
Sig. (2 – tail)	.126		.681
EO_PR mean			
Pearson correlation	.480	.121	1
Sig. (2 – tail)	.042	.681	

Table D45

Correlation Matrix for Environmental Turbulence Dimensions (Financial Climate, Intergroup Competition, Occupational Requirements, Legislative Activities, and Technological Shifts) of Nonmanagement Nurses

	ET_FC mean	ET_IC mean	ET_OR mean	ET_LA mean	ET_TC mean
ET_FC mean					
Pearson correlation	1	.206**	.243**	.252**	.149*
Sig. (2-tailed)		.001	.000	.000	.013
ET_IC mean					
Pearson correlation	.206**	1	.325**	.537**	.318**
Sig. (2-tailed)	.001		.000	.000	.000
ET_OR mean					
Pearson correlation	.243**	.325**	1	.195**	.192**
Sig. (2-tailed)	.000	.000		.001	.001
ET_LA mean					
Pearson correlation	.252**	.537**	.195**	1	.14f*
Sig. (2-tailed)	.000	.000	.001		.019
ET_TC mean					
Pearson correlation	.149*	.318**	.192**	.142*	1
Sig. (2-tailed)	.013	.000	.001	.019	

*Significant at the .05 level. **Significant at the .01 level.

Table D46

Correlation Matrix for Environmental Turbulence Dimensions (Financial Climate, Intergroup Competition, Occupational Requirements, Legislative Activities, and Technological Shifts) of Management Nurses

	ET_FC mean	ET_IC mean	ET_OR mean	ET_LA mean	ET_TC mean
ET_FC mean					
Pearson correlation	1	-.139	.728**	.296	.332
Sig. (2-tailed)		.636	.003	.304	.247
ET_IC mean					
Pearson correlation	-.139	1	.014	.461	.244
Sig. (2-tailed)	.636		.961	.047	.400
ET_OR mean					
Pearson correlation	.728**	.014	1	.394	.342
Sig. (2-tailed)	.003	.961		.163	.231
ET_LA mean					
Pearson correlation	.296	.461	.394	1	.112
Sig. (2-tailed)	.304	.047	.163		.704
ET_TC mean					
Pearson correlation	.332	.244	.342	.112	1
Sig. (2-tailed)	.247	.400	.231	.704	

**Significant at the .01 level.

Table D47

Correlation Matrix for Employee Productivity Dimensions (Challenging and Meaningful Work, Self-Management, Supportive Leadership, Multidimensional Skills, Preference for Individual-Based Reward System, and Preference for Group-Based Reward System) of Nonmanagement Nurses

	EP_CM mean	EP_SM mean	EP_SL mean	EP_MS mean	EP_GS mean	EP_IS mean
EP_CM mean						
Pearson correlation	1	.385**	.358**	.269**	.268**	.280**
Sig. (2-tailed)		.000	.000	.000	.000	.000
EP_SM mean						
Pearson correlation	.385**	1	.192**	.255**	.383**	.279**
Sig. (2-tailed)	.000		.001	.000	.000	.000
EP_SL mean						
Pearson correlation	.358**	.192**	1	.065	.212**	.093
Sig. (2-tailed)	.000	.001		.289	.000	.130
EP_MS mean						
Pearson correlation	.269**	.255**	.065	1	.201**	.198**
Sig. (2-tailed)	.000	.000	.289		.001	.001
EP_GS mean						
Pearson correlation	.268**	.383**	.212**	.201**	1	.148*
Sig. (2-tailed)	.000	.000	.000	.001		.015
EP_IS mean						
Pearson correlation	.280**	.279**	.093	.198**	.148*	1
Sig. (2-tailed)	.000	.000	.130	.001	.015	

*Significant at the .05 level. **Significant at the .01 level.

