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**THE RELATIONSHIP BETWEEN PERCEPTIONS OF LEARNING
ORGANIZATION CHARACTERISTICS AND FIRM PERFORMANCE**

A Dissertation in

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by

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ABSTRACT

Interest in organizational learning and the ‘learning organization’ has steadily increased over the past decades. Organizational learning is increasingly being viewed as a means for long-term success however, there is little empirical evidence to support this view. This research was conducted to address this gap. The research was conducted in the U.S. and involved public pharmaceutical companies within one particular code in the North American Industry Classification System (NAICS) code. The study explored the relationship between a firm’s implementation of learning organization dimensions or characteristics and financial performance.

The specific research hypotheses were:

1. Firms that demonstrate above-average financial performance possess the seven dimensions of a learning organization to a greater extent than firms that demonstrate below-average financial performance.
2. Firms that demonstrate above average improvement in financial performance possess the seven dimensions of a learning organization to a greater extent than firms that demonstrate below-average improvement in financial performance.

The independent variable was the ‘learning organization and the dependent variable was ‘organizational performance’. Both of these are latent variables measured by indicator variables. The indicator variables for ‘learning organization’ are the seven dimensions of a learning organization, as defined by Marsick and Watskins (2003).

These are: (a) create continuous learning opportunities; (b) promote inquiry and dialogue;

(c) encourage collaboration and team learning; (d) provide strategic leadership for learning; (e) empower people toward a collective vision; (f) connect the organization to its environment; and (g) create systems to capture and share learning. Financial performance was measured using two profitability ratios (i.e. return on assets and return on sales); these ratios relate profit to some aspect of management performance such as using assets profitably, creating a return on owner's investment and generating a profit on sales. Return on assets is calculated as net income divided by total assets and return on sales is calculated as net income divided by sales.

Financial data for these two ratios were collected over an eleven year period, from 1995 to 2005. To evaluate the first hypothesis, the firms that were in the first quartile for 'overall average' for both ROA and ROS were compared to firms that were in the fourth quartile for 'overall average' for both ROA and ROS. To evaluate the second hypothesis, change in performance was evaluated and firms that were in the first quartile for improvement in both ROA and ROS were compared to firms that were in the fourth quartile for improvement in both ROA and ROS.

The findings from this research give credence to the notion that a firm's adoption and implementation of 'learning organization' characteristics or dimensions is a means of continuous improvement in performance.

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Chapter 1

Introduction

The phrase ‘organizational learning’ was first published in 1963 in the book *A Behavioral Theory of the Firm*, written by Richard Cyert and James March. Since that time, the literature regarding organizational learning and the concept of the ‘learning organization’ has grown immensely, especially in the last two decades. The present level of interest in learning organizations in the United States and worldwide is unparalleled (Gephart, Marsick, VanBuren & Spiro 1996). A possible explanation is that the ‘learning organization’ paradigm provides a means of competitive advantage at a time when organizations face increasing competition from globalization and rapid change in a dynamic environment. Yeager and Hough (1998) reported that it is increasingly common to find proponents of organizational learning in large companies, and Rothwell and Sredl (2000) indicated that organizational learning is increasingly being viewed as a means for long-term success, so much so that transforming into a learning organization has become a trend. While this leads one to conclude that there is a link between being a learning organization and continued improvement in performance, there is very little empirical evidence to support this (Altman & Iles, 1998; Gardiner, 1999; Iles, 1994; Jacobs, 1995; Jashapara, 2003; Boyle, 2002; Easterby-Smith, 1997). Authors have devoted more attention to defining the learning organization than developing and using methods of measurement. This research contributed to closing this gap by examining the relationship between a firm being a ‘learning organization’ and financial performance. Such research

is justified because there is considerable attention and effort being put forth by scholars, practitioners, and organizations regarding organizational learning and becoming a 'learning organization' but as stated, very little empirical data to support the value of adoption and implementation.

One reason for this was suggested by Chris Argyris (1999) who stated that it is practitioners and consultants, as opposed to academics, that predominantly study the learning organization. Unfortunately, much of this work involves non-rigorous case studies (Easterby-Smith, 1997). Another reason may be that despite the interest in the learning organization, or perhaps because of it, the concept of a learning organization remains ambiguous (Altman & Iles (1998).

Foil and Lyles (1985) stated that although there is widespread acceptance of the notion of organizational learning and its importance to strategic performance, no theory or model of organizational learning is widely accepted and authors have approached the subject from different perspectives, leading to more divergence. Since their observation over twenty years ago, the literature in this area has continued to grow in scope and volume and the diversity has increased (Gephart et al. 1996). As a result, a clear definition of a 'learning organization' has proved to be elusive over the years and there is still considerable disagreement as to exactly what it means to be a learning organization (Garvin 2000).

The first challenge of this research was to define or characterize a 'learning organization'. The second was to measure it. In agreement with Bell, Whitmal and Lucas (2002), who argued for the need to bring coherence and consistency to the research in this area, it was decided that existing models of a learning organization should be reviewed

and one selected for use in this research, rather than succumb to the temptation to offer yet another construction of a learning organization. The selection criteria were that the model be comprehensive and reflective of the general consensus in the literature and that an instrument had been developed to measure it. An additional bonus would be that the model had some empirical evaluation history so that the results of this research could be combined with prior work and thus begin to build a foundation of consistent empirical data.

