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Walden University
2015

Abstract

Organizational Innovation's Moderation of Culture Effects on Company Financial Performance

by

Christopher L. Slaughter

MS, Walden University, 2013

MBA, University of Phoenix, 2006

BS, University of Phoenix, 2005

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Psychology

Walden University

August 2015

Abstract

Despite 40 years of research, little is known about what moderates the relationship between organizational culture and company financial performance. This quantitative study examined if innovation moderates the relationship between an organization's culture, as measured by the Denison Organizational Culture Survey, and a company's financial performance, as indicated by return on assets (ROA). Understanding if innovation moderates the relationship between organizational culture and ROA could help business leaders foster a culture that maximizes financial performance. Lewin's field theory was the theoretical foundation explaining organizational culture. Denison Consulting provided the archival dataset, which included organizational culture scores and ROA data for 104 publically traded companies. Companies were classified into 5 innovation quintiles. Pearson's correlation, ANOVA, and multiple regression analyses were used to test the hypotheses. The results indicated that ROA did not correlate with Denison's organizational culture dimensions of adaptability, mission, consistency, and involvement; the second highest and second lowest innovation quintiles had greater ROA at high levels of mission and consistency as compared to low levels of mission and consistency; and innovation moderated the relationship between organizational culture and ROA. Enabling companies to maximize their financial performance by adjusting their organizational culture in relationship to their innovation strategies could enable the creation of cutting-edge products and services, thereby generating positive social change.

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Dedication

I dedicate this dissertation to my late father, H. David Slaughter. His leadership and guidance were a continual reminder and inspiration for me to do great things. Thank you, Dad, for everything you have done for me, our family, and for the people whose lives you touched. You rock!

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Chapter 1: Introduction to the Study

Introduction

One of the primary purposes of business is to create shareholder wealth and operate as a profitable enterprise (Margolis & Walsh, 2003). In an effort to fulfill a company's profitability mandate, business leaders and researchers are continuously searching for strategies and tactics to improve financial and operational performance (Margolis & Walsh, 2003). To that end, researchers have demonstrated that aspects of organizational culture can impact a company's financial performance (Denison, 1990; Tseng, 2010). Aspects of organizational culture also affect a company's ability to generate innovation (Asree, Zain, & Razalli, 2010).

Although there is evidence that organizational culture is predictive of company financial performance (Denison, 1984; Gordon & DiTomaso, 1992; Hartnell, Yi Ou, & Kinicki, 2011; Jimenez-Jimenez, & Sanz-Valle, 2011; Prajongo & McDermott, 2011), there is a lack of research on moderating variables that could affect the relationship between organizational culture and company financial performance (Hartnell et al., 2011). Consequently, this study examined the moderating effect of innovation on the relationship between organizational culture and company financial performance.

In this chapter, I introduce the literature on organizational culture and innovation as related to company financial performance. Next, I provide the problem statement, purpose of the study, research questions, hypotheses, and nature of the study. I then present several key definitions, assumptions and limitation, and follow with the significance of the study.

Background

Organizational culture and innovation have been cornerstones of company performance research for many years, and both constructs remain active in the research community (Hartnell et al, 2011; U. S. Department of Commerce, 2012). For instance, Hartnell et al. (2011) identified over 4,600 articles on organizational culture since the 1980s. Further, the U. S. government recently completed a comprehensive report on the innovation capacity of U. S. businesses (U. S. Department of Commerce, 2012).

Denison and Mishra (1995) developed an organizational culture model in an attempt to explain the relationship between culture and organizational effectiveness; this model has four cultural dimensions: (a) adaptability; (b) mission; (c) consistency; and (d) involvement. Adaptability refers to the ability of an organization to identify and adapt to changing circumstances in the environment and among its customers (Denison et al., 2004; Denison Consulting, 2013). Consistency refers to an organization's ability to centralize, control, and integrate organizational processes (Denison et al., 2004; Denison, 2013). Involvement refers to autonomy, responsibility, and a sense of ownership in the organization (Denison et al., 2004; Denison, 2013). Mission provides a framework for strategic direction, goals, and vision that drive an organization (Denison et al., 2004; Denison, 2013). Mission and consistency have been found to be good predictors of financial performance (Denison & Neale, 1996), whereas adaptability and involvement have been associated with innovation (Denison et al., 2004).

Researchers have empirically demonstrated that organizational culture is predictive of company performance (Hartnell et al., 2011). For instance, Hartnell et al.

(2011) performed a metaanalysis of 84 studies and examined organizational culture and employee attitudes, operational performance, and financial performance. Hartnell et al. found that organizational culture was statistically significantly and positively correlated with operational and financial performance. The following authors all empirically linked organizational culture to company performance in a variety of industries and national cultures: Asree et al. (2010), Gordon and DiTomaso (1992), Tseng (2010), Wilderom, van den Berg, and Wiersma (2012), Lee and Yu (2004), Ogbonna and Harris (2000), and Baer and Frese (2003).

The relationship between organizational culture and financial performance has generally been examined at the company level (Denison, 1996; Hartnell et al., 2011). In an effort to understand the moderating factors between organizational culture and financial performance, there have been attempts to examine the constructs at different levels of analysis and according to different groupings (Asree, Zain & Razalli, 2010; Baird, Hu, & Reeve, 2011; Denison, Haaland, & Goelzer, 2004). For instance, Glaser (2014) empirically tested the moderating effects of company age and industry membership on organizational culture and company financial performance, but did not find age to moderate the relationship.

Innovation has also been studied in numerous contexts and there is not a universally accepted definition. For example, Prajogo and McDermott (2011) defined *innovation* as something that produces a new or improved outcome for the benefit of the company or its customers. Naranjo-Valencia and Jimenez-Jimenez (2011) defined *innovation* as a strategy of being first to market with internally developed innovative

products or services. Regardless of the precise definition of innovation, there are three types of innovation in an organizational setting: (a) product, (b) process, and (c) administrative (Chang et al., 2012). The three types of innovation are broadly classified as either (a) incremental innovation or (b) radical innovation (Crossan & Apaydin, 2010). Culture and innovation have been examined at the national (Tellis, Prabhu, & Chandy, 2009), organizational (Chang, et al., 2012; Jiménez-Jiménez & Sanz-Valle, 2011) and individual levels (Kesting & Ulhøi, 2010).

The relationship between organizational culture and innovation has also been a topic of study for years (Crossan & Apaydin, 2010). Researchers have demonstrated that organizational culture impacts the innovation process at the individual, team, and organizational levels (Chang et al., 2012; Crossan & Apaydin, 2010; Donate & Guadamillas, 2010, 2011; Naranjo-Valencia, Jiménez-Jiménez, & Sanz-Valle, 2011). For instance, Donate and Guadamillas (2010, 2011) found that organizational culture moderated the relationship between knowledge management and innovation outcomes.

Various industries are inherently more innovative than other industries (National Science Foundation, National Center for Science and Engineering Statistics, & U. S. Census Bureau, 2008). According to the results of the Business Research & Development and Innovation Survey (BRDIS), 80% of software publishers actively participated in innovation activities while less than 2% of mining, extraction, and support activities companies were involved in innovation activities from 2006 – 2008 (NSF, NCSES, & U. S. Census Bureau, 2008). Although there is evidence that organizational culture,

innovation, and performance are empirically related, the moderating effect of innovation on organizational culture and company financial performance is unknown.

Problem Statement

Research has shown that organizational culture is a predictor of company performance (Denison, 1984; Gordon & DiTomaso, 1992; Hartnell et al., 2011; Jimenez-Jimenez & Sanz-Valle, 2011; Prajongo & McDermott, 2011). Research has also demonstrated that organizational culture affects the innovation process at the individual, team, and organizational levels (Chang et al., 2012; Crossan & Apaydin, 2010; Donate & Guadamillas, 2010, 2011; Naranjo-Valencia et al., 2011). Thus, it follows logically that different organizational cultures will be more effective in driving financial performance for highly innovative companies than for less innovative companies; however, there is no empirical evidence to substantiate such a hypothesis. One limitation of the current literature is that no studies have examined whether innovation moderates the relationship between organizational culture and financial performance.

Purpose of the Study

The purpose of this quantitative study was to examine the extent to which innovation moderates the relationship between organizational culture and company financial performance. Understanding the extent to which innovation moderates this relationship could help business leaders in creating organizational cultures that maximize innovation efforts and company financial performance.

Research Questions and Hypotheses

The following research questions and associated hypotheses are intended to address the purpose of the study:

Research Question 1: Do the Denison organizational culture model traits of adaptability, mission, consistency, and involvement correlate with company financial performance?

$H_0$1: There is no relationship between the Denison organizational culture model traits of adaptability, mission, consistency, and involvement, assessed by the Denison Organizational Culture Survey, with company financial performance in terms of return on assets.

H_a1: There are relationships between the Denison organizational culture model traits of adaptability, mission, consistency, and involvement, as assessed by the Denison Organizational Culture Survey, with company financial performance in terms of return on assets.

Research Question 2: Is there a relationship between company innovation intensity with company financial performance?

$H_0$2**:** There is no relationship between company innovation intensity as determined by the BRDIS with company financial performance in terms of return on assets.

H_a2: There is a relationship between company innovation intensity as determined by the BRDIS on company financial performance in terms of return on assets.

Research Question 3: Does company innovation intensity moderate the relationship between the Denison organizational cultural model traits of adaptability, mission, consistency, and involvement with company financial performance?

$H_0$3: Company innovative intensity as determined by the BRDIS does not moderate the relationship between the four Denison organizational culture model traits of adaptability, mission, consistency, and involvement, as assessed by the Denison Organizational Culture Survey, and company financial performance in terms of return on assets.

H_a3: Company innovative intensity as determined by the BRDIS moderates the relationships between the four Denison organizational culture traits of adaptability, mission, consistency, and involvement, as assessed by the Denison Organizational Culture Survey, and company financial performance in terms of return on assets.

Theoretical Basis

Lewin's (1939) field theory was used as the theoretical framework for this study. This is the primary theoretical framework on which Denison based his organizational culture model (Denison, 1984). Lewin's field theory is focused on individual actors. Field theory is also applicable to groups and has been used to examine and explain behavior at the company level (Burnes & Cooke, 2013). A cursory introduction to field theory follows; it is explored in detail in the literature review.

Field theory helps to explain the psychological mechanisms that drive behavior at the individual and organizational levels. According to Lewin's (1939) field theory,

addressing a social psychology problem requires looking at a situation from the interdependent pieces that compromise the totality of the situation. The analysis of a situation begins by looking at the whole scenario and then addressing the specific elements for a more detailed examination (Lewin, 1942). The field represents the interdependent facts that make up the situation (Lippitt, 1939).

Nature of the Study

In this quantitative, nonexperimental study, the independent variables were the four Dennison organizational culture model dimensions: mission, consistency, involvement, and adaptability, as measured by the 60-item Denison Organizational Culture Survey. Each dimension has15 five-point Likert scale items. The dependent variable, company financial performance, was measured by return on assets (ROA). Although ROA is a standard index of financial performance, ROA does not scale equally across industries (Eccles, 1990). For example, an ROA of .20 could represent excellent performance in the construction industry, but poor performance in the software publishing industry. Therefore, ROA was transformed into *z*-scores per industry. The ROA *z*-scores were used as the dependent variable to account for differences in industry ROA performance standards. The moderating variable was innovation intensity, as determined by the BRDIS. Denison Consulting provided an archival dataset of 143 companies, which included each company's (a) scores on the four organizational culture dimensions and (b) ROA.

Definitions

The following terms were operationally defined for the purpose of this study:

Adaptability is the ability and extent an organization can respond and adapt to changes in the environment and customer needs (Denison & Mishra, 1995; Denison Consulting, 2013).

Consistency is the extent in which an organization has internalized a governance based system to coordinate and control its systems (Denison & Mishra, 1994; Denison Consulting, 2013).

Financial performance – Return on Assets is a calculation indicating the ratio between total assets and net income (net income/total assets).

Innovation is the process of developing and implementing new or improved products, services, or processes (Chang et al., 2012; Uzkurt, Kumar, Kimzan, & Eminoglu, 2013).

Involvement is the extent in which employees feel a sense of ownership and responsibility for their organizations (Denison & Mishra, 2996; Denison Consulting, 2013).

Mission is the extent the organization's mission is communicated, understood, and internalized within the workforce (Denison & Mishra, 2996; Denison Consulting, 2013).

Organizational culture is a basic set of assumptions adopted by a group to deal with "external adaptation and internal integration [which are] taught to new members as the correct way to perceive, think, and feel in relation to those problems" (Schein, 1990, p. 111).

Return on assets is a company financial performance measure calculated by dividing the net income of a company by its total assets (Lee & Yu, 2004).

Assumptions

This study was based on three assumptions: (a) Creating an innovation intensity classification using data from the BRDIS would translate to the individual companies and provide an adequate representation of innovation at the company level. This method of classifying innovation was necessary because obtaining sufficient data at the company level was not possible given the resource constraints for the study; (b) Transforming ROA into *z*-scores within each industry normalizes ROA to enable accurate cross-industry comparisons; (c) The Denison Organizational Culture Survey was assumed to be a valid measure of organizational culture as related to company financial performance.

Scope and Delimitations

This study included a sample of U. S. companies. The Denison organizational culture model addressed specific aspects of organizational culture and was not a comprehensive measure of organizational culture. Therefore, this study addressed U. S. companies and specific aspects of organizational culture. Further, the innovation intensity criteria applied to U. S. companies was based on the North American Industry Classification System (NAICS, see Appendix A). The exclusion of companies outside of the United States was necessary to facilitate the innovative intensity classifications.

Limitations

This study was subject to six limitations.

- Because this study used a cleaned dataset of archival data, I could not collect additional details about the companies under study. For example, I

was not able to determine the extent to which the companies included innovation in their strategies and tactics.