Table D48

Correlation Matrix for Employee Productivity Dimensions (Challenging and Meaningful Work, Self-Management, Supportive Leadership, Multidimensional Skills, Preference for Individual-Based Reward System, and Preference for Group-Based Reward System) of Management Nurses

	EP_CM mean	EP_SM mean	EP_SL mean	EP_MS mean	EP_GS mean	EP_IS mean
EP_CM mean						
Pearson correlation	1	.488	.284	.220	.143	-.140
Sig. (2-tailed)		.047	.324	.450	.625	.633
EP_SM mean						
Pearson correlation	.488	1	.474	.640*	.143	.154
Sig. (2-tailed)	.047		.087	.014	.625	.598
EP_SL mean						
Pearson correlation	.284	.474	1	.078	.000	-.109
Sig. (2-tailed)	.324	.087		.792	1.000	.711
EP_MS mean						
Pearson correlation	.220	.640*	.078	1	.558*	-.023
Sig. (2-tailed)	.450	.014	.792		.038	.938
EP_GS mean						
Pearson correlation	.143	.143	.000	.558*	1	-.185
Sig. (2-tailed)	.625	.625	1.000	.038		.526
EP_IS mean						
Pearson correlation	-.140	.154	-.109	-.023	-.185	1
Sig. (2-tailed)	.633	.598	.711	.938	.526	

*Significant at the .05 level.

Table D49

Independent t test Analysis for Entrepreneurial Orientation between Management and Nonmanagement Nurses

	Levene's test of equality of variances				*t* test for equality of means		
	F	Sig.	*t*	*df*	Sig. (2-tailed)	Mean diff.	Std. error diff.
EO_IN mean							
Equal variances assumed	2.758	.098	-2.132	286	.034	-.37982	.17813
Equal variances not assumed			-3.542	17.490	.002	-.37982	.10724
EO_RT mean							
Equal variances assumed	5.635	.018	-2.773	286	.006	-.61822	.22296
Equal variances not assumed			-5.105	18.858	.000	-.61822	.12111
EO_PR mean							
Equal variances assumed	.265	.607	-.046	286	.964	-.04484	.98260
Equal variances not assumed			-.176	151.186	.860	-.04484	.25462

Table D49 (continued)

	Levene's test of equality of variances		*t* test for equality of means				
	F	Sig.	*t*	*df*	Sig. (2-tailed)	Mean diff.	Std. error diff.
EO_All mean							
Equal variances assumed	2.861	.092	-2.384	286	.018	-.43503	.18245
Equal variances not assumed			-4.699	20.047	.000	-.43503	.09258

Table D50

Independent t test Analysis for Environmental Turbulence between Management and Nonmanagement Nurses

	Levene's test of equality of variances		*t* test for equality of means				
	F	Sig.	*t*	*df*	Sig. (2-tailed)	Mean diff.	Std. error diff.
ET_FC mean							
Equal variances assumed	.946	.331	1.384	286	.168	.37800	.27318
Equal variances not assumed			1.558	14.782	.140	.37800	.24255
ET_IC mean							
Equal variances assumed	2.425	.120	-1.180	286	.239	-.21350	.18088
Equal variances not assumed			-1.694	16.137	.109	-.21350	.12603
ET_OR mean							
Equal variances assumed	.793	.374	2.275	286	.024	.47341	.20810
Equal variances not assumed			2.314	14.414	.036	.47341	.20456

Table D50 (continued)

	Levene's test for equality of variances		t test for equality of means				
	F	Sig.	*t*	*df*	Sig. (2-tailed)	Mean diff.	Std. error diff.
ET_LA mean							
Equal variances assumed	1.117	.292	-.948	286	.344	-.17909	.18895
Equal variances not assumed			-1.247	15.555	.231	-.17909	.14356
ET_TC mean							
Equal variances assumed	.162	.688	.464	286	.643	.14672	.31622
Equal variances not assumed			.897	19.686	.380	.14672	.16355
ET_All mean							
Equal variances assumed	3.154	.077	.225	286	.822	.03581	.15938
Equal variances not assumed			.333	16.393	.743	.03581	.10749