The model selected was the one developed by Victoria Marsick and Karen Watkins. This model is comprised of seven dimensions. The definitions for these dimension, as written by Marsick and Watkins (2003, pg. 139) are presented in table 1. The dimensions in the model may be broadly categorized; the first three address individual and collaborative learning, the next two concern leadership and the last two are structural in nature. To facilitate measurement of these dimensions, Marsick and Watkins developed a survey instrument titled, 'Dimensions of a Learning Organization Questionnaire' (DLOQ). This instrument has been tested for reliability and validity and used in prior research (Yang, 2003; Hernandez, 2000). The current study made use of the DLOQ.

The purpose of this research was to gather empirical data that could be used to determine the value of adoption and implementation of learning organization characteristics. When practitioners propose organizational changes to managers,

Table 1
Learning Organization Dimensions and Definitions

Dimension	Definition
Create continuous learning opportunities	Learning is designed into work so that people can learn on the job; opportunities are provided for ongoing education and growth
Promote inquiry and dialogue	People gain productive reasoning skills to express their views and the capacity to listen and inquire into the views of others; the culture is changed to support questioning, feedback, and experimentation
Encourage collaboration and team learning	work is designed to use groups to access different modes of thinking; groups are expected to learn together and work together; collaboration is valued by the culture and rewarded
Provide strategic leadership for learning	Leaders model, champion and support learning; leadership uses learning strategically for business results
Empower people toward a collective vision	People are involved in setting, owning, and implementing a joint vision; responsibility is distributed close to decision making so that people are motivated to learn toward what they are held accountable to do
Connect the organization to its environment	People are helped to see the effect of their work on the entire enterprise; people scan the environment and use information to adjust work practices; the organization is linked to its communities
Create systems to capture and share learning	Both high and low technology systems to share learning are created and integrated with work; access is provided; systems are maintained

regardless of what arguments they make for its value, information regarding the ‘bottom line’ will typically be expected (Ellinger, Ellinger, Yang, Howten (2003). Therefore, financial performance was selected as the aspect of organizational performance to measure. To objectively measure financial performance, two profitability ratios (i.e.

return on assets and return on sales) were used. Profitability ratios provide insight into how well a company's management turns sales into profit. Data regarding the profitability ratios of the firms being studied was collected for an eleven year period.

The broad purpose of this research was to evaluate the relationship between being a learning organization (i.e. possessing characteristics of one), and financial performance. To this end, two specific research hypotheses were tested: (a) Firms that demonstrate above-average financial performance possess the seven dimensions of a learning organization to a greater extent than firms that demonstrate below-average financial performance. (b) Firms that demonstrate above average improvement in financial performance possess the seven dimensions of a learning organization to a greater extent than firms that demonstrate below-average improvement in financial performance.

The first hypothesis evaluates a firm's ability to sustain superior performance and the second hypothesis evaluates a firm's ability to improve performance. The theoretical framework for this study, which is based on the Watkins and Marsick model, is depicted in figure 1.

The remainder of this thesis is organized into four chapters. Chapter 2 presents an overview of the theoretical literature and related empirical research. Chapter 3 discusses the methodology employed in this research. Chapter 4 presents the results, and chapter 5 discusses the results, identifies strengths and limitations, and makes recommendations for future research.

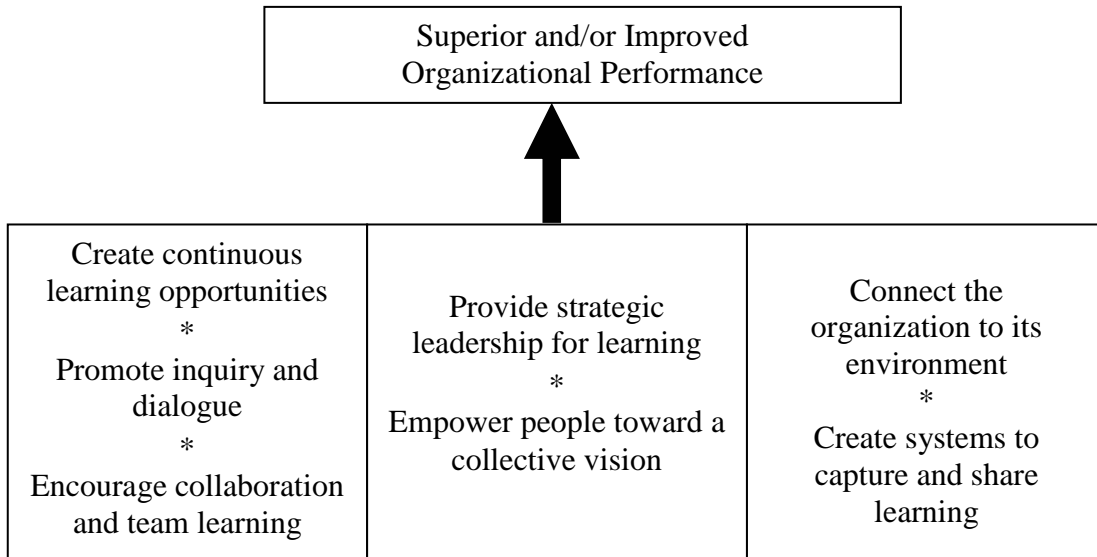


Figure1. Theoretical framework

Chapter 2

Literature Review

This chapter is divided into two main sections. The first provides a general background regarding the learning organization; included are: (a) a summary of perspectives, (b) examples of definitions and models, and (c) key ideas that have influenced the development of learning organization models. The second discusses empirical studies that have investigated the learning organization, primarily those using the 'seven dimensions of a learning organization' as a basis for their theoretical framework.