- The research addressed a single point in time, thus precluding a longitudinal design, as recommended by Glasser (2014).
- There was a possibility that the companies that had taken the Denison Organizational Culture Survey were not representative of all U. S. companies or representative of the distribution of innovation that exists among all U. S. companies.
- The Denison Organizational Culture Survey was a self-report assessment of organizational culture. Although self-report assessments are often used in research, there is a potential for biased responses. While an adequate sampling of U. S. companies across the spectrum of innovation was represented, no companies represented the top 11 innovative industries (see Appendixes B-F for a full breakdown of industries represented in the dataset). This lack, which was due to the use of archival data (provided by Denison Consulting), could have impacted the validity of the study's statistical conclusion.
- Comparing companies across different operating and regulatory environments could have affected the results due to strategic and operational considerations of each industry.
- Typically, company performance measures, like ROA, are compared to companies in the same industry. Generalizing company performance

across industries could have impacted the results of this study. To minimize this limitation, the performance measures were transformed into *z*-scores.

Significance

The results of this study could impart four benefits. They could

- Help practitioners understand the impact of organizational culture on company performance in innovative markets by identifying the cultural dimensions that best balance the needs of a company to maximize both financial performance and innovation efforts.
- Help leaders in the process of engineering organizational cultures that position companies for future growth in innovative industries.
- Help companies position their organizational culture to maximize innovation and performance, thereby increasing their ability to bring innovation to the marketplace and drive social change through their innovation efforts (Christensen, Baumann, Ruggles, & Sadtler, 2006).
- Understanding the impact that organizational culture can have on the performance of companies with varying levels of innovation could also help to minimize the conflicting organizational culture needs of businesses by providing a baseline fulcrum to balance the demands of organizational culture.

Summary

Organization culture is important to company financial performance and innovation. Despite 40 years of research, little is known about what moderates the

relationship between organizational culture and company financial performance. This quantitative study examined if innovation moderates the relationship between an organization's culture, as measured by the Denison Organizational Culture Survey, and a company's financial performance, as indicated by return on assets (ROA). The study was limited to publically traded companies based in the United States. Limitations of the study included the use of secondary data and how innovation and financial performance were operationalized. Understanding how the three constructs—organizational culture, company financial performance, and innovation—interact could assist business leaders in creating and modifying their organizational culture to best position their companies to maximize their innovation efforts.

In Chapter 2, I highlight the construct and genesis of organizational culture and innovation as each relates to financial performance. In Chapter 3, I detail the research design, data collection procedures, and ethical consideration. In Chapter 4, I present the results, and Chapter 5 I provide the interpretations and implications of the study.

Chapter 2: Literature Review

Introduction

The purpose of this study was to examine the extent to which innovation moderates the relationship between organizational culture and company financial performance. The purpose of this chapter is to provide a background of organizational culture, innovation, and company performance in context of this study. Researchers have provided evidence that different aspects of organizational culture affect innovation and company performance. It is a logical assumption that different organizational cultures will be more effective in generating financial performance for more innovative companies than for less innovative companies. Denison and Mishra (1995) developed an organizational culture model to examine the relationship between organizational culture and organizational performance. Its four cultural dimensions are adaptability, mission, consistency, and involvement.

One of the overarching patterns in quantitative organizational culture research is how its different dimensions impact different areas of organizational performance (Hartnell et al., 2011). Fisher (1997) found that some dimensions of organizational culture are more important for company performance than other dimensions. According to Fey and Denison (2003), industry and market conditions can change the organizational cultural traits that are most important for company performance

To answer the research questions in this study and provide sufficient support for the gap of knowledge in the literature, I detail the relationship between organizational culture, innovation, and financial performance. Next, I introduce the development and

definitions of organizational culture. Third, I discuss the current models and taxonomies of organizational culture, provided a brief overview of company performance, and analyzed the organizational culture and performance literature. Fourth, I provide an overview of innovation followed by organizational culture and innovation research. Fifth, I critically evaluate the literature in relation to this study.

Literature Search Strategy

I conducted the literature search for this study using PsycINFO, Business Source Complete, and SAGE Journals; but primarily I used Google Scholar. Due to the breadth of organizational culture and innovation research, it was important to obtain literature from different perspectives and disciplines such as psychology, anthropology, business, and economics. Because Google Scholar is one of the largest indexes of scholarly work—it offers articles, theses, books, abstracts, and other web sources across a variety of disciplines—it was well suited for a multidisciplinary search. I used the following keywords: *culture, organization, climate, financial, performance, innovation, process,* and *indicators*. I also mined the reference lists of significant articles for additional sources.

Organizational Culture

Organizational culture was initially studied using qualitative data popularized by anthropology and ethnographic research methods (Allaire & Firsirotu, 1984; Denison, 1990). The focus of early organizational culture researchers was as vast and varied as traditional culture research. Several researchers (e.g., Allaire & Firsirotu, 1984; Smircich, 1983) asserted that aspects of organizational culture were directly reflective of the

theories of culture outlined by Keesing's (1974) overview of culture. Allaire and Firsirotu's (1984) article provides a full analysis of organizational culture, including perspectives of how organizational cultures have been directly influenced by the schools of thought driving anthropologically based culture research. Allaire and Firsirotu provide a brief overview of how early organizational culture perspectives were influenced by theories of culture. I have summarized their overview in Table 1.

Field Theory

Some researchers have linked field theory as a psychological mechanism underpinning organizational culture (Denison & Mirsha, 1996; Quinn & Rohrbaugh, 1981; Camaron & Quinn, 2011). According to Lewin's (1939) field theory, an individual's behavior is a function of the person and the environment. Lewin asserted that a person's behavior is in part, shaped by his or her environment (Lewin, 1939; Lippet, 1939). The 'field' is the individual's environment or life-space. Thus, if one changes a part of the life-space, an individual's behavior will also change (Burnes & Cooke, 2013). The mathematical formula for field theory (Lewin, 1942) is: Behavior = Function of Person and Environment = Function of Life-Space (Be = F[P,E] = F[L-Sp]). Based on the premise of field theory, the actions of individuals in organizations should be directly related to the organizational culture because the organizational culture is a subdomain of the individual's life-space (Tolman, 1962). Researchers also extended field theory to organizations and the same mechanisms that drive an individual's behavior drive organization and group behavior (Lewin, 1947; Tolman, 1962).

Table 1

Organizational Culture/Culture Association

Cultural concepts	Major theorists	Impact on organizational culture theory
Cognitive	Goodenough	"Organizations become social artefacts of shared cognitive maps; they are enactments of a 'collective mind' that is not merely a replication of the minds of individual participants. It shares a belief in a collective mind or representation different from but related to individual participants' minds, albeit in an obscure and imprecise fission" (Allaire & Firsiroto, 1984, p. 204).
Structuralist	Levi-Strauss	"Organization forms, structures and processes… actually result from the permutations and transformations of universal and unconscious processes of the managerial mind" (Allaire & Firsiroto, 1984, p. 205).
Mutual equivalence	Wallace	"Organizations become the locus of intersection and synchronization of individual utility functions, the somewhat fortuitous site where actors' micromotives coalesce into organizational microbehavior. (Allaire & Firsiroto, 1984, p. 206).
Symbolic	Geertz, Schneider	"Organizations are… characterized by different degrees of sharing of values, norms, roles and expectations, which make up the organization's specific meaning-structures (Allaire & Firsiroto, 1984, p. 208).
Functionalist	Malinowski	"Organizations are sociocultural systems which will, or should, reflect their members' needs in their structures and processes" (Allaire & Firsiroto, 1984, p. 199).
Functionalist-structuralist	Radcliffe-Brown	"Organizations are systems with goals, purpose, needs, in functional interaction with their environment" (Allaire & Firsiroto, 1984, p. 200).
Historical-deffusionist	Boas, Benedict, Kluckhohn, Droeber	"No direct equivalent is found in the [organizational culture] field. However, a number of disparate authors have studied organizations as historically produced sociocultural systems" (Allaire & Firsiroto, 1984, p. 202).
Ecological-adaptationist	White, Service, Rappaport, Vayda, Harris	"Organizations are sociocultural systems that take on varied forms, as they adapt to environmental characteristics including the social and political ones, act upon their enacted environments, or are selected in or out of existence by ecological circumstances" (Allaire & Firsiroto, 1984, p. 201).

Conceptually, Lewin's field theory explains the mechanisms of behavior, action, and change. The general premise of field theory is that there is tension in an actor's – an individual or group – life-space. The forces of the tension are called valences (Lippitt, 1939). The valance of each area of the life-space has potential energy that will either compel an individual to take an action to move toward a particular outcome or to move away from an undesirable outcome (Lippitt, 1939). An outcome could be a physiological need, such as hunger or safety; a psychological need, such as affection and a sense of belonging; or a particular goal, such as finishing a dissertation.

The actor's valances, defined by his or her life-space, will compel the actor to take action to satisfy a need, desire, or goal. Satisfying the need, desire, or goal reduces the tension and relative power of the valances driving the actor's actions (Tolman, 1972). The actor's life-space will have changed as a result of meeting the need. For instance, if an individual is hungry and he or she takes action to satisfy the hunger, the valances driving the action to satisfy the hunger will be reduced as the hunger need is met (Tolman, 1962). Researchers have suggested that a group has a life-space, and the group life-space would define expected behavior for the group members (Toleman, 1962). Further, it has been argued that field theory, applied to groups, mirrors the work of anthropologists (Toleman, 1962).

Tolman (1962) created a process to define the life-space with independent variables, dependent variables, and intervening variables. The independent variables include demographic data of the actor, conditions of the situation, and the perceived environment. The dependent variables are the behaviors and actions of the individual

actor. The intervening variables –the life-space or field – includes the need system, belief-value matrix, and the immediate behavior space. Martin (2003), however, argued that Tolman's life-space mechanism was incongruent with field theory because the conceptual separation of the three variables did not adequately represent a coherent and interdependent system. Because of the challenges in accurately mapping and measuring a life-space, an instrument to measure field theory was never fully developed or accepted in the research community (Rummel, 1975). However, Lewin's work on field theory has proven a valuable theoretical framework for explaining behavior (Burnes & Cooke, 2013).

Models and Measurements of Organizational Culture

There are numerous models and measures of organizational culture, the two most prevalent organizational culture models used to examine organizational culture and company performance are the competing values framework (Quinn & Rohrbaugh, 1981; Cameron & Quinn, 1999) and Denison's organizational culture model (Denison & Mishra, 1995). The organizational culture profile (O'Reilly, Chatman, & Caldwell, 1991) has also been used to examine the relationship between organizational culture and performance. In this section, I describe the competing values framework, the organizational culture profile, and Denison's organizational culture model. I then discuss pertinent organizational culture research related to organizational performance and innovation.

Competing values framework. The competing values framework was one of the primary organizational culture models used to examine the relationship between

organizational culture and company performance. Quinn and Rohrbaugh (1981) originally developed the competing values framework model, which has been used to study aspects of organizational culture in relation to organizational effectiveness and financial performance. “The framework focuses on the competing tensions and conflicts inherent in any human system: primary emphasis is placed on the conflict between stability and change, and the conflict between the internal organizational and the external environment” (Denison & Spreitzer, 1991, p. 3). The framework was developed to address the challenges of explaining organizational cultures across different companies and industries (Quinn & Rohrbaugh, 1981).

The competing values framework includes three axes or value dimensions (Goodman, Zammuto, & Gifford, 2001). The first value dimension is *organizational focus*. The organizational focus dimension ranges from internal focus, with an emphasis on the development and well-being of employees, to external focus, in which the focus is on the development and well-being of the organization as a whole (Howard, 1998). The second value dimension is *organizational structure*. The organizational structure dimension ranges from stability, in which operational controls are emphasized, to flexibility, in which innovation and the ability to quickly react to market demands are emphasized (Howard, 1998). The final value dimension is related to how business leaders view time in the decision-making process; these dimension are referred to as *means and ends* (Quinn & Rohrbaugh, 1981). Means are related to the short-term operational aspects of the business, whereas ends are related to the long-term strategic goals of the organization (Howard, 1998).

According to Cameron and Quinn (2011), the culture dimension labels of the competing values frameworks can be confusing to business leaders. To address this confusion, action verbs were created to label the culture dimensions. The term *collaborate* was used as a synonym for clan, *create* as a synonym for adhocracy, *control* as a synonym for hierarchy, and *compete* as a synonym for market. Other researchers that have developed instruments based on the competing values framework have also created synonyms for the cultural dimensions of the competing values framework. For instance, several researchers have used the label *group* as a replacement for the *clan* cultural dimension (Prajogo & McDermott, 2011; Henri, 2006; Zu, Robbins, & Fredendal, 2010); the terms, however, are synonymous.

Cameron and Quinn developed the Organizational Culture Assessment instrument based on the competing values framework (Yu & Wu, 2009). The instrument measures four culture dimensions: clan, adhocracy, hierarchy, and market cultures (Heritage, Pollock, & Roberts, 2014). Employees in an organization with a clan culture are employee focused and strive to understand and meet the needs of their customers by creating flexible operational structures to ensure that the company can quickly adapt to and meet customer and market changes (Heritage et al., 2014). Employees in an organization with an adhocracy culture are focused on the business as a whole with a strong emphasis on individual risk taking and innovation in an effort to meet customer and market demands (Heritage et al., 2014). Employees in an organization with a hierarchy culture experience a formalized and structured work environment in which leaders view long-term goals and operational efficiencies as measures of success

(Heritage et al., 2014). Employees in an organization with a market culture experience a competitive, goal-driven, work environment where leadership is focused on competitiveness and the achievement of measurable goals (Heritage et al., 2014).

The Organizational Culture Assessment is composed of six questions. According to Cameron and Quinn (2011), each question has four alternative statements, and each statement has a "now" and "future" column. The test user splits 100 points between the four alternatives to indicate how similar the alternative description matches the users' perception of the organization. The process is used for the "now" and "future" column. Each alternative represents a culture dimension. The scores of each question-alternative pair are averaged for the "now" and "future" columns and plotted to create a graphic representation of the organizational culture. The dimension that is scored the highest on the "now" column would be considered the primary culture dimension for the organization. The scores on the "future" column represent an ideal culture to meet the company's goals.