Table D51

Independent t test Analysis for Employee Productivity between Management and Nonmanagement Nurses

	Levene's test of equality of variances		*t* test for equality of means				
	F	Sig.	*t*	*df*	Sig. (2-tailed)	Mean diff.	Std. error diff.
EP_CM mean							
Equal variances assumed	3.097	.080	-.906	284	.366	-.16203	.17877
Equal variances not assumed			-1.218	15.706	.241	-.16203	.13301
EP_SM mean							
Equal variances assumed	2.786	.096	-.861	284	.390	-.14732	.17107
Equal variances not assumed			-1.112	15.463	.283	-.14732	.13249
EP_SL mean							
Equal variances assumed	5.330	.022	-1.299	284	.195	-.28309	.21792
Equal variances not assumed			-2.277	18.201	.035	-.28309	.12431

Table D51 (continued)

	Levene's test of equality of variances		t test for equality of means				
	F	Sig.	*t*	*df*	Sig. (2-tailed)	Mean diff.	Std. error diff.
EP_MS mean							
Equal variances assumed	2.244	.135	.277	284	.782	.05620	.20315
Equal variances not assumed			.349	15.326	.732	.05620	.16124
EP_GS mean							
Equal variances assumed	.975	.324	-1.003	284	.317	-.21849	.21790
Equal variances not assumed			-1.218	15.136	.242	-.21849	.17941
EP_IS mean							
Equal variances assumed	.477	.490	-.103	280	.918	-.02452	.23775
Equal variances not assumed			-.108	14.547	.915	-.02452	.22690
EP_All mean							
Equal variances assumed	.477	.490	-.103	280	.918	-.02452	.23775
Equal variances not assumed			-.108	14.547	.915	-.02452	.22690

Table D52

Models for Predicting Challenging and Meaningful Work Dimension of Nonmanagement Nurses

	Unstandardized coefficients		Standardized coefficients			Collinearity statistics			
	B	Std. error	Beta	*t*	Sig.	Partial	Part	Tolerance	VIF
Model 1: EP_CM = 2.671 + 0.381 (EO_IN)									
(Constant)	2.671	.238		11.243	.000				
EO_IN mean	.381	.056	.382	6.796	.000	.382	.382	1.000	1.000
Model 2: EP_CM = 2.098 + 0.265 (EO_IN) + 0.241(ET_LA)									
(Constant)	2.098	.269		7.809	.000				
EO_IN mean	.265	.061	.266	4.335	.000	.256	.237	.793	1.262
ET_LA mean	.241	.058	.255	4.161	.000	.246	.227	.793	1.262

Table D53

ANOVA of EP_CM Predictive Models for Nonmanagement Nurses

	Sum of squares	*df*	Mean square	*F*	Sig.
		Model 1			
Regression	17.227	1	17.227	46.191	.000[a]
Residual	100.698	270	.373		
Total	117.926	271			
		Model 2			
Regression	23.318	2	11.659	33.150	.000[b]
Residual	94.608	269	.352		
Total	117.926	271			

[a] Predictors: (Constant), EO_IN_mean. [b] Predictors: (Constant), EO_IN_mean, ET_LA_mean

Table D54

Regression Analysis of EP_CM for Nonmanagement Nurses

Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	.382	.146	.143	.611
2	.445	.198	.192	.593