Perspectives of a Learning Organization

In general, there are three perspectives relating to the concept of a learning organization: capability, developmental, and normative (Dibella 1995). The capability perspective promotes the idea that learning is innate to all organizations and that there is no one best way for all organizations to learn. Distinctive styles of learning become embedded in culture and routine as an organization solves problems, develops core competencies, and evolves (Schein, 1992; Prahalad & Hamel, 1990). This perspective argues against the implementation of a given set of conditions to maximize learning as each organization has a unique culture and learning style. The developmental view considers organizations to go through developmental stages, with learning capability or potential increasing through each stage (Cameron & Whetton, 1983; Torbert, 1994).

Authors that adhere to the capability or developmental perspective believe that organizational learning occurs in all organizations and is therefore a natural occurrence.

The perspective most represented in the literature, and the one being evaluated by this research, is the normative perspective. This view posits that organizational learning will be maximized under a given set of conditions. Authors that adhere to the normative perspective (e.g. Senge, 1990; Garvin, 1993, Goh, 1998 and Marsick & Watkins, 2003), argue that just because all organizations learn does not mean that all organizations are learning organizations; that being a learning organization requires effort beyond the ‘natural state’ of organizational learning. According to Lassy (1998), all organizations train their staff; all organizations develop new concepts and methods of working to cope with changing situations however, too many organizations learn painfully slowly, they train their staff badly, and develop new situations long after the more successful organizations.

The normative perspective promotes the idea that a learning organization is a particular type or form of organization that has an ‘action orientation’ and promotes the quality of learning processes inside organizations. (Ortenblad, 2001; Easterby-Smith & Araujo, 1999, Dibella, 1995). Learning organization models, within this perspective, identify elements or characteristics that an organization should adopt to become a learning organization and thus realize the benefit of improved performance.

Definitions and Models

Chapter one pointed out the ambiguity surrounding the concepts of the learning organization. Many authors have discussed the difficulty in understanding and clarifying

this concept (Ortenblad, 2001; Burgoyne, 1999; Garvin, 1993; Kiechel, 1990). Different views and opinions are found among authors that share the same general perspective (e.g. normative). Fortunately, the similarities are greater than the differences. Examples of definitions are presented in Table 2 and examples of models are presented in Table 3. These examples illustrate the core beliefs of the normative perspective: (a) that a learning organization is different from ‘organizations that learn’, (b) that a learning organization purposefully takes action to promote learning, and (c) that there are specific measures or conditions an organization should adopt or create.

Table 2
Learning Organization Definitions and Authors

Author	Definition of a Learning Organization
Senge (1990 p.3)	an organization where people continually expand their capacity to create results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together
Garvin (1993 p.80)	an organization skilled at creating, acquiring and transferring knowledge; and at modifying its behavior to reflect new knowledge and insights.
Watkins and Marsick (2003 p.142)	an organization that learns continuously and transforms itself.
Dodson (1993 p.377)	an organization that purposefully construct structures and strategies so as to enhance and maximize organizational learning.
Gephart, Marsick, VanBuren and Spiro (1996 p.40)	an organization in which learning processes are analyzed, monitored, developed, managed and aligned with improvement and innovation goals
Pedler, Burgoyne and Boydell (1989 p.2)	an organization that facilitates learning for all its members and consciously transforms itself and its context

Table 3
Learning Organization Models and Authors

Author	Characteristics Included in the Model
Senge (1990)	<ol style="list-style-type: none"> 1) systems thinking 2) personal mastery 3) mental models 4) building shared vision 5) team learning
Garvin (1993)	<ol style="list-style-type: none"> 1) systematic problem solving 2) experimentation with new approaches 3) learning from past experience 4) learning from the best practices of others 5) transferring knowledge quickly and efficiently throughout the organization.
Goh (1998)	<ol style="list-style-type: none"> 1) mission and vision 2) leadership 3) experimentation 4) transfer of knowledge 5) teamwork and cooperation 6) effective organization design 7) appropriate employee skills and competencies (needed for successful implementation of the model)
Griego, Geroyu and Wright, (2000)	<ol style="list-style-type: none"> 1) training and development 2) rewards and recognition 3) information flow 4) vision and strategy 5) team development
Gardiner and Whiting, (1997)	<ol style="list-style-type: none"> 1) self-development 2) learning strategy 3) learning climate 4) participation in policy making 5) use of information 6) empowerment 7) leadership and structure 8) links with external environment.

Author	Characteristics Included in the Model
Porth, McCall and Bausch, (1999)	<ol style="list-style-type: none"> 1) employee development 2) continuous learning 3) rewards for learning 4) information sharing and collaboration 5) team building and shared purpose
Marsick and Watkins (2003),	<ol style="list-style-type: none"> 1) create continuous learning opportunities 2) promote inquiry and dialogue 3) encourage collaboration and team learning 4) create systems to capture and share learning 5) empower people toward a collective vision 6) connect the organization to its environment 7) provide strategic leadership for learning

Key influential ideas

To aid in understanding the development of learning organization models, ideas that have influenced this development are presented. This information has been organized into four main categories: (a) learning, (b) learning climate, (c) mental models, and (d) structure. ‘Learning’ concerns what learning is, who or what learns (i.e. the learning entity), learning levels, and informal learning. ‘Learning climate’ addresses what an organization does to facilitate learning, including the role of organizational leadership. ‘Mental models’ deals with how assumptions and the ability to think ‘systemically’ impact learning. ‘Structure’ addresses the influence of organization structure on learning.