Person-culture fit. O'Reilly et al. (1991) developed the person-culture fit model and proposed that the extent to which an individual's values match the perceived values of an organization indicate person-culture fit. O'Rielly et al. argued that "when a social unit's members share values, they may form the basis for social expectations or norm" (p. 492). Further, individuals tend to align themselves with other entities, such as people, groups, and organizations, with similar underlying values. Congruence is created when an individual aligns him or herself with an organization that has similar values. The researchers proposed that when the values of an individual and organization are

congruent, the person-culture fit would be strong. An individual's values are believed to have an important role in influencing behavior, attitudes (Robbins & Judge, 2009), and job satisfaction (Greenburg, 2011). Given the potential benefits of an individual's values, O'Reilly et al. proposed that a strong person-culture fit could result in attracting and retaining employees with similar values as the organization and the value congruence created could enhance the employee's behavior, attitude, and overall job satisfaction.

The Organizational Culture Profile was developed to measure person-culture fit (O'Reilly et al., 1991). The Organizational Culture Profile uses Q-methodology (Dziopa & Ahern, 2011). Q-methodology is a process in which participants rank items in a set in order according to their perspective (Dziopa & Ahern, 2011). According to O'Rielly et al. (1991), the Organizational Culture Profile used a set of values that relate to both the organization and the individuals. The individuals in an organization rank the items from strongest to weakest to obtain the organization's cultural profile. The participants also rank their personal values using Q-methodology. There are 54 value items used in the ranking system. To determine person-culture fit, the value rankings are compared to determine the level of congruence between the individual's values and the values of the organization. To determine the organization's values, all of the individuals within an organization rank their perceptions of the organization's values and then the rankings are aggregated. The values are then transformed into cultural dimensions. The cultural dimensions of the Organizational Culture Profile are: (a) innovative, (b) aggressive, (c) outcome oriented, (d) stable, (e) people oriented, (f) team oriented, and (g) detail oriented (Chatman & Jehn, 1994).

Innovation culture model. Dobni (2008) developed an innovation culture model and instrument. Dobni's innovation culture consists of four dimensions of organizational culture: (a) innovation intention, (b) innovation infrastructure, (c) innovation influence, and (d) innovation implementation. I created Table 2 to illustrate the innovation culture dimensions, each of the factors associated with the dimensions, and a description of each factor. The Innovation Culture Scale consists of 86 items or statements. The statements are scored on a seven-point Likert scale. The participants are asked to rate the degree they had adopted the practice described in the statement to their organization. There was good content and construct validity with all four factors correlated at $\alpha > .70$. The model and instrument has not been widely used by researchers, however, according to the Google Scholar website, Dobni's article has been cited over 120 times, whereas the publisher, Emerald | Insight, reported the original article had been referenced only 47 times.

Denison organizational culture model. The Denison organizational culture model was conceived and designed for the explicit purpose of examining aspects of organizational culture that affect company performance (Denison & Mirsha, 1995). Similar to the competing values framework, Denison's model consists of four traits based on two opposing dimensions. The conflicting dimensions are: (a) external or internal focus, and (b) flexible or stable tendencies. The organizational culture traits of the model are: (a) adaptability, (b) consistency, (c) involvement, and (d) mission. Each organizational culture trait has three subdimensions, for a total of four organizational culture traits and 12 subdimensions.

Table 2

Innovation Culture Dimensions and Factors

Dimension	Factor	Factor description
Innovation intention	Innovation Propensity	"The degree to which the organization has a formally established – within their business model – architecture to develop and sustain innovation" (Dobni, 2008, p. 551).
	Organizational Constituency	"Considers the level to which employees are engaged in the innovation imperative and how employees think of themselves vis-à-vis their colleagues in respect to value, equity, and contributions made within the organization" (Dobni, 2008, p. 551).
Innovation infrastructure	Organizational learning	"The degree to which the training and educational opportunities of employees are aligned with innovation objectives" (Dobni, 2008, p. 551).
	Creativity and empowerment	"Determination of the creative capacity of employees and the amount of creativity that employees are allowed to express in their work" (Dobni, 2008, p. 551).
Innovation influence	Market orientation	"This involves the market sensing and contextual awareness behaviors of employees. It considers the extent to which employees generate and disseminate knowledge on customer, competitors, the industry, as well as their understanding of the value chain or cluster in which they operate" (Dobni, 2008, p. 551).
	Value orientation	"The degree to which employees are focused on and involved in the process to create value for customers/clients" (Dobni, 2008, p. 551).
Innovation implementation	Implementation context	"Involves the organization's ability to execute value-added ideas. It considers the ability to proactively co-align systems and processes with changes in the competitive environment" (Dobni, 2008, p. 551).

Adaptability is the extent an organization can respond and adapt to changes in the environment and customer demands (Denison & Mishra, 1995). There are three

subdimensions in adaptability: (a) creating change, (b) customer focus, and (c) organizational learning. Creating change is the capacity of the organization to react to market and customer trends in innovative ways that meet shifting market demands. Customer focus is the capacity of the organization to understand and satisfy the customers' demands. Organizational learning is the extent that risk and innovation are encouraged.

Consistency is the extent in which an organization has internalized a governance-based system to coordinate and control its systems (Denison & Mishra, 1995). The three subdimensions of consistency are: (a) core values, (b) agreement, and (c) coordination and integration. Core values refer to the strength the company's values and ethics direct the employee's behaviors. Agreement is the extent to which conflicting ideas are incorporated into the decision process. Coordination and integration refers to the extent in which different business units, or individuals with different functions, work and cooperate across the organization.

Involvement is the extent in which employees feel a sense of ownership and responsibility for the organization (Denison & Mishra, 1995). The three subdimensions of involvement are: (a) empowerment, (b) team orientation, and (c) capability development. Empowerment is the extent in which employees are allowed the authority and autonomy to perform their work. Team orientation is the extent that common goals and mutual responsibility are shared across the organization/teams. Capability development is the extent the organization's employees are developed through skills and knowledge.

Mission is the extent the organization's mission is communicated, understood, and internalized within the workforce (Denison & Mishra, 1995). The three subdimensions of mission are: (a) strategic direction and intent, (b) goals and objectives, and (c) values. Strategic direction and intent are the extents the mission and direction of the organization are clearly communicated to the employees. Goals and objectives are the extents in which the employees are held accountable for both short and long-term goals that align with the company's strategy. Vision is the extent the desired future of the organization is communicated and shared throughout the company.

The Denison model is measured using the Denison Organizational Culture Survey, it contains 60 items measuring four traits: adaptability, mission, consistency, and involvement on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) (Denison & Mishra, 1995). The survey items, coupled with the organizational culture traits and subdimensions, have been included in Appendix D. The Denison Organizational Culture Survey has good construct validity, face validity and reliability (Denison et al., 2004). Further, the researchers have use the instrument extensively over the past 19 years (Denison, Nieminen, & Kotrba, 2014). The full psychometric properties of the instrument have been included in Chapter 3 of this study.

Organizational Performance

There are numerous indicators and measures of company performance. From a strategic perspective, company performance can be assessed from three domains: (a) financial performance, (b) business performance, and (c) organizational effectiveness (Venkatraman & Ramanujam, 1996). Hofer (1983) asserted that some company

performance measures were more conducive to examining company financial performance in particular situations. For example, current organizational culture research has addressed company performance measures from the financial, business performance, and organizational effectiveness levels of analysis, which are discussed in detail in the next section.

Organizational Culture and Organizational Performance

According to Hartnell et al. (2011), researchers have been examining the impact of organizational culture on company performance since the 1980's. The majority of current research indicates that some dimensions of organizational culture are statistically significantly related to aspects of company performance (Hartnell et al., 2011). In the context of organizational culture, organizational performance has been measured through financial performance (Asree et al., 2010; Denison, 1984; Denison & Mishra, 1995; Gordon & DiTomaso, 1992, Tseng, 2010; Wilderom et al., 2012), business performance, and organizational effectiveness measures (Baird et al., 2011; Hartnell et al., 2011; Jacobs, et al., 2012; Lee & Yu, 2004; Mitchell & Pattison, 2012; Ogbonna & Harris, 2000). However, with the exception of Denison's Organizational Culture Survey, the effect sizes between most organizational culture measures and financial performance measures are generally small and limited in scope (Hartnell et al., 2011; Denison, Nieminen, & Kotrba, 2014).

Competing values framework research. In a study of 313 Taiwanese companies, Tseng (2010) reported that companies with the dominant cultural dimension of adhocracy had statistically significantly better performance than companies with a

dominant cultural dimension of clan. However, there were no statistically significant differences between hierarchy and the clan cultural dimensions. There were also no companies with the market culture dimension in the sample; therefore, market culture was not included in the statistical analysis. Although companies with the adhocracy culture dimension demonstrated better performance than companies with the clan culture dimension, the difference between the two culture dimensions on performance measures was $\eta^2 = 0.062$, indicating a small effect.

Jacobs et al. (2012) found that different cultural dimensions of the competing values framework were statistically significantly and positively related to different nonfinancial performance measures. Of the five hospital-specific performance criteria examined, only three performance criteria were statistically significantly and positively correlated to all four cultural dimensions. The remaining performance criteria were statistically significantly and positively correlated to three of the culture dimensions. Jacobs et al.'s results indicate that not all culture dimensions are statically significantly correlated with performance measures. Further, the model the researchers used had a McFadden $R^2 = 0.1469$, indicating a less than optimal fit. The McFadden R^2, also known as *pseudo* R^2, is a measure of effect size and used to determine if a statistical model is a good fit for the data. McFadden (1974) stated that an excellent fit ranged from R^2=0.20 to R^2=0.40. Overall, the hospitals with a predominantly developmental culture dimension outperformed hospitals with other dominant culture dimensions (Jacobs et al., 2012). Given the small effect size, Jacobs et al. concluded that hospitals with a developmental

culture outperforming hospitals with other dominant cultures should be viewed cautiously.

Prajogo and McDermott (2011) examined the relationships between the culture dimensions of the competing values framework against four performance measures, product quality, process quality, product innovation, and process innovation. The developmental culture dimension was statistically significantly and positively correlated with three of the performance measures: product quality $r_{(192)} = .36$; product innovation $r_{(192)} = .44$; and process innovation $r_{(192)} = .31$. The group culture dimension was statistically significantly and positively correlated with process quality $r_{(192)} = .42$, and process innovation $r_{(192)} = .20$. The rational culture dimension was statistically significantly and positively correlated with product quality $r_{(192)} = .19$ and process quality $r_{(192)} = .25$. The hierarchical culture dimension was statistically significantly and positively correlated with only process quality $r_{(192)} = .17$.

Although Prajogo and McDermott (2011) reported medium effect sizes between organizational culture and performance measures, Hartnell et al. (2011) stated that most organizational culture and performance researchers reported small effect sizes. For instance, Henri (2006) examined the dimensions of the competing values framework against product management control systems and found statistically significant, but weak, positive correlations between the group and developmental cultures, as well as three-product management control measures. The correlations ranged between $r_{(382)} = 0.098$ and 0.134.

Organizational culture has been statistically significantly and positively correlated with sigma six practices (Zu et al., 2010). The researchers identified that the group, developmental, and rational culture dimensions of the competing values framework were statistically significantly and positively correlated with sigma six quality management measures. The hierarchical culture dimension did not have a statistically significant impact on sigma six measures. The rational culture dimension statistically significantly and positively correlated with 9 of the 10 sigma six indicators, with correlations ranging between $r_{(225)} = 0.20$ and 0.45. The group culture dimension statistically significantly and positively correlated with seven indicators, with correlations ranging between $r_{(225)}=0.37$ and 0.62. The developmental culture dimension statistically significantly and positively correlated with one sigma six measure, at $r_{(225)} = 0.37$.

In a metaanalysis of 84 studies, Hartnell et al. (2011) provided an example of organizational culture measures having statistically significant, but small effects on performance measures. Many researchers reported statistically significant and positive relationships between organizational culture and company performance. However, the general trend was that most statistically significant results were weak correlations with small effect sizes. Hartnell et al. based their metaanalysis on the competing values framework dimensions. The effect sizes between organizational culture dimensions and subjective financial performance measures ranged from R^2=.00 to R^2=.05. The effect sizes between organizational culture dimensions and objective financial performance measures were greater than subjective measurements of financial performance; the effect sizes ranged from R^2=.01 to R^2=.15. The relationships between organizational culture

dimensions and operational effectiveness criteria had effect sizes between R^2=.08 and R^2=.35. The researchers concluded that the small effect sizes between organizational culture and performance measures could be explained by moderator variables. Hartnell et al. also stated that more research was needed to determine the effects of moderators between organizational culture and company performance.

Person-culture fit research. In a study examining Singapore companies, Lee and Yu (2004) found that companies in different industries tended to differ on their strongest cultural dimensions. For example, manufacturing and insurance industries had more innovative cultures than hospitals. Further, different cultural profiles could be replicated within industries. Industry membership accounted for 53.3% of the variance between cultural profiles. Although organizations have unique cultures, "cultural variation is greater across industries than within them" (p. 349); in other words, organizations within the same industry shared more cultural traits than companies in different industries. In the same study, the relationship between cultural strength and financial performance had mixed results. For instance, the cultural dimension of innovation positively correlated with growth in the insurance industry, but not in manufacturing or hospital industries.

In a study of 364 Australian businesses, Baird et al. (2011) examined the relationships between organizational culture and the effectiveness of total quality management practices. The organizational culture dimension of innovation was statistically significantly and positively correlated with total quality management (TQM) practices. Additionally, the culture dimensions of teamwork and respect were statistically significantly and positively related to quality data and reporting, supplier quality

management, and product/service design. The effect sizes between organizational culture and the TQM performance measures were small, ranging between R^2 = 0.09 to 0.18. Baird et al. also found that the cultural dimensions of attention to detail, stability, and aggressiveness were not statically significant in relation to TQM performance measures.

Denison organizational culture research. Denison's Organizational Culture Survey (Denison & Mirsha, 1995) was specifically constructed to measure organizational culture dimensions that directly relate to company performance (Denison, 1990; Denison, et al., (2014). Fisher (1997) found that the strength of the relationship between the four culture dimensions and performance measures were not spread equally across the cultural dimensions (Fisher, 1997). For instance, revenue growth, sales growth, and market share were statistically significantly and positively correlated with the cultural dimensions of mission and adaptability, but not the cultural dimensions of consistency and involvement (Denison & Neale, 1996; Fisher, 1997). On the other hand, market share, employee satisfaction, and quality of products and services were statistically significantly related to all four Denison culture traits (Denison & Neale, 1996). The effect sizes ranged from R^2=.07 for mission and return on assets, to R^2=.77 for involvement and employee satisfaction (Fisher, 1997).