Table D55

Models for Predicting Self-Management Dimension for Nonmanagement Nurses

	Unstandardized coefficients		Standardized coefficients			Collinearity statistics			
	B	Std. error	Beta	*t*	Sig.	Partial	Part	Tolerance	VIF
Model 1: EP_SM = 3.071 + 0.276 (ET_LA)									
(Constant)	3.071	.233		13.208	.000				
ET_LA mean	.276	.052	.305	5.269	.000	.305	.305	1.000	1.000
Model 2: EP_SM = 2.657 + 0.242 (ET_LA) + 0.161 (ET_OR)									
(Constant)	2.657	.260		10.232	.000				
ET_LA mean	.242	.052	.268	4.614	.000	.271	.262	.962	1.039
ET_OR mean	.161	.048	.194	3.349	.001	.200	.191	.962	1.039
Model 3: EP_SM = 2.382 + 0.184 (ET_LA) + 0.138 (ET_OR) + 0.145 (EO_IN)									
(Constant)	2.382	.282		8.434	.000				
ET_LA mean	.184	.057	.203	3.197	.002	.192	.180	.787	1.271
ET_OR mean	.138	.049	.166	2.836	.005	.171	.160	.924	1.083
EO_IN mean	.145	.062	.153	2.364	.019	.143	.133	.761	1.314
Model 4: EP_SM = 2.455 + 0.155 (ET_LA) + 0.147 (ET_OR) + 0.171 (EO_IN) – 0.021 (EO_PR)									
(Constant)	2.455	.283		8.677	.000				
ET_LA mean	.155	.059	.172	2.647	.009	.160	.148	.744	1.344
ET_OR mean	.147	.048	.177	3.024	.003	.182	.170	.916	1.091
EO_IN mean	.171	.062	.180	2.742	.007	.166	.154	.731	1.369
EO_PR mean	-.021	.010	-.121	-2.068	.040	-.126	-.116	.926	1.080

Table D56

ANOVA of EP_SM Predictive Models for Nonmanagement Nurses

	Sum of squares	*df*	Mean square	*F*	Sig.
			Model 1		
Regression	10.044	1	10.044	27.759	.000[a]
Residual	97.691	270	.362		
Total	107.734	271			
			Model 2		
Regression	13.954	2	6.977	20.013	.000[b]
Residual	93.780	269	.349		
Total	107.734	271			
			Model 3		
Regression	15.869	3	5.290	15.432	.000[c]
Residual	91.865	268	.343		
Total	107.734	271			
			Model 4		
Regression	17.318	4	4.329	12.785	.000[d]
Residual	90.417	267	.339		
Total	107.734	271			

[a] Predictors: (Constant), ET_LA_mean. [b] Predictors: (Constant), ET_LA_mean, ET_OR_mean. [c] Predictors: (Constant), ET_LA_mean, ET_OR_mean, EO_IN_mean. [d] Predictors: (Constant), ET_LA_mean, ET_OR_mean, EO_IN_mean, EO_PR_mean.

Table D57

Regression Analysis of EP_SM for Nonmanagement Nurses

Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	.305[a]	.093	.090	.602
2	.360[b]	.130	.123	.591
3	.384[c]	.147	.138	.586
4	.401[d]	.161	.148	.582

[a] Predictors: (Constant), ET_LA_mean. [b] Predictors: (Constant), ET_LA_mean, ET_OR_mean. [c] Predictors: (Constant), ET_LA_mean, ET_OR_mean, EO_IN_mean. [d] Predictors: (Constant), ET_LA_mean, ET_OR_mean, EO_IN_mean, EO_PR_mean.

Table D58

Models for Predicting Supportive Leadership Dimension Associated with the Productivity of Nonmanagement Nurses

	Unstandardized coefficients		Standardized coefficients			Collinearity statistics			
	B	Std. error	Beta	*t*	Sig.	Partial	Part	Tolerance	VIF
Model 1: EP_SL = 1.973 + 0.476 (EO_IN)									
(Constant)	1.973	.290		6.796	.000				
EO_IN mean	.476	.068	.390	6.956	.000	.390	.390	1.000	1.000
Model 2: EP_SL = 1.352 + 0.351 (EO_IN) + 0.261 (ET_LA)									
(Constant)	1.352	.331		4.092	.000				
EO_IN mean	.351	.075	.287	4.666	.000	.274	.256	.793	1.262
ET_LA mean	.261	.071	.225	3.660	.000	.218	.201	.793	1.262