Learning

Organizational learning literature typically defines learning as the ‘changing of behavior’ (Swieringa and Wierdsma, 1992); learning is not considered to have occurred if

behavior and performance have not changed. There is some disagreement as to what entity learns (individuals or the organization) and whether the learning is cognitive or cultural. The cognitive approach considers organizations to learn as individuals learn, however while individual learning is stored with the individual, when it is transferred and stored in the organization's memory in the form of procedures, rules, shared mental models and culture, organizational learning has occurred (Argyris & Schon, 1978; Swieringa & Wiersdama, 1992; Senge, 1990; March, 1991; Simon, 1991). Within this perspective there is agreement that organizational learning cannot occur without individual learning however, individual learning does not equal organizational learning (Argyris and Schon, 1978; Cangelosi and Dill, 1965; March and Olsen, 1975).

Collaborative and team learning are considered especially important as they will more readily cascade into organizational learning than individual learning, especially if the organization is receptive and supporting of learning efforts (Laiken, 2003; Senge, 1990; Altman and Iles, 1998; Marsick & Watson, 2003).

The cultural or social approach considers that an organization learns as a collective, mainly through participation with others such as in communities of practice and that learning is situated and knowledge context dependent (Lave and Wenger, 1991; Cook and Yanow, 1993; Wenger and Snyder, 2001). Despite these differences, both views acknowledge the importance of employees as sources of information and learning rather than the more traditional view of employees being dependent on the organization for training and development.

Hierarchical levels

Another prominent element found in learning organization literature is the notion of 'hierarchical levels' of learning. In essence the argument is that the typical type and level of learning that occurs in organizations is not sufficient for a learning organization. The key to this hierarchy is that at higher levels, the challenges to assumptions, reasoning processes, principles, etc. increase and that through this examination, learning (i.e. behavioral change) that is more consequential and longer lasting will result. Foil and Lyles (1985) defined lower-level learning as associations formed under repetition of past behaviors and higher-level learning as the development of new rules and associations regarding actions. Senge (1990) used the terms adaptive and generative; adaptive learning involves developing capability to manage new situations by making improvements and amendments while generative learning focuses on developing new perspectives. Argyris and Schon (1978) distinguished learning levels as 'single loop' and 'double loop'; and Swieringa and Wierdsma (1992) referred to learning at the rules level, the insight level and the principle level. In essence, lower-level learning (e.g. single loop, rule-level) is viewed as associations formed under repetition of past behaviors. This level involves making improvements and modifying strategies within the context of current organizational norms and mental models. Strategies and assumptions may be modified but probably not challenged (Argyris and Schon, 1978); while changes in behavior may occur, they will still be in agreement with the current organizational norm. Higher-level learning (e.g. double loop or insight-level) poses 'why' questions, which probe deeper and result in changes not only to existing rules but changes to underlying assumptions (Swieringa and Wierdsma, 1992). At this level, learning often concerns conflicts,

disputes and contradictions, not just between individuals, but also departments, and other groups (Argyris and Schon, 1978). The critical aspect of higher learning levels is that they promote examination of mental models which influence thinking and judgment. New insights often fail to get put into practice if they conflict with deeply held internal beliefs that limit thinking and acting to ways that are familiar (Senge, 1990; Sternman, 2000).

Informal learning

Proponents of learning organizations posit that informal learning is as important if not more important than formal and structured learning in the workplace (Parkes, 1998; Marksick, Cederholm, Turner & Pearson, 1992; Laiken 2003). Learning experiences within the context of work itself, such as action learning, and viewing learning as an iterative process based on reflection are considered especially important (Kolb 1984; Marsick and Watkins, 2003). The value of informal learning is supported by research; Agashe and Bratton (2001) reported that the greatest percentage of learning in the workplace occurs not from formal training and instruction, but from informal and incidental learning.

Learning Climate

According to Garrett (1990), the key role of leadership is to create a climate that encourages and rewards learning. Pedler and Aspinwall (1998) stated that organizations that value learning and encourage collaboration have a better learning climate as opposed to that which is created when time spent away from direct production related activities is

viewed as wasteful or unproductive. A positive learning climate is also one in which employees are 'free from fear' (Deming 1982). The environment should be a place where employees feel safe and have trust in the leaders. This will facilitate the discussion of mistakes, so that they can be learned from, rather than hiding them to avoid blame and criticism. Employees also need to feel safe enough to challenge existing norms and take time for collaboration and reflection without concern about negative repercussions. The critical role of leadership in creating an appropriate and effective 'learning climate' has been broadly discussed (Senge, 1990; Brodbeck, 2002; Popper and Lipshitz, 2000; Drucker, 1996; Kouzes and Posner, 1995; Laiken 2003).