Yilmaz and Ergun's (2008) research examining manufacturing companies in Turkey were somewhat consistent with Fisher's (1997) findings. Yilmaz and Ergun and Fisher identified mission as the strongest indicator of performance measures. However, Yilmaz and Ergun reported that adaptability and consistency were the primary organizational culture traits associated with new product development, whereas Fisher

identified adaptability with new products. Effect sizes for Yilmaz and Ergun's study were large, ranging from $R^2 = .37$ to $R^2 = .53$.

Roldán and Bary (2009) provided evidence that companies with strong, balanced cultures in all four dimensions of the Denison organizational culture model outperformed companies with unbalanced cultural dimensions, in which one or more dimension was weaker than the other cultural dimensions. Companies with strong, balanced cultures have consistently outperformed companies with unbalanced and weak cultural dimensions, as defined by the Denison organizational culture model (Denison, 1990).

The original research conducted in the formulation of the Denison organizational culture model consisted of several large-scale studies used to create the model and validate the Denison Organizational Culture Survey (i.e., Denison, 1990; Denison & Mishra, 1995; Denison, Janovics, Young & Cho, 2006). The validity and initial studies of the Denison Organizational Culture Survey are fully explored in Chapter 3. Current research efforts have supported the applicability of the Denison organizational culture model to various performance measures.

Fey and Denison (2003) examined the Denison organizational culture model in Russia. The authors found adaptability to be the single most important culture trait for predicting company performance (Fey & Denison, 2003). In the United States however, mission was the most important determinant of performance (Fisher, 1997). Based on their findings, Fey and Denison asserted that the turbulent market and sociopolitical landscape of the Russian economy could account for the different organizational cultural traits between Russia and the United States Fey and Denison asserted that Russian

companies needed to be more flexible than U. S. companies to compensate and react to the turbulent business and political environment in Russia.

This pattern of strong, balanced cultures producing superior performance over weak or unbalanced cultures has been empirically demonstrated in Columbia (Roldán & Bray, 2009), Turkey (Yilmaz and Ergun, 2008), Russia (Fey and Denison, 2003) South Africa (Denison et al., 2003), and North America (Denison, 1990). Research in Canada, Jamaica, and Japan failed to link a majority of Denison's 12 indices to performance measures (Denison et al, 2003). Denison et al. (2003) speculated that the cultural dimensions and subdimensions of Denison's cultural model are still relevant to performance in those countries, but the manifestation of the cultural traits differs due to the overarching national contexts.

Innovation

Innovation is a complex process that can operate on the individual (Scott & Bruce, 1994), team (West, et al., 2003), organizational (Tajeddini & Trueman, 2012), regional (Cooke, 2001), national (U. S. Department of Commerce, 2012), and global levels (Carlsson, 2006). For the purpose of this study, innovation is defined as the process of developing and implementing new or improved products, services, or processes (Chang et al. 2012; Uzkurt et al. 2013). Innovation is discussed at the organizational level. The innovation process within an organization generally results in new or improved products, services, or operational processes (Gopalakrishan & Damanpour, 1997). The magnitude of the change to the products, services, or processes can be defined as incremental or radical. Incremental changes are small changes to existing products,

services, or processes. Radical changes, on the other hand, are drastic and fundamental changes in existing products, services, or processes, or result in new products, processes, or services.

Innovation is both a measure of company performance (Crossan & Apaydin, 2010; U. S. Department of Commerce, 2012), and an integral component of organizational culture (Denison et al., 2006; O'Reilly et al., 1991; Eccles, 1990). For example, Eccles (1990) argued that innovation is an important element in gaining a strategic advantage and superior performance over a company's competition. Conversely, Denison (1996) and O'Reilly et al. (1991) proposed that innovation is an integral aspect of organizational culture. I have included select research articles illustrating the multi-faceted construct of innovation in the next section.

Innovation and Organizational Culture Research

There is a strong link between innovation and organizational culture. Hartnell et al. (2011) found statistically significant and positive correlations between the dimensions of the competing values framework and organizational innovation activities in a metaanalysis. For examplemetaanalysis the clan organizational culture dimension statistically significantly and positively correlated with subjective innovation at $r_{(816)}$ = .41, adhocracy statistically significantly and positively correlated with subjective innovation at $r_{(622)}$ = .48, and the market culture dimension statistically significantly and positively correlated with subjective innovation at $r_{(710)}$ = .59.

Valencia, Valle, and Jimenez-Jimenez (2010) examined the competing values framework in Spanish companies across a variety of industries. The adhocracy and

hierarchy cultural dimensions were statistically significantly and positively correlated with product innovation. Adhocracy culture was statistically significantly and positively correlated with product innovation. Hierarchy culture was statistically significantly and negatively correlated with product innovation.

Hurley and Hult (1998) found that the market culture dimension was statistically significantly and positively correlated with innovation. Employees working in market-orientated companies think about and respond to the external environment. Therefore, the employees are prone to create innovative products to meet the customer's needs. This proposition is congruent with Denison's organizational culture model (Denison & Mirsha, 1995) and Cameron and Quinn's (1999) competing values framework. Hurley and Hult argued that the external focus of a market culture and adequate resources of the organization are antecedents to innovation at the company level.

The Denison organizational culture model (Denison & Mirsha, 1995) highlights adaptability and involvement as cultural traits associated with innovation activities. Scores on measures of both constructs have been statistically significantly and positively correlated to company innovation (Fisher, 1997). Hurley and Hult's (1998) conceptual connection between innovation and organizational culture can be applied to Denison's organizational culture model. By definition, the cultural trait of adaptability includes elements of flexibility and external focus; whereas involvement encompasses flexibility and empowers employees to act (Denison & Mersha, 1995). For instance, Yilmaz and Ergun (2008) found statistically significant and positive correlations between innovation activities and consistency, $r(100) = .48$, and adaptability, $r(100) = .50$, with a large effect

size, R^2 = .37. In summary, Hurley and Hult and Denison and Mersha (1995) agreed that product innovation requires a focus on customer needs, the external environment, and the resources to act.

In a metaanalysis of 60 innovation studies, 16 variables that predict new product performance in four major categories were identified: (a) product characteristics, (b) company strategy characteristics, (c) company process characteristics, and (d) marketplace characteristics (Henard & Szymanski, 2001). Two of the company process characteristics, structured approach and market orientation, closely match aspects of the Denison organizational culture model. Structured approach was defined as "employment of formalized product development procedures" (p. 364). Structured approach parallels the organizational culture dimension of consistency, which includes elements of support coordination, control, and governance (Denison & Mirsha, 1995). Market orientation was defined as the "degree of company orientation to its external, competitor, and customer environments" (Henard & Szymanski, 2001, p. 364). Market orientation was closely related to Denison's cultural trait of adaptability (Denison & Mirsha, 1995). The cultural trait of consistency has been linked to financial performance, but not innovation (Fisher, 1997). On the other hand, "formalized product development procedures" (Henard & Szymanski, 2001, p. 364) was an antecedent to financial gain from new product development. Therefore, consistency is still important in the financial performance of innovation activities.

Innovation and Financial Performance

Innovation and financial performance have been closely associated in business theory and recognized as a source of competitive advantage (Crossan & Apaydin, 2010). The U. S. Department of Commerce has recognized the importance of innovation to the U. S. economy, writing that innovation "is the key driver of competitiveness, wage and job growth, [and] long-term economic growth" (U. S. 2012, p. v). The U. S. government has been studying and tracking innovation activities in the United States since 1953 (NSF, 2014). Innovation activities have been associated with increased performance within organizations (Henard & Szymanski, 2001). However, Hoonsopon and Ruenrom (2012) found that product innovation involving both radical and incremental changes had a statistically significant and positive impact on company financial performance only if the innovative product performed well in the marketplace. Further, not all innovation activities enhance financial performance (Simpson, Siguaw, & Enz, 2006).

Although innovation is generally accepted as a competitive advantage strategy (U. S. Department of Commerce, 2012), several empirical studies have demonstrated that innovation has a statistically significant and positive relationship with ROA (Bierly & Chakrabarti, 1996), revenue, and growth (Hall & Bagchi-Sen, 1999; Thornhill, 2006). First, Bierly and Chakrabarti (1996) examined the R&D efforts of pharmaceutical companies in the United States and found that, over time, aggressive innovation strategies of the pharmaceutical companies produced statistically significantly greater profitability than less innovative companies. For instance, ROA for strong innovators was 0.16 while less innovative companies demonstrated an ROA of 0.10. Further, Return on Sales for

innovative companies was 0.19, whereas less innovative companies was 0.11 (Bierly & Chakrabarti, 1996).

Hall and Bagchi-Sen (1999) had mixed results examining the relationship between innovation and company performance in the Canadian biotechnology industry. New patents, a measured of innovation, did not statistically significantly affect firm performance. However, new products introduced to the marketplace statistically significantly increased total revenue growth, product sales growth, growth in exports, and pretax profit growth.

In a study of 854 manufacturing firms, Thornhill (2006) examined the effects of innovation on revenue growth. Thornhill found that innovation was statistically significantly positively correlated with revenue growth. However, the effect size of innovation on revenue growth was small $R^2 = 0.033$ (Thornhill, 2006). Capitalizing on innovation activities is a challenging and complex endeavor. In a metaanalysis of 60 studies, Henard and Szymanski (2001) identified 16 variables in which company performance was statistically significant. I created Table 3 to highlight the statistically significant antecedents, definitions, and the effect sizes in Henard and Szymanski's metaanalysis,

Table 3

Product Innovation Success Antecedents

Predictor variable	Definition	R^2
Product advantage	Superiority and/or differentiation over competitive offerings	.31
Product meets customer needs	Extent to which product is perceived as satisfying desires/needs of the customer	.86
Product technological sophistication	Perceived technological sophistication of the product	.86
Market synergy	Congruency between the existing marketing skills of the company and the marketing skills needed to execute a new product initiative successfully	.38
Order of entry	Timing of marketplace entry with a product/service	.84
Dedicated human resources	Focused commitment of personnel resources to a new product initiative	.94
Structured approach	Employment of formalized product development procedures	.39
Marketing task proficiency	Proficiency with which a company conducts its marketing activities	.41
Launch proficiency	Proficiency with which a company launches the product/service	.48
Reduced cycle time	Reduction in the concept-to-introduction time line (i.e., time to market)	.59
Market orientation	Degree of company orientation to its internal, competitor, and customer environments	.37
Cross-functional integration	Degree of multiple-department participation in a new product initiative	.25
Senior management support	Degree of senior management support for a new product initiative	.81
Likelihood of competitive response	Degree/likelihood of competitive response to a new product introduction	.74
Market potential	Anticipated growth in customers/customer demand in the marketplace	.47

Note. Predictor variables, definitions, and effect sizes extracted from "Why some new products are more successful than others." by D. H. Henard & D. M. Szymanski, 2001, *Journal of Marketing Research, 38*(3), 362-375.

Literature Summary and Study Justification

In this literature review, I highlighted that researchers have been studying organizational culture for over 35 years, and they have developed robust organizational culture theories, models, and instruments. Further, organizational culture and organizational performance researchers have matched organizational culture dimensions and company performance measures in numerous industries and national settings. The Denison Organizational Culture Survey was specifically designed to measure aspects of organizational culture that related to company performance and demonstrated a large effect on performance measures.

I also highlighted that specific cultural dimensions are predictive of specific company performance criteria. For example, the Denison cultural dimensions of mission and consistency statistically significantly and positively correlated with financial performance measures, whereas the cultural dimensions of adaptability and involvement were statistically significantly and positively correlated with innovation. Further, industry-specific characteristics and socio-political turbulence can impact the relationship between organizational culture and company performance measures.

Although researchers have examined organizational culture for decades, I have identified that there are numerous weaknesses in the existing studies. First, with the exception of the Denison Organizational Culture Survey, the effect sizes between organizational culture dimensions and financial performance are small. Second, minimal research has been conducted examining moderators between organizational culture and company performance. Third, there is not an encompassing organizational culture model

to examine every aspect of an organization's culture. Fourth, organizational culture researchers are limited to examining measurable manifestations of culture, which limits the researcher's ability to explain the full relationship between organizational culture and company performance.

Despite the depth and breadth of organizational culture and company performance literature, I was unable to locate research to indicate if company membership in innovation-driven industries changes the relationship between organizational culture traits and company performance. No studies have examined if an innovative-intense industry alters the organizational culture dimensions that impact company performance. In summary, I have identified several unanswered questions. First, little is known about the moderators between organizational culture and company performance. Further, it is unknown if the organizational culture dimensions for companies involved in varying degrees of innovative activities are moderated by innovative-intense industries. Knowing if innovation affects the relationships between organizational culture dimensions and company financial performance could help business leaders to justify focusing on developing their company culture to maximize their innovation efforts.

Summary

In this chapter, I presented a brief overview of organizational culture and the development of organizational culture theory. I also presented several key taxonomies and instruments pertinent to organizational culture such as the Denison organizational culture model, the competing values framework, and person-culture fit. Financial performance measures, such as ROA were also discussed. Finally a brief introduction to

how innovation, organizational culture, and company performance were discussed. The research I presented indicates that innovation and company financial performance are related to different dimensions of organizational culture. Further, an unstable sociostructural system could alter the organizational culture dimensions that impact financial performance. This study was designed to test innovation intensity moderated the relationship between organizational culture and company financial performance. In Chapter 3, I detail the research methods to test the hypothesis that the relationships between the Denison organizational culture traits and financial performance are moderated by innovation.

Chapter 3: Research Method

Introduction

The purpose of this study was to determine if innovation moderated the relationship between organizational culture and company financial performance. The purpose of this chapter is to detail the research methods used for this study. First, I discuss the research design and rationale. Next, I outline the methodology including the population, the sources of data, the instruments used, and operationalize the measured constructs. I conclude the chapter by discussing the threats to validity and ethical considerations.