Table D59

ANOVA of EP_SL Predictive Models for Nonmanagement Nurses

	Sum of squares	*df*	Mean square	*F*	Sig.
		Model 1			
Regression	26.931	1	26.931	48.389	.000[a]
Residual	150.271	270	.557		
Total	177.202	271			
		Model 2			
Regression	34.061	2	17.031	32.005	.000[b]
Residual	143.141	269	.532		
Total	177.202	271			

[a] Predictors: (Constant), EO_IN_mean. [b] Predictors: (Constant), EO_IN_mean, ET_LA_mean.

Table D60

Regression Analysis of EP_SL for Nonmanagement Nurses

Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	.390[a]	.152	.149	.746
2	.438[b]	.192	.186	.730

[a] Predictors: (Constant), EO_IN_mean. [b] Predictors: (Constant), EO_IN_mean, ET_LA_mean.

Table D61

Models for Predicting Multidimensional Skills Dimension Associated With the Productivity of Nonmanagement Nurses

	Unstandardized coefficients		Standardized coefficients	t	Sig.	Collinearity statistics			
	B	Std. error	Beta			Partial	Part	Tolerance	VIF
Model 1: EP_MS = 3.365 + 0.144 (ET_FC)									
(Constant)	3.365	.153		21.931	.000				
ET_FC mean	.144	.044	.194	3.249	.001	.194	.194	1.000	1.000
Model 2: EP_MS = 3.543 + 0.138 (ET_FC) – 0.037 (EO_PR)									
(Constant)	3.543	.162		21.881	.000				
ET_FC mean	.138	.044	.185	3.139	.002	.188	.185	.997	1.003
EO_PR_mean	-.037	.012	-.180	-3.059	.002	-.183	-.180	.997	1.003
Model 3: EP_MS = 3.231 + 0.122 (ET_FC) – 0.034 (EO_PR) + 0.095 (ET_TC)									
(Constant)	3.231	.202		15.975	.000				
ET_FC mean	.122	.044	.163	2.770	.006	.167	.161	.976	1.024
EO_PR mean	-.034	.012	-.168	-2.863	.005	-.172	-.167	.990	1.010
ET_TC mean	.095	.037	.150	2.531	.012	.153	.147	.971	1.030
Model 4: EP_MS = 2.905 + 0.101 (ET_FC) - 0.032 (EO_PR) + 0.089 (ET_TC) + 0.108 (EO_RT)									
(Constant)	2.905	.260		11.177	.000				
ET_FC mean	.101	.045	.136	2.256	.025	.137	.131	.925	1.081
EO_PR mean	-.032	.012	-.159	-2.727	.007	-.165	-.158	.985	1.015
ET_TC mean	.089	.037	.140	2.382	.018	.144	.138	.965	1.036
EO_RT mean	.108	.054	.119	1.982	.049	.120	.115	.928	1.077

Table D62

ANOVA of EP_MS Predictive Models for Nonmanagement Nurses

	Sum of squares	*df*	Mean square	*F*	Sig.
		Model 1			
Regression	5.707	1	5.707	10.554	.001[a]
Residual	145.996	270	.541		
Total	151.702	271			
		Model 2			
Regression	10.615	2	5.307	10.119	.000[b]
Residual	141.088	269	.524		
Total	151.702	271			
		Model 3			
Regression	13.908	3	4.636	9.016	.000[c]
Residual	137.795	268	.514		
Total	151.702	271			
		Model 4			
Regression	15.905	4	3.976	7.818	.000[d]
Residual	135.798	267	.509		
Total	151.702	271			

[a] Predictors: (Constant), ET_FC_mean. [b] Predictors: (Constant), ET_FC_mean, EO_PR_mean. [c] Predictors: (Constant), ET_FC_mean, EO_PR_mean, ET_TC_mean. [d] Predictors: (Constant), ET_FC_mean, EO_PR_mean, ET_TC_mean, EO_RT_mean.