Mental Models

The importance of challenging mental models was briefly presented in the section on hierarchical learning levels. Mental models are underlying and unconscious processes so we are often not aware of how they influence our thinking. Chris Argyris devoted much attention to mental models and reasoning processes (Argyris, 1990, 1993). Argyris distinguished between espoused theory and theory in use to facilitate empirical research into human learning in situations of interpersonal interaction. An espoused theory is how someone would claim to behave under certain circumstances. How he or she would actually behave (i.e. what governs his actions) is his or her theory in use, which may or may not be in agreement with the espoused theory. Theory in use is influenced by four governing characteristics: strive to be in unilateral control, minimize losing and maximize winning, minimize the expression of negative feelings, and be rational (Argyris, 1993). These characteristics may lead to undesired outcomes because of the behaviors that they

include. For example, maximizing winning may be achieved by advocating a viewpoint without encouraging inquiry but it may hinder the discovery of a better solution that might result if inquiry were permitted.

Argyris proposed that people are not critically aware of their behavior and that if they are aware of discrepancies, they may unknowingly use reasoning processes that distort or justify the discrepancy. Therefore, many people respond or act in ways that are contrary to what they truly believe would be beneficial, either to them or an organization, and therefore produce results that they really don't want. To address this, organizations need to enable members to critically examine their mental models and reasoning processes, and create an environment such that defensiveness is not perceived as necessary and self-interests are in alignment with organizational interests (Senge, 1990).

Systems Thinking

Jay Forrester (1992), another important contributor regarding mental models and a leader in systems-thinking, stressed that all decisions are based on models, usually mental models. The relationship between systems-thinking and mental models is that mental models influence how and what we perceive to be causes and effects, and influence what elements we choose to include or exclude. The more limited or non-systems oriented our mental models, the more likely we are to misinterpret or exclude important factors and forces that influence the systems we work with (Senge, 1990; Sternman, 2000). The ability to understand the dynamic complexity of systems, and to utilize systems-thinking increases the likelihood that the attribution of cause will be correct (Deming, 1982), that interrelationships will be understood, that leverage will be

understood and so on, all of which improve the quality of problem-solving and decision making (Forrester, 1992; Sternman 2000). While some proponents of the learning organization emphasize that systems-thinking be developed within organization members, what is more typically seen in the literature is reflective of the paradigm that views the organization as a system that processes information and makes decisions (Nonaka 2004).

Organizational Structure

The view of the organization as a system relates to organizational structure in that structure dictates communication and information flow within the organization, determines who has authority to make independent decisions, and affects the extent to which employees can apply or implement ideas. In short, structure influences performance. Pinchot and Pinchot (1994) stated that the traditional bureaucratic structure, which is characterized by a downward flow of information, decision making at the top, a rigid chain of command, and functional organization, is not ideal for a learning organization. Spillan, Mino, and Rowles (2002) argued that the traditional, top-down structure constrains communication and interaction to specified vertical connections resulting in ineffective communication.

In summary, key ideas that have influenced the development of learning organization models include: (a) the contribution of the employee towards organizational learning (b) learning/knowledge transfer within the organization, (c) team/group learning, (d) challenging assumptions and reasoning processes, (e) climate/culture that supports challenge, is free from fear of repercussion and doesn't encourage defensiveness (f)

creation of systems to support learning and knowledge transfer, (g) development of systems thinking, (h) structures that facilitate communication and access within an organization and (i) leadership.

Prior Research

Prior to 2005, the majority of studies found that utilized the DLOQ instrument to evaluate the seven dimensions of a learning organization and various aspects of organizational performance have been dissertations performed by students at the University of Georgia (e.g. McHargue, 1999; Selden, 1998; Hernandez, 2000; Fatima, 2000). While the type of organization examined in these investigations varied as did the measurements used to assess performance, they all conclude a positive relationship between one or more dimensions of a learning organization and organizational performance.

In the last several years, the use of the DLOQ has broadened however, it is still used primarily in dissertations (e.g. Davis, 2005; Weldy, 2007; Haque, 2008; Murugiah, 2008). The majority of these studies evaluate the relationship of a learning organization to factors other than financial performance. For example, one study evaluated the relationship between the learning organization and organizational readiness for change. Another study evaluated the barriers and supports of becoming a learning organization and yet another evaluated the relationship between being a learning organization and transfer of training. The study conducted by Davis (2005) did evaluate financial performance and concluded that organizations scoring 'high' on the DLOQ were three

times as likely to have reported having the greatest percentage of sales from new products.

A study by Ellinger, Ellinger, Yang and Howten (2002), which utilized the twenty-one item DLOQ instrument, addressed the relationship between the dimensions of a learning organization and objective measures of financial performance in organizations. This study surveyed logistics managers from the Council of Logistics Management, which represents a variety of industries. A random sample of 400 was selected and 208 responded. Financial performance was measured using return on assets, return on equity, a proxy for Tobin's q and market value added. Financial data was for one year – 1998. This study concluded that a positive relationship exists and indicated that approximately 10 percent of the variance in organizational performance could be explained by the dimensions measured with the DLOQ instrument.

Kontoghiorghes, Awbrey, and Feurig (2005), evaluated the relationship between learning organization characteristic and change adaptation, innovation and organization performance. While this study did not employ the DLOQ instrument, there was some overlap among the characteristics selected to measure the learning organization. Specific characteristics for this study were: open communications; risk taking; support and recognition for learning; resources to perform the job; teams; rewards for learning; training and learning environment; and knowledge management. A general conclusion was that structural, cultural and information systems within the organization were the most important dimensions for change adaptation, quick product/service introduction and financial performance.

While each study points to a positive relationship between being an organization possessing characteristics of a learning organization and organization performance, it seems prudent, given the small volume and diversity of this research, that strong conclusions not be made until more evidence is presented. As a collective body however, the research results support continued study of the relationship between an organization possessing learning organization characteristics and organizational performance.