Research Design and Rationale

This nonexperimental, quantitative study used secondary data to examine the moderating effects of innovation on organizational culture (the independent variable) and company financial performance (the dependent variable). The use of archival data prohibited assigning companies randomly to innovative or noninnovative industries. Nor was it feasible to change company industries, thus making experimental research impossible. Finally, Denison Consulting, which provided the dataset, could not divulge company-specific information beyond industry membership and key financial indicators, thus eliminating the option of other research designs.

Methodology

Population

The target population for this study was all United States, for-profit, private-sector businesses with over five employees operating in nonfarm industries According to

the National Science Foundation (NSF, 2010), there are 1,926,012 such companies representing approximately 180 million employees and an annual payroll of $8 trillion (NSF, 2010).

Sampling and Sampling Procedures

This study used a convenience sample comprised of companies that had previously taken the Denison Organizational Culture Survey and for which financial data were available. Denison Consulting had a database with 143 for-profit publically traded companies with financial data that had taken the Denison Organizational Culture Survey. I created five quintiles of innovation and assigned each company into its respective quintile based on industry membership: top 20%, 21–40%, 41–60%, 61–80%, and bottom 20%. The total sample size was 103 companies. Appendix A lists all of the industries and their associated innovation levels as measured by the BRIDS. Appendixes B–F list the quintiles of innovation and the number of companies represented, by industry.

To achieve statistical significance for the multiple linear regression required to answer the research questions, I set the alpha at .10, the power level to .8, and the effect size at medium (.15). I set the alpha level at .10 because Aguinis and Romero (1997) suggested that moderation effects can be difficult to detect. Further, Stone-Romero and Anderson (1994) found that moderated multiple regressions have a greater statistical power than other methods of determining moderating effects. I conservatively estimated a medium effect size based on previous studies examining organizational culture and financial performance. For instance, Gordon and Ditomaso (1992) found a large effect size of the Denison Organizational Culture Survey on financial performance (between R^2

= .35 and R^2 = .77) whereas other measures of organizational culture demonstrated a small effect size (R^2 = .02) (Hartnell, Ou, & Kinicki, 2011). I calculated the minimum sample size at *n* = 68 companies (G*Power v. 3.1.1).

Procedures for Data Collection

Denison Consulting has been collecting data using the Denison Organizational Culture Survey for research and consulting activities for the past 19 years (Denison, Janovics, Young, & Cho, 2006). To gain access to the data, I contacted Denison Consulting by phone and outlined the research proposal. After an initial verbal agreement, I signed a Data Use Agreement (Appendix F), and Denison Consulting agreed to provide the requested dataset. The dataset included 143 organizations with matched financial performance information.

The dataset I used for this study is a subset of a larger archive. Denison and other researchers collected the data over the instrument's 19-year history. Companies that have taken the Denison Organizational Culture Survey include international organizations from a variety of industries, company sizes, and organization age. The companies that I included in this study were selected based on three criteria: (a) there needed to be matching financial data in the Denison dataset, (b) the companies needed to be based in the United States or have an assigned NAICS industry code, and (c) the NAICS code needed to fall within the innovative quintiles, as determined by the BRDIS. The total sample that matched all the criteria for inclusion was *n* = 103. In this study, I used the Denison Organizational Culture Survey for organizational culture dimension data, and

the BRDIS to create the innovation quintiles, and both surveys are outlined in the next section.

Instruments and Operationalization of Constructs

Denison Organizational Culture Survey. The Denison Organizational Culture Survey was developed to measure the Denson model of organizational culture (Denison & Mirsha, 1995). The Denison Organizational Culture Survey was specifically created to examine the relationship between aspects of organizational culture that directly related to company financial. The survey contains 60 items measuring four traits; adaptability, mission, consistency, and involvement on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). Each trait includes three subtraits, explained in detail in Chapter 2. The instrument has a total of 60 items measured on a five-point Likert scale. The items are equally distributed at 15 items per trait and five items per subtrait. The survey questions coupled with the organizational culture traits and subtraits have been included in Appendix G.

The Denison Organizational Culture Survey (Denison & Mishra, 1995) is a psychometrically valid instrument and has been shown to be reliable for measuring aspects of organizational culture pertinent to financial performance (Denison et al., 2006) and innovation (Denison et al., 2004). The most recent validity study (Denison, et al., 2006) included 35,474 participants representing 160 companies. The organizations volunteered to take the study, and 74% of the companies were based in North America. The researchers demonstrated the internal consistency of the four dimensions of the survey: involvement $\alpha = .89$, consistency $\alpha = .88$, adaptability $\alpha = 87$, and mission $\alpha = .92$

(Denison, et al., 2006). Further, the researchers calculated the internal reliability of the instrument with a confirmatory factor analysis, and found the loadings ranged between .60 and .75, indicating a good fit for the model.

Business Research & Development and Innovation Survey. The NSF, in cooperation with the U. S. Census Bureau, administers the annual BRDIS. The survey was created to collect "R&D expenditures and the R&D workforce of for-profit, nonfarm businesses with five or more employees operating in the U. S." (NSF, 2014, para. 2). Prior to the BRDIS, the Survey of Industrial R&D was used to collect R&D information in the United States The first Survey of Industrial R&D was administered in 1953, and the initial year of BRDIS was 2008 (NSF, 2014). The BRDIS has 12 key variables. This study utilized 2 of the 12 variables, business codes and indication of innovative activities.

The population for the BRDIS was approximately 2,000,000 companies, and the sample size was approximately 45,000 companies (NSF, 2014). BRDIS used "a stratified probability sampling design that uses both simple random sampling and probability proportional to size sampling within strata. Stratification [was] based on R&D activity and an NAICS-based industry code." (NSF, 2014, para. 4.c.). Data was collected through mail-in surveys (48%) and web reporting (52%)" (NSF, 2014, para. 5). I used the publically available BRDIS dataset (NSF, 2010) to construct the innovation quintiles.

The process of defining innovative quintiles entailed examining the innovation and R&D efforts of the population in the United States. The innovation quintile classification was accomplished using the data from the BRDIS administered by the U. S. Census Bureau and managed by the NSF. Innovation and R&D efforts, by industry, were

examined, and I sorted the industries by innovation level then divided the industries into five equal groups. I then matched companies to their industry and assigned the companies to the matching innovation quintile (see Appendix A).

Financial Performance. Financial performance was measured using ROA. Although ROA is a standard index of financial performance, ROA does not scale equally across industries (Eccles, 1990). For example, an ROA of .5 could represent excellent performance in one industry, but poor performance in a different industry. Therefore, ROA was transformed into *z*-scores per industry. The ROA *z*-scores were used as the dependent variable to account for industry differences. Using *z*-scores normalized the financial performance measure to minimize the differences between industry standards.

Data Analysis Plan

To analyze the data, I used SPSS v.21. Denison consulting provided a clean dataset devoid of identifying information. The data consisted of aggregate information including industry code, financial performance, and organizational culture scores for each of the 103 companies included in the study.

RQ 1: Do the Denison organizational culture model traits of adaptability, mission, consistency, and involvement correlate with company financial performance?

$H_0$1: There is no relationship between the Denison organizational culture model traits of adaptability, mission, consistency, and involvement, assessed by the Denison Organizational Culture Survey, with company financial performance in terms of return on assets.

H_a1: There are relationships between the Denison organizational culture model traits of adaptability, mission, consistency, and involvement, as assessed by the Denison Organizational Culture Survey, with company financial performance in terms of return on assets.

To test hypothesis one, I used Person's product movement correlations with the four cultural traits of the Denison organizational culture model as the independent variables and company financial performance (ROA) as the dependent variable.

RQ 2: Is there a relationship between company innovation intensity with company financial performance?

$H_0 2$: There is no relationship between company innovation intensity as determined by the BRDIS with company financial performance in terms of return on assets.

$H_a 2$: There is a relationship between company innovation intensity as determined by the BRDIS on company financial performance in terms of return on assets.

To test hypothesis two, I used an MANOVA with the innovation quintiles as the independent variables and company ROA as the dependent variable.

RQ 3: Does company innovation intensity moderate the relationship between the Denison organizational cultural model traits of adaptability, mission, consistency, and involvement with company financial performance?

$H_0 3$: Company innovative intensity as determined by the BRDIS does not moderate the relationship between the four Denison organizational culture model traits of adaptability, mission, consistency, and involvement, as

assessed by the Denison Organizational Culture Survey, and company financial performance in terms of return on assets.

H_a3: Company innovative intensity as determined by the BRDIS moderates the relationships between the four Denison organizational culture traits of adaptability, mission, consistency, and involvement, as assessed by the Denison Organizational Culture Survey, and company financial performance in terms of return on assets.

I tested hypothesis three with a series of multiple linear regressions. In order to test whether the interaction between each of the culture traits and innovation had an independent, but not unique, effect on ROA, I conducted four separate multiple regression analysis. In step 1, I entered four dummy codes for innovation. The top 20% innovation quintile was the constant, the 21 – 40% quintile was coded as DC1, the 41 – 60% quintile was coded as DC2, the 61 – 80% quintile was coded as DC3, and the bottom 80% quintile was coded as DC4. In step 2, I entered the culture trait of interest (e.g. mission). In step 3, I entered the culture trait – innovation interaction terms. Multiplying scores of the culture traits by the innovation dummy codes generated the interaction terms. To test the unique influence of each of the culture traits and the four culture trait – innovation interactions on ROA, I conducted a single regression analysis in which I entered dummy codes for innovation in step 1, the four culture traits in step 2, and the sixteen interaction terms in step 3.

Threats to Validity

There were four primary threats to the validity of this study: (a) internal, (b) external, (c) construct, (d) and statistical conclusion. I discussed each type of threat below. Internal validity was a concern with this study. First, the study was not designed to determine a cause and effect relationship. Further, I cannot assert that changes in organizational culture or innovation activities cause a change in financial performance. The complexity of organizational culture and the innovation process adds the possibility of extraneous variables. It was likely that there were complex interactions between the variables that could have resulted in confounding and extraneous variables not addressed by the research design. The complex interactions could be an appropriate explanation of the study results. The internal validity of this study was less than optimal, and I needed to interpret the results accordingly.

External validity was also a concern. The companies included in the Denison Organizational Culture Survey were self-selected. The self-selected nature of the study represents a nonexperimental design and limits the external validity of this study. I needed to be cautious interpreting the results to the target population. Further, industry innovation levels were used to generate the quintiles of innovation. Innovation is widely studied at the company level. Assigning innovation intensity to each company based on industry membership could limit the wider applicability of this study.

Statistical conclusion validity was also a concern. The data had to be evaluated to ensure the data did not violate the assumption of the statistical tests. Finally, construct

validity was strong. The Denison organizational culture model is a proven measurement of organizational culture dimensions in relation to financial performance.

Ethical Procedures

There were nominal ethical issues associated with this study. I obtained permission from Denison Consulting to use the data, subject to a data use agreement (see Appendix I). The data provided by Denison consulting was aggregate cultural assessments at the company level. Therefore, no identifying information of the individual participants was included or accessible at any time. Further, the company names were omitted from the dataset provided by Denison Consulting. The only potentially identifying information included in the study was the NAICS-based industry code and performance data. After data analysis, the dataset was encrypted and stored on a secure external device in a safety deposit box. It will remain there for 5 years, after which I will perform a low-level format on the storage device to permanently and irrevocably eradicate the data from the device. There were no conflicts of interest associated with this study. Walden University's Institutional Review Board granted approval for this study on February 26, 2015; the approval number was 02-26-15-0290149.

Summary

The purpose of this quantitative study was to examine the extent that innovation moderates the relationship between organizational culture and company financial performance. I used archival data provided by Denison Consulting which included organizational culture scores and company financial data to undertake the correlations, ANOVA, and multiple linear regression analysis required to test the three hypotheses.

Threats to this study included company participation self-selection and the operationalizing innovation at the industry level. There were minimal ethical risks or considerations associated with this study. In Chapter 4, I present the results of this study.

Chapter 4: Results

Introduction

The purpose of this quantitative study was to examine the extent that innovation moderates the relationship between organizational culture and company financial performance. This study included three research questions. The first research question was to determine if the Denison organizational culture traits of adaptability, mission, consistency, and involvement correlated with company financial performance. The second research question was to determine if there was a relationship between company innovation intensity and company financial performance. The final research question was to examine if innovation moderated the relationship between the Denison organizational cultural traits and financial performance. In this chapter, I provide an overview of the data collection process, report the statistical results of the hypotheses, and detail all follow-up tests.

Data Collection

Denison Consulting provided the dataset analyzed, it encompassed 143 companies that completed the Denison Organizational Culture Survey between 2000 and 2012. The companies represented 86 industries, and 83 were multi-national. Given the variety of industries represented in the sample, the sample potentially has external validity. However, given the companies included in the dataset were self-selected, external validity is limited. The dataset included scores on the organizational culture traits of mission, consistency, involvement, and adaptability, and ROA. Of the 143 companies in the dataset, 37 did not have ROA data from 2006 to 2008, and were excluded from the

analysis, reducing the sample to n = 106 companies. In addition to removing companies with missing data, I removed three companies that had outlier data. The decision rule I used to remove outliers was to remove samples that had a standard score of +-3 or beyond. I recalculated the mean and standard deviation after the removal of each sample. The final sample size was n = 103 companies.

Results

I first ran descriptive statistics for four culture variables: involvement, consistency, adaptability, and mission; and ROA. The mean score for involvement was M = 3.42 (SD = .23); the skewness was -.26 and the kurtosis was .26. The mean score for consistency was M = 3.30 (SD = .21); the skewness was .12 and the kurtosis was -.02. The mean score for adaptability was M = 3.22 (SD = .19); the skewness was .24 and the kurtosis was .07. The mean score for mission was M = 3.31 (SD = .26); the skewness was -.04 and the kurtosis was .14. The mean score for ROA was M =.13 (SD = .08); the skewness was 1.60 and the kurtosis was 1.87. The descriptive statistics are displayed in Table 4.

My first hypothesis was that ROA would correlate positively with each of the culture traits. I tested the hypothesis using the Pearson's Product-Movement correlation. ROA did not correlate statistically significantly with any of the culture traits (see Table 4). I failed to reject the null hypothesis; therefore, Hypothesis 1 was not supported.