Table D63

Regression Analysis of EP_MS for Nonmanagement Nurses

Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	.194[a]	.038	.034	.735
2	.265[b]	.070	.063	.724
3	.303[c]	.092	.082	.717
4	.324[d]	.105	.091	.713

[a] Predictors: (Constant), ET_FC_mean. [b] Predictors: (Constant), ET_FC_mean, EO_PR_mean. [c] Predictors: (Constant), ET_FC_mean, EO_PR_mean, ET_TC_mean. [d] Predictors: (Constant), ET_FC_mean, EO_PR_mean, ET_TC_mean, EO_RT_mean.

Table D64

Models for Predicting Supportive Leadership Dimension Associated With the Productivity of Management Nurses

	Unstandardized coefficients		Standardized coefficients			Collinearity statistics			
	B	Std. error	Beta	*t*	Sig.	Partial	Part	Tolerance	VIF
Model 1: EP_SL = 5.198 – 0.324 (ET_FC)									
(Constant)	5.198	.319		16.272	.000				
ET_FC mean	-.324	.105	-.666	-3.089	.009	.866	.666	1.000	1.000
Model 2: EP_SL = 3.618 – 0.434 (ET_FC) + 0.530 (ET_TC)									
(Constant)	3.618	.324		11.163	.000				
ET_FC mean	-.434	.058	-.892	-7.435	.000	.913	.842	.890	1.124
ET_TC mean	.530	.093	.684	5.696	.000	.864	.645	.890	1.124

Table D65

ANOVA of EP_SL Predictive Models for Management Nurses

	Sum of squares	df	Mean square	F	Sig.
		Model 1			
Regression	1.052	1	1.052	9.543	.009[a]
Residual	1.323	12	.110		
Total	2.375	13			
		Model 2			
Regression	2.040	2	1.020	33.500	.000[b]
Residual	.335	11	.030		
Total	2.375	13			

[a] Predictors: (Constant), ET_FC_mean. [b] Predictors: (Constant), ET_FC_mean, ET_TC_mean.

Table D66

Regression Analysis of EP_SL for Management Nurses

Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	.666[a]	.443	.397	.332
2	.927[b]	.859	.833	.175

[a] Predictors: (Constant), ET_FC_mean. [b] Predictors: (Constant), ET_FC_mean, ET_TC_mean.

Table D67

Relationship between Environmental Turbulence, Entrepreneurial Orientation, and Productivity

Items that correlated	Correlation coefficient	Sig. (2-tailed)
	$H_0 1a$	
IN and RT	0.407**	.000
IN and PR	0.130*	.032
RT and PR	-0.085	.159
	$H_0 1b$	
IN and RT	0.429	.120
IN and PR	0.480	.042
RT and PR	0.121	.681
	$H_0 2a$	
FC and IC	0.206**	.001
FC and OR	0.243**	.000
FC and LA	0.252**	.000
FC and TC	0.149*	.013
IC and OR	0.325**	.000
IC and LA	0.537**	.000
IC and TC	0.318**	.000
OR and LA	0.195**	.001
OR and TC	0.192**	.001
LA and TC	0.142*	.019

Table 67 (continued)

Items that correlated	Correlation coefficient	Sig. (2-tailed)
	$H_0$2b	
FC and IC	-0.139	.636
FC and OR	0.728**	.003
FC and LA	0.296	.304
FC and TC	0.332	.247
IC and OR	0.014	.961
IC and LA	0.461	.047
IC and TC	0.244	.400
OR and LA	0.394	.163
OR and TC	0.342	.231
LA and TC	0.112	.704
	$H_0$3a	
CM and SM	0.385**	.000
CM and SL	0.358**	.000
CM and MS	0.269**	.000
CM and GS	0.268**	.000
CM and IS	0.280**	.000
SM and SL	0.192**	.001
SM and MS	0.255**	.000
SM and GS	0.383**	.000
SM and IS	0.279**	.000
SL and MS	0.065	.289