Chapter 3

Methodology

This chapter elaborates on methodology; details regarding sampling, measurement of variables, data collection and data analysis are presented. The objective of this research was to investigate the relationship between perceptions of learning organization characteristics and a firm's financial performance. There were two specific research hypotheses: (a) Firms that demonstrate above-average financial performance possess the seven dimensions of a learning organization to a greater extent than firms that demonstrate below-average financial performance. (b) Firms that demonstrate above average improvement in financial performance possess the seven dimensions of a learning organization to a greater extent than firms that demonstrate below-average improvement in financial performance.

The research was conducted in the U.S. and involved public pharmaceutical companies within code 325412 of the North American Industry Classification System (NAICS). The purpose of selecting only firms within a particular NAICS code was to eliminate some of the potential variability across industries. Of those firms, the ones for which financial data was available for at least ten of eleven years, from 1995 through 2005, were selected for inclusion in this study. The decision to require data from 1995 through 2005 was based on the desire to evaluate a firm's consistent ability to demonstrate superior financial performance and to allow evaluation of improvement in

performance over time. A total of 80 firms, met the criteria of having at least ten years of financial data available.

Financial performance was measured using two profitability ratios (i.e. return on assets and return on sales); these ratios relate profit to some aspect of management performance such as using assets profitably, creating a return on owner's investment and generating a profit on sales. Return on assets is calculated as net income divided by total assets and return on sales is calculated as net income divided by sales.

Data for return on assets and return on sales, (i.e. the dependent variables) were obtained from the Wharton Research Data Services database. Permission to access this database was requested from the University of Pennsylvania and granted. Data was extracted company by company and copied into an Excel spreadsheet. To determine if the size of a firm influenced financial performance, a situation which would necessitate analysis of firms by size, regression analysis was performed using Minitab®. Results indicated that the size of the firm, as measured by number of employees, was not a significant factor for financial performance. Therefore, the firms were not categorized by size. A summary of the regression analysis is presented in Table 4.

Table 4
Summary of Regression Analysis for
Firm Size and Financial Performance (N = 813)

Financial Performance Measure	T	p
ROA	-0.39	0.695
ROS	1.51	0.133

* $p < .05$

For each of the firms an overall average, of the data from 1995 – 2005, was calculated for both return on assets (ROA) and return on sales (ROS). The percentage difference or change between the average of the first five years and the average of the last five years was also calculated for each firm for both ROA and ROS. Percentage change was calculated by dividing the difference, between the first and second averages, by the first average. For example, if the average ROA for the first five years was -1.108 and the average ROA for the last five years was 17.784, the percent change was 17.051. Quartile values, for both overall average and percentage change were obtained using MiniTab®. The data was then organized into two main categories, both with four sub-categories. The main categories were: (a) first quartile and (b) fourth quartile. The sub-categories were: (a) ROA overall average, (b) ROS overall average, (c) ROA percent change, and (d) ROS percent change.

Firms in the first quartile were considered to have ‘above average’ financial performance and firms in the fourth quartile were considered to have ‘below average’ financial performance. Firms, for which financial data fell into the second and third quartiles, and firms that did not have consistent quartile placement between ROA and ROS were not used to evaluate the research hypotheses. In other words, only firms that were in the first quartile for both ROA and ROS and only firms that were in the fourth quartile for both ROA and ROS were used to evaluate the research hypotheses. A total of fifty-four firms met the inclusion criteria.

The independent variable in this research was ‘the learning organization’ and the dependent variable was ‘organizational performance’. Both are latent variables, measured by indicator variables. The indicator variables for ‘learning organization’ were the seven

dimensions of a learning organization as defined by Marsick and Watkins (2003). These are: (a) continuous learning, (b) dialogue and inquiry, (c) team learning, (d) embedded system, (e) system connection, (f) empowerment, and (g) provide leadership. Indicator variables for 'organizational performance' are profitability ratios (i.e. return on assets and return on sales).

Data for the independent indicator variables was obtained using survey research methodology. The survey content was developed and validated by Marsick and Watkins (Yang, Watkins and Marsick, 2004). Permission was granted for its use. The survey items are measured using a six-point Likert scale, with response choices ranging from 1 (almost never) to 6 (almost always). A 43 item, a 21 item, and a seven item survey have been developed. The 43 item survey is recommended for use as a diagnostic tool to guide an intervention for a particular organization and the 21 and seven item surveys are recommended as a research instrument to evaluate the relationship of a 'learning organization' to other variables, such as performance (Marsick & Watkins, 2003). The intended survey respondents were business executives, which are typically very busy people. Therefore, the seven item survey was selected for this research to limit the amount of time their participation would require. According to Yang (2003), the reliability estimate for the seven-item survey is acceptable ($\alpha = .84$) and the seven items provide a concise evaluation of a learning organization environment. Based on the literature review, this research appears to be the first to use the seven item survey.