Table 4

Descriptive Statistics and Correlations Between ROA and Culture Traits

	Mean	SD	1	2	3	4	5
1. ROA	.13	.08					
2. Involvement	3.24	.23	.046				
3. Consistency	3.30	.21	.066	.879*			
4. Adaptability	3.22	.19	-.041	.843*	.781*		
5. Mission	3.31	.26	.107	.852*	.875*	.790*	

Note. SD = standard deviation.
*$p < .01$.

My second hypothesis was that there would be a relationship between innovation and ROA. I created five quintiles of innovation and assigned each company into their respective quintile; top 20%, 21–40%, 41–60%, 61–80%, and bottom 20%; and tested the hypothesis with an ANOVA. Overall, innovation had a statistically significant effect on ROA, F (4,95) = 9.57, p <.01, ω = .50. I conducted a post-hoc Tukey HSD test to assess mean differences. The results indicated that the 21–40% quintile had statistically significantly higher ROA from the top 20% quintile (M_{diff} = .09), the 41–60% quintile (M_{diff} = .10), and the bottom 20% quintile (M_{diff} = .10) at the .05 level. Further, the 61–80% quintile had statistically significantly higher ROA than the 41–60% quintile (M_{diff} = .07) and the bottom 20% quintile (M_{diff} = .07) at the .05 level. Thus, Hypothesis two was supported.

The last hypothesis was that innovation would moderate the relationships between Denison's four culture traits and ROA. I tested this hypothesis with five multiple linear regressions. The first multiple linear regression tested the 16 interactions between the quintiles of innovation and the four culture traits to determine the moderating effects of

the interactions on ROA. The other regressions tested the four interactions between the quintiles of innovation and each of the four culture traits, one culture trait per regression, to determine the moderating effect of the interactions on ROA.

In the first multiple linear regression testing all four of the culture variables, there was a problem with multicollinearity. All of the culture traits were correlated at over .84 (see Table 4). The collinearity tolerances ranged from .02 - .008 and VIFs ranged between 49.99 and 118.27 for the independent variables. A tolerance of .10 or less is cause for concern with multicollinearity because tolerance indicates the percent of variance uniquely accounted for by the variable; the remaining percentage of variance is shared with other independent variables (Menard, 2002). A VIF of greater than ten also indicates a collinearity problem (Myers 1996). An accepted method of reducing collinearity is to normalize the independent variables (Menard, 2002). As such, I created z-scores for the culture traits, recalculated the interaction terms and reran the analysis. The tolerances and VIFs were not affected by using z-scores in the analysis, indicating that the collinearity is directly attributed to the high correlations between the independent variables and renders the statistical model unreliable. Therefore, I did not report the analysis with all four of the culture variables and focused on the individual culture trait multiple linear regressions.

In the other four regression analyses, I tested the moderating effect of innovation on the relationship between each culture trait and ROA, one regression for each culture trait. The interactions for two of the culture traits were not statistically significant: involvement, $\Delta R^2 = .043$, $F_{(4,94)} = 1.77$, $p = .29$ (see Table 5), and adaptability, $\Delta R^2 =$

.002, $F_{(4,94)} = 0.067$, $p = .99$ (see Table 6). The interactions for consistency and mission were statistically significant: $\Delta R^2 = .059$, $F_{(4,94)} = 2.11$, $p = .08$ (see Table 7) and $\Delta R^2 = .066$, $F_{(4,94)} = 2.36$, $p = .06$ (see Table 8), respectively. Figure 1 graphically represents the slopes for mission. The slopes of the relationships between mission and ROA were flat for the top 20% and 41 - 60% quintiles of innovation. The bottom 20% quintile had lower ROA at higher levels of mission than at low levels of mission, while the 21 - 40% quintile had higher ROA at higher levels of mission than at low levels of mission. The 61–80% quintile had the greatest increase in ROA at higher levels of mission than the other four quintiles. All of the quintiles had approximately the same ROA at low levels of mission except the 21 - 40% quintile, which had a higher ROA than the other quintiles. At high levels of mission, the 61 - 80% quintile had higher ROA than the 21 - 40% quintile. Figure 2 graphically represents the slopes for consistency. The slope of the relationships between consistency and ROA resembled the slopes for mission except the top 20%, 41 - 60%, and bottom 20% quintiles of innovation had lower ROA at higher levels of consistency than at lower levels of consistency.

Table 5

Regression Analysis of Involvement and Interactions on ROA

	ΔR^2	B	SE	β
Step 1	.28*			
DC1		.09	.03	.44
DC2		-.02	.03	-.08
DC3		.06	.03	.24
DC4		-.01	.02	-.08
Step 2	.001			
Involvement		.01	.03	.03
Step 3	.04			
Involvement x DC1		.07	.10	1.24
Involvement x DC2		.01	.11	.09
Involvement x DC3		.23	.14	3.23
Involvement x DC4		-.04	.10	-.82

Note: DC1 represents the comparison between the top 21 - 40% quintile of innovative companies and the other quintiles; DC2 represents the comparison between the 41 - 60% quintile and the other quintiles; DC3 represents the comparison between the 60 - 80% quintile and the other quintiles; DC4 represents the comparison between the bottom 20% quintile and the other quintiles.
* $p < .01$.

Table 6

Regression Analysis of Adaptability and Interactions on ROA

	ΔR^2	B	SE	β
Step 1	.28*			
DC1		.09	.03	.44
DC2		-.02	.03	-.08
DC3		.06	.03	.24
DC4		-.01	.02	-.08
Step 2	.005			
Constant		.20	.12	
Step 3	.002			
Adaptability x DC1		-.02	.14	-.33
Adaptability x DC2		-.01	.16	-.15
Adaptability x DC3		-.07	.16	-.90
Adaptability x DC4		-.04	.13	-.79

Note: DC1 represents the comparison between the top 21 - 40% quintile of innovative companies and the other quintiles; DC2 represents the comparison between the 41 - 60% quintile and the other quintiles; DC3 represents the comparison between the 60 - 80% quintile and the other quintiles; DC4 represents the comparison between the bottom 20% quintile and the other quintiles.
* $p < .01$;.

Table 7

Regression Analysis of Consistency and Interactions on ROA

	ΔR^2	B	SE	β
Step 1	.28***			
DC1		.09	.03	.44
DC2		-.02	.03	-.08
DC3		.06	.03	.24
DC4		-.01	.02	-.08
Step 2	.25			
Consistency		.03	.03	.08
Step 3	.06*			
Consistency x DC1		.10	.12	1.74
Consistency x DC2		.02	.13	.33
Consistency x DC3		.27**	.13	3.68
Consistency x DC4		-.02	.11	-.34

Note: DC1 represents the comparison between the top 21 - 40% quintile of innovative companies and the other quintiles; DC2 represents the comparison between the 41–60% quintile and the other quintiles; DC3 represents the comparison between the 60 - 80% quintile and the other quintiles; DC4 represents the comparison between the bottom 20% quintile and the other quintiles.
*** $p < .01$, ** $p < .05$, *, $p < .10$.

Table 8

Regression Analysis of Mission and Interactions on ROA

	ΔR^2	B	SE	β
Step 1	.28**			
DC1		.09	.03	.44
DC2		-.02	.03	-.08
DC3		.06	.03	.24
DC4		-.01	.02	-.08
Step 2	.006			
Mission		.02	.03	.08
Step 3	.66*			
Mission x DC1		.06	.09	1.01
Mission x DC2		-.01	.10	-.24
Mission x DC3		.18*	.11	2.48
Mission x DC4		-.07	.09	-1.35

Note: DC1 represents the comparison between the top 21 - 40% quintile of innovative companies and the other quintiles; DC2 represents the comparison between the 41 - 60% quintile and the other quintiles; DC3 represents the comparison between the 60 - 80% quintile and the other quintiles; DC4 represents the comparison between the bottom 20% quintile and the other quintiles.
** $p < .01$, * $p < .10$.

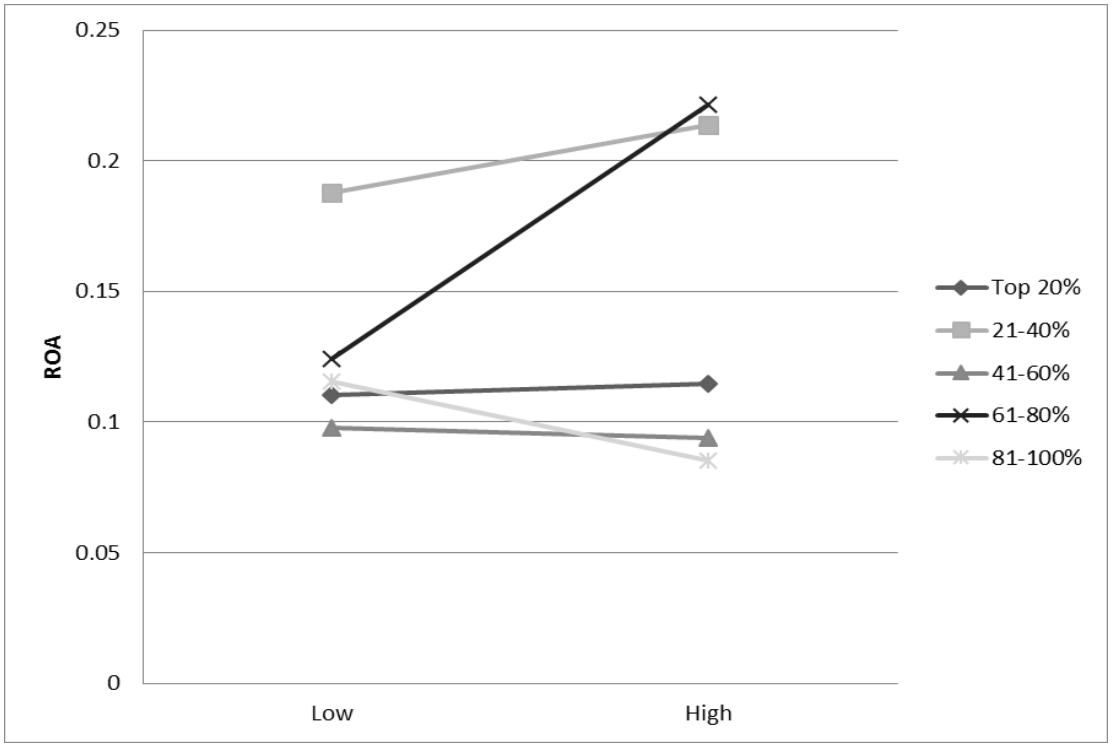

Figure 1. *Mission by innovation interaction.*

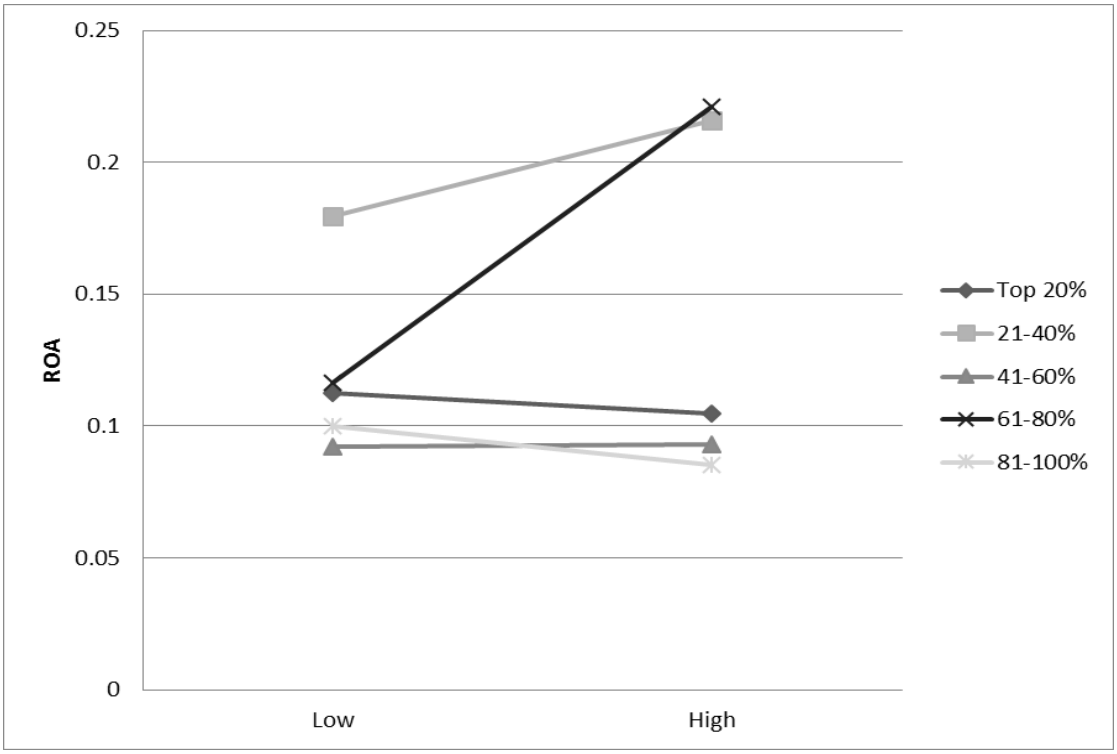

Figure 2. *Consistency by innovation.*

Follow-up Analysis

Given the collinearity issues with the organizational culture traits, I created an overall culture score and performed another regression analysis with ROA as the dependent variable. The overall culture score was created by averaging the four culture dimension scores together. In this regression analysis, I loaded the four innovation dummy codes for innovation in Step 1, the overall organizational culture score in Step 2, and the interactions between the culture score and dummy codes in Step 3. Organizational culture did not have a statistically significant impact on ROA. Nor was the organizational culture – innovation interaction statistically significant.

The research on organizational financial performance and the Denison organizational culture traits has mainly been conducted with the top and bottom 25% of culture scores (Denison Consulting, 2012). To that end, I removed the companies that fell within the middle 50% of the overall culture score and reran the regression. None of the interactions were statistically significant.