Table 67 (continued)

Items that correlated	Correlation coefficient	Sig. (2-tailed)
SL and GS	0.212**	.000
SL and IS	0.093	.130
MS and GS	0.201**	.001
MS and IS	0.198**	.001
GS and IS	0.148	.015
	H_03b	
CM and SM	0.488	.047
CM and SL	0.284	.324
CM and MS	0.220	.450
CM and GS	0.143	.625
CM and IS	-0.140	.633
SM and SL	0.474	.087
SM and MS	0.640*	.014
SM and GS	0.143	.625
SM and IS	0.154	.598
SL and MS	0.078	.792
SL and GS	0.000	1.000
SL and IS	-0.109	.711
MS and GS	0.558	.038
MS and IS	-0.023	.938
GS and IS	-0.185	.526

* Significance at the .05 level. ** Significance at the .01 level.

Table D68

Best Predictive Models for Employee Productivity

Best predictive models	*R* square
$H_0$4a	
EP_CM = 2.098 + 0.265 (EO_IN) + 0.241 (ET_LA)	0.198
EP_SM = 2.455 + 0.155 (ET_LA) + 0.147 (ET_OR) + 0.171 (EO_IN) – 0.021 (EO_PR)	0.161
EP_SL = 1.352 + 0.351 (EO_IN) + 0.261 (ET_LA)	0.192
EP_MS = 2.905 + 0.101 (ET_FC) - 0.032 (EO_PR) + 0.089 (ET_TC) + 0.108 (EO_RT)	0.105
$H_0$4b	
EP_SL = 3.618 - 0.434 (ET_FC) + 0.530 (ET_TC)	0.859

APPENDIX E: UOP INSTITUTIONAL REVIEW BOARD APPROVAL

UNIVERSITY OF PHOENIX

INSTITUTIONAL REVIEW BOARD

On behalf of Dr. Bill Pepicello, Chair of the Institutional Review Board, your doctoral research proposal has been reviewed and deemed “exempt.”

Your progress report for this study is due one year from the date identified below.

The Relationship between Environmental Turbulence, Entrepreneurial Orientation and Productivity in a Canadian Healthcare Network Organization

By

Albert Otote

Dr. Bill Pepicello

Bill Pepicello
Provost of Academic Affairs
University of Phoenix

University of Phoenix

December 12, 2007

APPENDIX F: UHN NURSING RESEARCH COMMITTEE APPROVAL

University Health Network

Toronto General Hospital Toronto Western Hospital Princess Margaret Hospital

RECEIVED

DEC 11 2007

To	Date
Dr. [redacted] Research Ethics Board	December 4, 2007
Re	**Sender**
Nursing Research Study	[redacted], RN; PhD Director of Nursing--New Knowledge and Innovation

Memo

The Nursing Research Committee has approved the research proposal entitled ***"The relationship between environmental turbulence, entrepreneurial orientation and productivity in a Canadian healthcare network organization."*** The University Health Network Principle Investigator for this study is [redacted]. The Study Principle Investigator, Albert Otote, is completing this study as part of the requirements for Doctoral degree, so we would appreciate if you could complete a timely expedited review for this study. If you have any questions, please call me at [redacted]. Thank you.