Human resource (HR) and quality assurance (QA) personnel at the manager level or above, that had been with the firm for at least two years, were asked to complete the survey. These two groups were selected because their organizational roles typically

involve them with learning and development activities, particularly in an industry regulated by the Food and Drug Administration. It was also desired to have more than one respondent per organization. A minimum of two years was required to provide time for the executive to assess the firm's implementation of the learning organization characteristics being evaluated. Initially, firms were contacted by phone, using the phone number provided on their website. Requesting the receptionist to connect to a position (e.g. Director of HR) was not effective. In the large majority of cases, the receptionist would not put the call through unless the person's name was known. To remedy this, specific contact information was purchased from 'Jigsaw', which is an on-line business directory of contacts and company information. The amount of contact information that Jigsaw provided varied from firm to firm. In some cases, contacts for HR and QA were limited. Contacts from 'operations/plant management' were substituted when contacts from HR or QA were not available. Four substitutions were made and of these, one completed the survey. To limit cost, two contacts per company were initially purchased and if these two did not respond, the process was repeated. In most cases, two responses per firm, of firms that responded, were obtained. Intended respondents were first contacted by phone to explain the purpose of the research, solicit their cooperation, verify their time with the firm and confirm their email address. If they had not been with the firm for at least two years, they were asked to recommend a co-worker. This occurred once and the person that was suggested did participate. If they agreed to participate or at least consider participation, the survey and implied consent form were sent via email. An electronic version of the survey was created so that respondents could complete the survey electronically and return it via email. Copies of the survey and the script of the

telephone communication are presented in Appendix A. In the majority of cases, the phone was answered by an answering machine and a message, explaining the purpose of the research and requesting their participation, was left in the person's voice mail. The survey, implied consent form and background information were sent via email even though the email address was not confirmed.

A total of 183 people were contacted by phone; approximately two-thirds receiving voice messages. Of the 183, a total of 43 (approximately 23%) actually completed the survey. Of the 43 respondents, 38 (approximately 90%) were from those actually spoken to on the phone as opposed to leaving voice mail; indicating that actual conversation is more effective in eliciting participation than leaving voice mail.

Although two responses were not obtained from every company, the total number of responses from Human Resource executives and Quality Assurance executives was equal. Several of those contacted indicated that their firms did not allow participation in outside research activities. Of the 54 firms, responses were obtained from 25 (approximately 46%).

To evaluate the research hypotheses, a series of two-sample t-tests were performed for the survey results/scores. Data analysis was performed using MiniTab®. The confidence level for each t-test was 95. The results of the data analysis are presented in Chapter 4 and discussed in Chapter 5.

Chapter 4

Findings

This chapter presents the data analysis and interpretation for the two hypotheses that guided the research: (a) Firms that demonstrate above-average financial performance possess dimensions of a learning organization to a greater extent than firms that demonstrate below-average financial performance. (b) Firms that demonstrate above-average improvement in financial performance possess dimensions of a learning organization to a greater extent than firms that demonstrate below-average improvement in financial performance.

Financial performance was measured using two profitability ratios (i.e. return on assets (ROA) and return on sales (ROS)); these ratios relate profit to management performance. Measurement of 'dimensions of a learning organization' utilized a validated, seven-item survey instrument that was developed to measure seven specific dimensions: (a) continuous learning, (b) dialogue and inquiry, (c) team learning, (d) embedded system, (e) system connection, (f) empowerment, and (g) provide leadership. Financial performance data (i.e. overall average and percent change between the first five years and the latter five years), for both ROA and ROS, was arranged by quartile. Data in the first quartile was considered to be 'above average' and data in the fourth quartile was considered to be 'below average'. Firms that had consistent quartile placement for both ROA and ROS were selected to test the study hypotheses.

The presentation of findings is organized by research hypothesis. Data analysis was performed using MiniTab®. Independent-samples t-tests were conducted; the null

hypothesis that MiniTab® uses for this t-test is that the samples are equal. All t-tests were performed with a confidence level of 95 ($\alpha = 0.05$).

Hypothesis One

Firms that demonstrate above-average financial performance possess dimensions of a learning organization to a greater extent than firms that demonstrate below-average financial performance.

This hypothesis concerned the relationship between a firm's overall financial performance over an eleven year period and the perception of management employees regarding the firm's implementation of learning organization characteristics. The survey scores for the firms in the first quartile (overall average performance) were compared with the survey scores for firms in the fourth quartile (overall average performance). All survey questions were included.

There was not a statistically significant difference in the overall average of survey scores between the firms in the first quartile ($M = 3.87$, $SD = 1.28$) and the fourth quartile ($M = 3.96$, $SD = 1.53$) conditions: $t = -0.38$, $p = 0.703$, $df = 145$.

Each question was also evaluated individually; there was not a statistically significant difference between survey scores for any of the questions. A summary of the data for each question is presented in Table 5.

Table 5
 Summary of T-test by Survey Question for Overall Average Performance
 ($df = 19$)

Survey Question	First Quartile		Fourth Quartile		t	p	CI
	M	SD	M	SD			
1	3.40	1.43	4.27	1.35	-1.44	0.166	-2.142, 0.396
2	3.40	1.17	4.18	1.33	-1.42	0.171	-1.932, 0.368
3	4.800	0.789	4.55	1.44	0.49	0.626	-0.822, 1.331
4	3.00	1.25	2.91	1.38	0.16	0.876	-1.113, 1.294
5	4.500	0.972	4.55	1.21	-0.09	0.926	-1.057, 0.966
6	4.20	1.03	3.09	1.81	1.70	0.926	-0.259, 2.477
7	3.80	1.48	4.18	1.60	-0.57	0.578	-1.793, 1.029

* $p < .05$

Hypothesis Two

Firms that demonstrate above-average improvement in financial performance possess dimensions of a learning organization to a greater extent than firms that demonstrate below-average improvement in financial performance.