In an attempt to gain further insights into the moderating effects of innovation, I examined other company financial indicators. I examined the correlations between return on investment (ROI), return on sales (ROS), and market to book value (MtoB) with the four organizational culture traits. The data for ROI, ROS, and MtoB were not normally distributed; therefore, I used Spearman's rho to examine the correlations between the financial ratios and organizational culture dimensions. MtoB was the only financial indicator that related statistically significantly to Denison's cultural traits. Specifically, MtoB statistically significantly and positively correlated with involvement, Spearman's ρ

= .29, $p < .01$; consistency, Spearman's $\rho = .25$, $p < .05$; and mission, Spearman's $\rho = .21$, $p < .05$. The correlations are displayed in Table 9.

I further examined the relationship between the quintiles of innovation and ROS, ROI, and MtoB with an MANOVA. There was a statistically significant effect of innovation on the financial performance measures, $F_{(4, 89)} = 143.39$, $p < .00$. I then followed-up the MANOVA with separate univariate ANOVAs. Innovation had a statistically significant effect on ROS, $F_{(4,95)} = 6.60$, $p < .01$, $\omega = .37$, but not ROI or MtoB. I further conducted a post-hoc Tukey HSD test on the relationship between innovation and ROS. The Tukey HSD test showed that the 61–80% innovation quintile had statistically significantly higher ROS from the 41–60% quintile ($M_{diff} = .04$) and the bottom 20% quintile ($M_{diff} = .05$) at the .05 level.

I performed 12 additional regression analyses, one for each culture trait and alternative financial indicator, ROS, ROI, and MtoB to determine if innovation moderated the relationship between the other financial measures and organizational culture. For each alternative financial indicator, I ran four separate multiple linear regressions – one for each organizational culture trait. None of the interactions were statistically significant; innovation did not moderate the relationship between the financial indicators of ROI, ROS, or MtoB and the Denison organizational culture traits.

Table 9

Correlations Between Culture Traits and MtoB, ROI, and ROS

	1	2	3	4	5	6	7
1. Involvement							
2. Consistency	.86**						
3. Adaptability	.81**	.75**					
4. Mission	.84**	.87**	.77**				
5. MtoB	.29**	.25*	.19	.21*			
6. ROI	.09	.13	.02	.07	.07		
7. ROS	-.11	-.02	-.07	-.05	.10	.25*	

Note: *p<.05, **p<.01.

Summary

In an attempt to determine if innovation moderated the relationship between organizational culture and ROA, I tested three hypotheses. Hypothesis 1 was not supported because ROA did not correlate statistically significantly with any of Denison's culture traits. Hypothesis 2 was supported in that innovation was statistically significantly related to ROA; specifically the 21 - 40% innovation quintile had statistically significantly higher ROA than the top 20% quintile, the 41 - 60% quintile, and the bottom 20% quintile at the .05 level. The 61 - 80% quintile had statistically significantly higher ROA than the 41 - 60% quintile and the bottom 20% quintile at the .05 level. Hypothesis 3 was supported in that innovation moderated the relationship between ROA and mission and between ROA and adaptability. The follow-up analysis uncovered statistically significant correlations between MtoB and involvement, consistency, and mission. Further, ROS and innovation were statistically significantly related; specifically, the 61 - 80% innovation quintile had statistically significantly higher ROS from the 41 - 60%

quintile and the bottom 20% quintile. However, the relationship between ROI, ROS, and MtoB and the four Denison culture traits were not moderated by innovation.

In chapter 5, I summarize this study, provide an analysis of the findings and present the limitations of the study. I also suggest recommendations for future research. I conclude this study by outlining implications of the findings for businesses and social change.

Chapter 5

Introduction

The purpose of this quantitative study was to examine the extent that innovation moderates the relationship between organizational culture and company financial performance. My study included three hypotheses. I first hypothesized that organizational culture would correlate positively with financial performance. This hypothesis was not supported. Next, I hypothesized that there would be a positive relationship between innovation and financial performance; this hypothesis was supported. Lastly, I hypothesized that innovation would moderate the relationship between organizational culture and financial performance. Issues with multicollinearity forced the examination of the culture traits individually, therefore the unique moderation effect of innovation on each the organizational culture trait was unknown; in other words, I could not isolate each culture trait from the other culture traits to determine the unique moderation effect of innovation for each culture trait. When examining the traits individually, only the relationships between mission and ROA and consistency and ROA were moderated by innovation: innovation did not moderate the relationships between adaptability and ROA and consistency and ROA. The slopes of the relationships between mission and ROA were flat for the top 20% and the 41–60/% quintiles of innovation. The bottom 20% quintile had lower ROA at higher levels of mission than at low levels of mission, while the 21–40% quintile had higher ROA at higher levels of mission than at low levels of mission. The 61–80% quintile had the greatest increase in ROA at higher levels of mission than the other four quintiles. All of the quintiles had approximately the

same ROA at low levels of mission, except the 21% to 40% quintile, which had a higher ROA than the other quintiles. At high levels of mission, the 61–80% quintile had higher ROA than the 21–40% quintile. The slope of the relationships between consistency and ROA resembled the slopes for mission except the top 20%, 41–60%, and bottom 20% quintiles of innovation had lower ROA at higher levels of consistency than at lower levels of consistency. Therefore, the third hypothesis was partially supported.

After testing the three hypotheses, I performed several follow-up analyses, consisting of a series of multiple linear regressions, correlations, and an MANOVA to gain a better insight into the effects of innovation on the relationship between company financial performance and organizational culture. First, I performed a regression analysis to determine if innovation moderated the relationship between ROA and the overall culture score of the organization. The test was not statistically significant. Next, I removed companies in the middle 50% of overall culture scores because most culture–performance research using the Denison organizational culture model used the top and bottom 25% of culture scores (Denison Consulting, 2012). I ran the second regression on the overall culture score. This test was also not statistically significant.

Next, I examined the correlations between the four organizational culture traits and ROI, ROS, and MtoB. Of the 12 correlations in the follow-up analysis, MtoB was the only financial indicator statistically significantly and positively correlated with involvement, mission, and consistency; none of the other correlations were statistically significant. I further examined the relationship between innovation and ROS, ROI, and MtoB with an MANOVA. Innovation was statistically significantly related to ROS, but

not ROI or MtoB. I concluded the follow-up analyses with twelve additional regression analyses, one for each culture trait and alternative financial indicator, ROS, ROI, and MtoB, to determine if innovation moderated the relationship between the other financial measures and organizational culture. For each alternative financial indicator, I ran four separate multiple linear regressions – one for each organizational culture trait. None of the interactions were statistically significant. In this chapter, I interpret the findings in context of the literature, outline the limitations to this study, provide recommendations for future research, offer potential implications of the findings, and conclude this study.

Interpretation of the Findings

My study provides weak support for Denison and Mishra's (1995) theory of organizational culture and effectiveness; in that companies with strong organizational cultures performed better compared to companies that have weak organizational cultures. I found that organizational culture dimensions of mission, consistency, involvement, and adaptability did not statistically significantly correlate with the financial performance measures of ROI, ROA, or ROS. However, involvement, consistency, and mission, but not adaptability correlated statistically significantly and positively with MtoB. Few studies have examined the correlations between financial performance measures and the organizational culture traits (i.e., Glasser, 2014). The relationship between financial performance and organizational culture has typically been examined by comparing the differences in financial performance between the top and bottom 25% of culture scores (Denison et al., 2004; Denison et al., 2006; Fisher, 1997) using *t* tests, ANOVAs, or other methods of comparing mean differences between two or more groups. One possible

explanation of why MtoB statistically significantly and positively correlated with involvement, consistency, and mission across the spectrum of organizational culture scores whereas ROA, ROI, and ROS did not correlate is the theory of social capital. "Social capital is the goodwill available to individuals or groups. Its source lies in the structure and content of the actor's social relations. Its effects flow from the information, influence, and solidarity it makes available to the actor" (Adler & Kwon, 2002, p. 23). Some researchers have identified organizational culture as a source of social capital (Nahapiet & Ghoshal, 1998). Other researchers have identified organizational culture as an antecedent to the development of other forms of social capital; such as innovation (Landry, Amara, & Lamari, 2002), and knowledge management (Donate & Guadamillas, 2010)).

In a research note, Denison Consulting (2012) asserted that the investment community recognizes and responds to strong organizational cultures. However, the mechanism for this phenomenon was not clearly stated. MtoB is the only financial performance measure included in this study that accounts for an external, subjective valuation of a company. The market recognizes and accounts for social capital in the valuation of a company (Nahapiet & Ghoshal, 1998). Because organizational culture is a recognized component of social capital (Nahapiet & Ghoshal, 1998), the mechanisms of social capital in the marketplace could explain a linear relationship between investor valuation of a company and organizational culture. ROA, ROI, and ROS are directly related to the financial performance of a company and considered in the market value. However, ROA, ROI, and ROS are objective financial ratios determined by the financial

performance of a company and represent tangible capital, whereas social capital is specifically related to intangible capital. Because financial ratios are representative of tangible capital, by definition, the ratios cannot be related to social capital. However, a portion of the market value of an organization represents a subjective valuation based on stakeholder and shareholder perceptions of a company and is, therefore, subject to fluctuation based on the principle of social capital (Luthans, Luthans, & Luthans, 2004).

Innovation was statistically significantly positively associated with ROA and ROS, but not ROI or MtoB. The second most innovative quintile had greater ROA than all of the other quintiles of innovation except for the second least quintile of innovation. The results are consistent with the findings of Kostopoulos et al. (2010) in that the researchers found that innovation at the company level was statistically significantly positively correlated with ROA and ROS. Although researchers have linked company performance, ROA, and ROS to innovation efforts (Denison & Mirsha, 1995; Yilmaz & Ergun, 2008), there has not been published research on the financial impact of innovation along a continuum of innovation intensity. There are challenges monetizing innovation efforts (Hoonsopon & Ruenrom, 2012), and innovation requires financial resources (Henard & Szymanski, 2001). One explanation for these findings is the law of diminishing returns. Diminishing returns "occurs when marginal product falls as a rising amount of a variable homogeneous input is applied to a fixed input" (Brue, 1993, p. 186). Further, "the modern formulation of the law of diminishing returns remains the best explanation for upward-sloping short-run marginal cost curves and downward-sloping short-run resource demand curves" (p. 190). Therefore, it is possible that companies in

the 20–40% quintile outperformed the other quintiles of innovation because of the proportional investment/return in innovation activities: the economic law of diminishing returns.

The second least innovation quintile had statistically significantly greater ROA and ROS than the middle and least quintiles of innovation. It is possible that company strategy and positioning in the 60 - 80% quintile of innovation is more effective at the sales process and cycle than the least and middle quintiles of innovation. However, there is no theory or previously published literature to justify this assertion. It is possible that companies with lower levels of innovation activity focused their resources on other activities and are therefore experiencing diminishing returns on unmeasured constructs. The data, however, supports the notion of diminishing returns on both ends of the innovation spectrum.

Innovation statistically significantly moderated the relationship between ROA and mission and consistency. Specifically, stronger culture scores in mission and consistency had greater ROA than low levels of mission and consistency at the second to least innovation quintile and the second greatest innovation quintiles. These findings provide additional evidence that strong cultures are an important element of financial performance (Asree et al., 2010; Denison, 1984; Denison & Mishra, 1995; Gordon & DiTomaso, 1992, Tseng, 2010; Wilderom et al., 2012). Further, this study provides an example of how company innovation activities can impact the relative importance of specific cultural traits. For example, organizations that fell within the second most innovation quintile had a larger gain in ROA with stronger cultural dimensions of

mission and consistency than companies that have chosen different levels of innovation intensity. However, the relationships between the culture traits and ROS, ROI, and MtoB were not moderated by innovation.

Limitations to the Study

There were numerous limitations to this study. These limitations include the use of secondary data, how innovation was operationalized, multicollinearity issues with the Denison Organizational Culture Survey, and the research design itself. Denison Consulting provided the data for this study. Using secondary data and disaggregating innovation from the BRDIS were fundamental to the methodological limitations of the study. There was no indication of the company names included in the dataset provided by Denison Consulting. Therefore, I was not able to gather and analyze additional information about the companies included in the study beyond what Denison Consulting provided. This limited the ability to examine other factors that could have affected the results. Further, it was necessary to assign companies to innovation quintiles based on industry membership. Therefore, the measure of innovation was a limitation to this study. It is possible that the method chosen to operationalize innovation at the company level was not representative of actual innovation levels at each company.

Another set of limitations was the high correlations between the organizational culture traits as measured by the Denison Organizational Culture Survey (see Table 4). There were high levels of multicollinearity between the culture traits, thereby limiting the ability to determine the unique moderation effects innovation had on the organizational culture traits. Further, the high correlations potentially indicated that the organizational

culture dimensions measured by the Denison Organizational Culture Survey are not unique cultural dimensions. In other words, the high correlations indicated that the survey could be measuring different manifestations of the same cultural dimension and not four independent organizational culture dimensions. However, Denison et al. (2006) have demonstrated homogeneity for each subdimension. In a study by Denison et al. (2014), the items of the Denison Organizational Culture Survey were analyzed using a confirmatory factor analysis. The results indicated that a second-order confirmatory factor model with 12 subdimensions as the first order and the four culture traits as the second order fit the data reasonably well, $\chi^2(1692) = 122{,}715.83$, $p < .01$, GFI = .88, NFI = .98, CFI = .98, and RMSEA = .04 (Denison et al., 2014). Denison et al. (2014) also found intercorrelations between the four organizational culture dimensions ranging from .84 to .94 and the intercorrelations between the 12 subdimensions ranged from .45 to .74. Further, Denison et al. (2014) reported "considerable shared variance within [the] items intended to measure the same underlying concepts, overlap in the variances explained by the first-order factors, and strong relationships between second-order factors" (pp. 154-155). Thus, it is reasonable to conclude that the strong positive correlations and shared variances between the four cultural dimensions will continue to be problematic in determining moderating effects using multiple linear regressions.

An additional limitation was that the measure for innovation was aggregated between the years of 2006 and 2008, and the organizational culture measures were taken between the years of 2000 and 2012. Each company was administered the organizational culture survey once. Denison (1984) asserted that culture scores change over the life of

an organization, from startup to well-established and entrenched companies. The sample included in this study was limited to publically traded companies. Because the companies were publically traded, the companies should be considered well-established. Although organizational culture scores tend to be consistent over time in well-established companies and are difficult to change (Cameron & Quinn, 2011), it is possible that the organizational culture scores were not representative of the companies' organizational culture during the time frame innovation was determined. Therefore, the ability to examine organizational culture, organizational innovation, and organizational performance in the same time-periods was limited.