Sincerely,

[redacted], RN; PhD
Director of Nursing—New Knowledge and Innovation
University Health Network
Co-chair, UHN Nursing Research Committee
Email: [redacted]@uhn.on.ca

APPENDIX G: UHN RESEARCH ETHICS BOARD APPROVAL

University Health Network
Toronto General Toronto Western Princess Margaret

University Health Network
Research Ethics Board
700 University Avenue
8th Floor South Room 8-18
Toronto, Ontario M5G 1Z5
Phone:
Fax:

Notification of REB Initial Approval

RECEIVED
MAR 17 2008

Date: March 12, 2008

To: Mr.
2nd Floor, Human Resources Dept. TGH

Re: 08-0022-BE
The Relationship Between Environmental Turbulence, Entrepreneurial Orientation And Productivity In a Canadian Healthcare Network Organization

REB Review Type:	Expedited
REB Initial Approval Date:	March 7, 2008
REB Expiry Date:	March 7, 2009

Documents Approved:
Protocol (dated March 3, 2008)
Main Survey Group Information Material (dated March 3, 2008)
Focus Group Information Material (dated March 3, 2008)
Questionnaire (dated March 3, 2008)

The above named study has been reviewed and approved by the University Health Network Research Ethics Board. If, during the course of the research, there are any serious adverse events, confidentiality concerns, changes in the approved project, or any new information that must be considered with respect to the project, these should be brought to the immediate attention of the REB. In the event of a privacy breach, you are responsible for reporting the breach to the UHN REB and the UHN Corporate Privacy Office (in accordance with Ontario health privacy legislation – Personal Health Information Protection Act, 2004). Additionally, the UHN REB requires reports of inappropriate/unauthorized use of the information.

Please be aware that it is UHN policy that research-related activities involving an external party require a research agreement. An 'external party' refers to a corporation other than UHN or an individual who is not UHN personnel. Should a research agreement be required in this case, the study may not begin at UHN until the agreement has been signed by all parties. Should the negotiation process raise concerns, the REB reserves the right to reconsider its approval.

If the study is expected to continue beyond the expiry date, you are responsible for ensuring the study receives re-approval. The REB must be notified of the completion or termination of this study and a final report provided. As the Principal Investigator, you are responsible for the ethical conduct of this study.

There's always an answer. *We'll find it.*

APPENDIX G: (Page 2 of 2)

University Health Network
Toronto General Toronto Western Princess Margaret

The UHN Research Ethics Board operates in compliance with the Tri-Council Policy Statement, ICH/GCP Guidelines, the Ontario Personal Health Information Protection Act (2004), and Part C, Division 5 of the Food and Drug Regulations of Health Canada.

Sincerely,

______ , Ph.D.
Chair, University Health Network Research Ethics Board

There's always an answer. *We'll find it.*

APPENDIX H: SURVEY PARTICIPANTS' RECRUITMENT POSTER

The following terminologies are increasingly associated with nurses in their role as valued contributors in the health care delivery system.

- *Internal Entrepreneurs*, who think about better ways of helping the employer meet its competitiveness objectives as internal stakeholders.
- *Proactive Thinkers*, who think about viable solutions ahead of time.
- *Innovative Thinkers*, who think about new and novel ways of doing work with the aid of technology.
- *Adaptive Followers and Leaders*, who are capable of displaying leadership and followership attributes, in response to a given situation when working with others.

To what extent do these terminologies reflect the way you view yourself as a nurse? To find out, a study is being conducted at the University Health Network that would explore the opinions of management and nonmanagement nurses. In the data-gathering phase of the study, questionnaires and consent forms will be distributed to selected subjects from the management and nonmanagement nursing ranks. If selected as a participant in this study your rights will be fully protected, and all information gathered will be treated as confidential. To ensure confidentiality, you will be identified only with a study number, and your name will not be used in any report or presentations based on the study.

APPENDIX H: (Page 2 of 2)

You are encouraged to participate in this study; by participating you would help policy makers better understand the needs of nurses, and the critical roles they play in advancing better healthcare service delivery in Ontario. The results from the study would also facilitate the design of a more productive working environment for nurses at all levels.

Upon receiving the survey questionnaire you are encouraged to fill them out promptly, to the best of your ability. Detailed instructions will be provided on the questionnaire.

If you have any questions about the survey, or any concerns related to your participation, please contact Mr. Albert Ototé at oniigbi@yahoo.com.

Thank You.

Albert Ototé, Researcher