Recommendations

Future research examining the moderating effects of any construct on the relationship between the Denison organizational culture dimensions and company performance will be limited due to the high correlations between the organizational culture dimensions. Although this study provides preliminary evidence that there are optimal levels of innovation in relationship to financial performance, more research is needed to verify this finding. Further, researchers should use direct measures of innovation and delineate product and process innovations in future studies. Financial ratios are a subset of numerous company performance measures. Future research could examine operational performance measures to gain a better understanding of the operational impact of innovation. In addition to direct measures of innovation, researchers should also examine the relationship between innovation a variety of financial and operational performance, not just financial ratios.

Another recommendation for future research is to examine the measurement issues with the Denison Organizational Culture Survey. The high correlations between the culture traits are problematic and could indicate there the instrument is measuring a single cultural dimension. Researchers might have better results by examining the moderating effects of the 12 subdimensions on various constructs in place of the four cultural dimensions of the Denison model. Finally, other taxonomies of organizational culture, such as the competing values framework, could be used to determine if innovation moderates other, nonfinancial, performance measures. Different models of organizational culture focus on different manifestations of organizational culture. Dimensions of organizational culture measured by other instruments could affect or be affected by company innovation efforts differently.

Implications

Innovation drives social change. The results of this study indicate several potentially important pieces of information to assist companies in maximizing their innovation efforts. First, this study provides preliminary evidence that there are optimal levels of innovation in relationship to company financial performance. Second, this study indicates that specific aspects of organizational culture, specifically mission and consistency, are important for strengthening the financial performance of companies in the second to least innovation quintile. This study also indicates that there could be a problem with the Denison Organizational Culture Survey in that the main four organizational culture dimensions of mission, consistency, adaptability, and involvement are not unique organizational culture traits. From a social change perspective, the results

could assist companies in determining an optimal level of innovation to increase financial performance. Further, companies that choose to undertake less innovation than their competitors can financially benefit by focusing on strengthening aspects of their organizational culture; thereby helping to maintain and create employment and bolster the economic underpinnings of society.

Conclusion

Companies are continuously striving to optimize their efficiency and operational effectiveness. This study presents preliminary evidence that optimum levels of innovation exists. Further, the results provide additional evidence that culture matters to financial performance. There is data supporting the hypothesis that innovation moderates the relationship between organizational culture and financial performance; however, the results of this study are not what I expected. The culture traits of adaptability and involvement have been linked to innovation efforts whereas mission and consistency have been linked to financial performance. Innovation did not moderate the relationship between adaptability, involvement, and financial performance. Therefore, the culture traits of mission and consistency remain key cultural dimensions in the relationship between organizational culture and financial performance.

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Appendix A: Innovation by Industry

Industry	NAICS code	Innovation
Software publishers	5112	80.55%
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	61.07%
Communications equipment	3342	56.27%
Soap, cleaning compound, and toilet preparation	3256	55.75%
Navigational, measuring, electromedical, and control instruments	3345	55.10%
Engine, turbine, and power transmission equipment	3336	55.03%
Other measuring and controlling instruments	other 3345	54.87%
Computer and peripheral equipment and other computer and electronic products	3341, 3343, 3346	53.74%
Pharmaceuticals and medicines	3254	52.56%
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	52.12%
Computer and electronic products	334	47.79%
Chemicals	325	46.12%
Paint, coating, adhesive, and other chemical	3255, 3259	45.67%
Internet service providers, Web search portals, and data processing services	518	45.43%
Medical equipment and supplies	3391	42.69%
Resin, synthetic rubber, fibers, and filaments	3252	42.53%
Electrical equipment, appliances, and components	335	42.49%
Publishing	511	40.58%
Scientific R&D services	5417	39.53%
Computer systems design and related services	5415	38.58%
Miscellaneous manufacturing	339	37.31%
Basic chemicals	3251	36.87%
Other transportation equipment	other 336	36.85%
Semiconductor machinery	333295	36.48%
Semiconductor and other electronic components	3344	35.57%
Other miscellaneous manufacturing	3399	34.08%
Plastics and rubber products	326	33.95%
Aircraft, aircraft engine, and aircraft parts	336411–336413	33.54%
Electronic shopping and mail-order houses	4541	33.48%
Agricultural implements	33311	33.42%
Aerospace products and parts	3364	33.14%
Information	51	32.15%
Machinery	333	31.68%

(continued)

Industry	NAICS code	Innovation
Transportation equipment	336	31.07%
Other machinery	other 333	30.80%
Telecommunications	517	28.30%
Automobiles, bodies, trailers, and parts	3361–3363	28.19%
Guided missile, space vehicle, and related parts	336414, 336415, 336419	27.59%
Beverage and tobacco products	312	26.69%
Fabricated metal products	332	25.07%
Petroleum and coal products	324	23.69%
Textiles, apparel, and leather products	313–316	23.51%
Pesticide, fertilizer, and other agricultural chemical	3253	23.06%
Food	311	22.64%
Utilities	22	22.25%
Printing and related support activities	323	22.17%
Primary metals	331	21.95%
Furniture and related products	337	20.46%
Paper	322	19.81%
Nonmetallic mineral products	327	19.43%
Wood products	321	17.74%
Architectural, engineering, and related services	5413	17.24%
Professional, scientific, and technical services	54	17.22%
Other information	other 51	15.76%
Wholesale trade	42	15.01%
Newspaper, periodical, book, and directory publishers	5111	14.59%
Other professional, scientific, and technical services	other 54	13.17%
Transportation and warehousing	48, 49	12.15%
Health care services	621–623	12.02%
Finance and insurance	52	10.77%
Retail trade	44, 45	9.61%
Real estate and rental and leasing	53	9.49%
Other retail trade	other 44, 45	9.24%
Other nonmanufacturing	55, 56, 61, 624, 71, 72, 81	8.36%
Construction	23	6.40%
Mining, extraction, and support activities	21	1.91%

Notes: NAICS – 2002 North American Industry Classification System. Adapted from "*Business R&D and Innovation Survey*" by NSF, NCSES, & U. S. Census Bureau, 2008

Appendix B: Top 20% Quintile of Innovation Companies

Industry	NAICS Code	Number of Companies
Software publishers	5112	0
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	0
Communications equipment	3342	0
Soap, cleaning compound, and toilet preparation	3256	0
Navigational, measuring, electromedical, and control instruments	3345	0
Engine, turbine, and power transmission equipment	3336	0
Other measuring and controlling instruments	other 3345	0
Computer and peripheral equipment and other computer and electronic products	3341, 3343, 3346	0
Pharmaceuticals and medicines	3254	0
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	0
Computer and electronic products	334	0
Chemicals	325	3
Paint, coating, adhesive, and other chemical	3255, 3259	9
Total		12

Appendix C: 21–40% Quintile of Innovation Companies

Industry	NAICS Code	Number of Companies
Internet service providers, Web search portals, and data processing services	518	13
Medical equipment and supplies	3391	4
Resin, synthetic rubber, fibers, and filaments	3252	0
Electrical equipment, appliances, and components	335	0
Publishing	511	0
Scientific R&D services	5417	0
Computer systems design and related services	5415	0
Miscellaneous manufacturing	339	0
Basic chemicals	3251	2
Other transportation equipment	other 336	2
Semiconductor machinery	333295	0
Semiconductor and other electronic components	3344	0
Other miscellaneous manufacturing	3399	0
Total		21

Appendix D: 41–60% Quintile of Innovation Companies

Industry	NAICS Code	Number of Companies
Plastics and rubber products	326	0
Aircraft, aircraft engine, and aircraft parts	336411–336413	1
Electronic shopping and mail-order houses	4541	4
Agricultural implements	33311	2
Aerospace products and parts	3364	0
Information	51	0
Machinery	333	9
Transportation equipment	336	0
Other machinery	other 333	0
Telecommunications	517	0
Automobiles, bodies, trailers, and parts	3361–3363	3
Guided missile, space vehicle, and related parts	336414, 336415, 336419	0
Beverage and tobacco products	312	0
Total		19

Appendix E: 61–80% Quintile of Innovation Companies

Industry	NAICS Code	Number of Companies
Fabricated metal products	332	0
Petroleum and coal products	324	6
Textiles, apparel, and leather products	313–316	1
Pesticide, fertilizer, and other agricultural chemical	3253	0
Food	311	0
Utilities	22	0
Printing and related support activities	323	0
Primary metals	331	2
Furniture and related products	337	4
Paper	322	0
Nonmetallic mineral products	327	0
Wood products	321	0
Architectural, engineering, and related services	5413	0
Total		13

Appendix F: Bottom 20% Quintile of Innovation Companies

Industry	NAICS Code	Number of Companies
Professional, scientific, and technical services	54	7
Other information	other 51	1
Wholesale trade	42	0
Newspaper, periodical, book, and directory publishers	5111	1
Other professional, scientific, and technical services	other 54	2
Transportation and warehousing	48, 49	3
Health care services	621–623	0
Finance and insurance	52	9
Retail trade	44, 45	0
Real estate and rental and leasing	53	3
Other retail trade	other 44, 45	2
Other nonmanufacturing	55, 56, 61, 624, 71, 72, 81	0
Construction	23	3
Mining, extraction, and support activities	21	6
Total		37

Appendix G: Denison Organizational Culture Survey Questions

Trait	SubTrait	Item
Involvement	Empowerment	1. Most employees are highly involved in their work. 2. Decisions are usually made at the level where the best information is available 3. Information is widely shared so that everyone can get the information he or she needs when it's needed. 4. Everyone believes that he or she can have a positive impact. 5. Business planning is ongoing and involves everyone in the process to some degree.
	Team Orientation	6. Cooperation across different parts of the organization is actively encouraged. 7. People work like they are part of a team. 8. Teamwork is used to get work done, rather than hierarchy. 9. Teams are our primary building blocks. 10. Work is organized so that each person can see the relationship between his or her job and the goals of the organization.
	Capability Development	11. Authority is delegated so that people can act on their own. 12. The "bench strength" (capability of people) is constantly improving. 13. There is continuous investment in the skills of employees. 14. The capabilities of people are viewed as an important source of competitive advantage. 15. Problems often arise because we do not have the skills necessary to do the job. (Reversed Scale)

Trait	SubTrait	Item
Consistency	Core Values	16. The leaders and managers "practice what they preach". 17. There is a characteristic management style and a distinct set of management practices. 18. There is a clear and consistent set of values that governs the way we do business. 19. Ignoring core values will get you in trouble. 20. There is an ethical code that guides our behavior and tells us right from wrong.
	Agreement	21. When disagreements occur, we work hard to achieve "win-win" solutions. 22. There is a "strong" culture. 23. It is easy to reach consensus, even on difficult issues. 24. We often have trouble reaching agreement on key issues. (Reversed Scale) 25. There is a clear agreement about the right way and the wrong way to do things.
	Coordination and Integration	26. Our approach to doing business is very consistent and predictable. 27. People from different parts of the organization share a common perspective. 28. It is easy to coordinate projects across different parts of the organization. 29. Working with someone from another part of this organization is like working with someone from a different organization. (Reversed Scale) 30. There is good alignment of goals across levels.

Trait	SubTrait	Item
Adaptability	Creating Change	31. The way things are done is very flexible and easy to change. 32. We respond well to competitors and other changes in the business environment. 33. New and improved ways to do work are continually adopted. 34. Attempts to create change usually meet with resistance. (Reversed Scale) 35. Different parts of the organization often cooperate to create change.
	Customer Focus	36. Customer comments and recommendations often lead to changes. 37. Customer input directly influences our decisions. 38. All members have a deep understanding of customer wants and needs. 39. The interests of the customer often get ignored in our decisions. (Reversed Scale) 40. We encourage direct contact with customers by our people.
	Organizational Learning	41. We view failure as an opportunity for learning and improvement. 42. Innovation and risk taking are encouraged and rewarded. 43. Lots of things "fall between the cracks". (Reversed Scale) 44. Learning is an important objective in our day-to-day work. 45. We make certain that the "right hand knows what the left hand is doing".

Trait	SubTrait	Item
Mission	Strategic Direction and Intent	46. There is a long-term purpose and direction. 47. Our strategy leads other organizations to change the way they compete in the industry. 48. There is a clear mission that gives meaning and direction to our work. 49. There is a clear strategy for the future. 50. Our strategic direction is unclear to me. (Reversed Scale)
	Goals and Objectives	51. There is widespread agreement about goals. 52. Leaders set goals that are ambitious, but realistic. 53. The leadership has "gone on record" about the objectives we are trying to meet. 54. We continuously track our progress against our stated goals. 55. People understand what needs to be done for us to succeed in the long run.
	Vision	56. We have a shared vision of what the organization will be like in the future. 57. Leaders have a long-term viewpoint. 58. Short-term thinking often compromises our long-term vision. (Reversed Scale) 59. Our vision creates excitement and motivation for our employees. 60. We are able to meet short-term demands without compromising our long-term vision.

Notes. From "*Diagnosing Organizational Cultures: Validating a Model and Method"* by Daniel R. Denison, Jay Janovics, Joana Young, and Hee Jae Cho, 2006. Ann Arbor: Denison Consulting.

Appendix H: BRDIS Innovation Questions

Did your company introduce any of the following during the three-year period, 2006 to 2008 (yes or no)?

a. New or significantly improved goods (excluding the simple resale of new goods purchased from others and changes of a solely aesthetic nature)
b. New or significantly improved services
c. New or significantly improved methods of manufacturing or producing goods or services
d. New or significantly improved logistics, delivery, or distribution methods for your inputs, goods, or services
e. New or significantly improved support activities for your processes, such as maintenance systems or operations for purchasing, accounting, or computing

Notes: From "*Business R&D and Innovation Survey"* by U. S. Department of Commerce, Economics and Statistics Administration, & U. S. Census Bureau. 2008. Washington D.C.: Author.

Appendix I: Data Agreement Form

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