The survey scores for the firms in the first quartile (percentage change in performance) were compared with the survey scores for firms in the fourth quartile (percentage change in performance). All survey questions were included.

There was a significant difference in the scores between the firms in the first quartile ($M = 4.21$, $SD = 1.14$) and the fourth quartile ($M = 3.59$, $SD = 1.23$) conditions: $t = 3.28$, $p = 0.001$, $df = 152$.

Each question was also evaluated individually; there was a statistically significant difference for questions three and six. A summary of the data for each question is presented in Table 6.

Table 6
Summary of T-test by Survey Question for Percent Change in Performance
($df = 19$)

Survey Question	First Quartile		Fourth Quartile		t	p	CI
	M	SD	M	SD			
1	4.25	1.36	3.8	0.919	-0.89	0.384	-1.504, 0.604
2	4.250	0.622	4.000	0.816	-0.82	0.424	-0.889, 0.389
3	4.917	0.515	4.00	1.33	-2.20	0.040*	-1.785, -0.048
4	3.083	0.900	2.90	1.45	-0.36	0.720	-1.237, 0.870
5	4.333	0.985	3.70	1.16	-1.39	0.181	-1.586, 0.320
6	4.000	0.953	2.80	1.55	-2.23	0.037*	-2.323, -0.077
7	4.67	1.56	3.90	0.876	01.38	0.182	-1.924, 0.390

* $p < .05$

Similar results were obtained from analysis by job function (i.e. Human Resources vs. Quality Assurance). There was not a statistically significant difference in the overall average of survey scores between Human Resource respondents from the firms in the first quartile ($M = 3.68$, $SD = 1.28$) and Human Resource respondents from the firms in the fourth quartile ($M = 4.05$, $SD = 1.64$) conditions: $t = -1.01$, $p = 0.318$, $df = 68$. There was not a statistically significant difference in the overall average of survey scores between Quality Assurance respondents from the firms in the first quartile ($M = 4.00$, $SD = 1.29$) and Quality Assurance respondents from the firms in the fourth quartile ($M = 4.14$, $SD = 1.41$) conditions: $t = -0.44$, $p = 0.663$, $df = 68$.

There was a statistically significant difference in the overall average of survey scores between Human Resource respondents from the firms in the first quartile ($M = 4.26$, $SD = 1.08$) and Human Resource respondents from the firms in fourth quartile ($M = 3.64$, $SD = 1.12$) conditions: $t = 2.57$, $p = 0.012$, $df = 82$. There was a statistically significant difference in the overall average of survey scores between the Quality Assurance respondents from firms in the first quartile ($M = 4.17$, $SD = 1.21$) and the Quality Assurance respondents from firms in the fourth quartile ($M = 3.50$, $SD = 1.40$) conditions: $t = 2.12$, $p = 0.38$, $df = 68$.

There was not a statically significant difference between responses from multiple respondents within organizations. A summary of the data is presented in Table 7.

Table 7
Summary of T-test by Respondent Within Each Category ($df = 19$)

Category	HR		QA		t	p	CI	df
	M	SD	M	SD				
Q1 Ave.	3.68	1.28	4.00	1.29	-1.03	0.308	-0.947, 0.304	68
Q4 Ave.	4.05	1.64	4.14	1.41	-0.25	0.802	-0.850, 0.660	68
Q1 Diff.	4.26	1.08	4.17	1.21	0.38	0.705	0.440, 1.098	82
Q4 Diff.	3.64	1.12	3.50	1.40	0.47	-0.638	0.040, 1.294	68

* $p < .05$

Histograms for responses by category (Q1 – overall average, Q4 – overall average, Q1 – difference, and Q4 – difference) are presented in Figures 2 – 5.

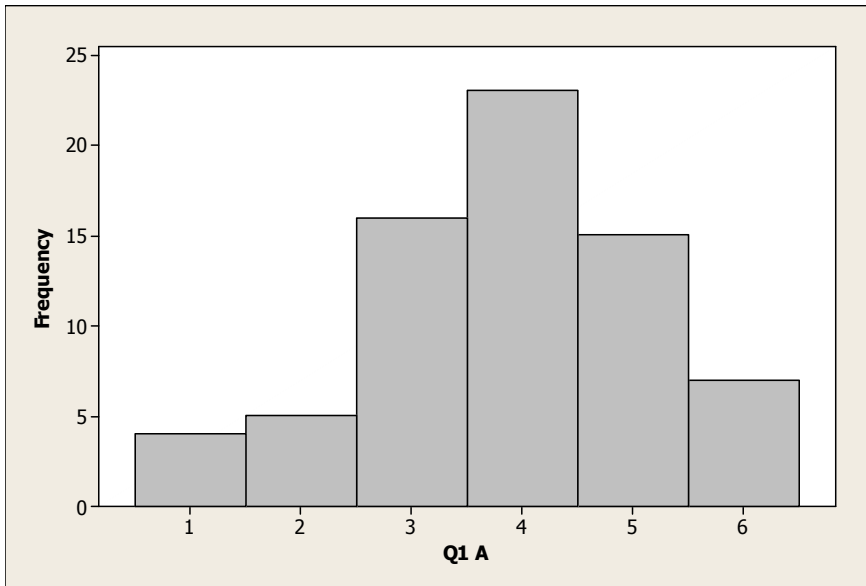


Figure 2. Histogram of responses from first quartile – overall average performance.

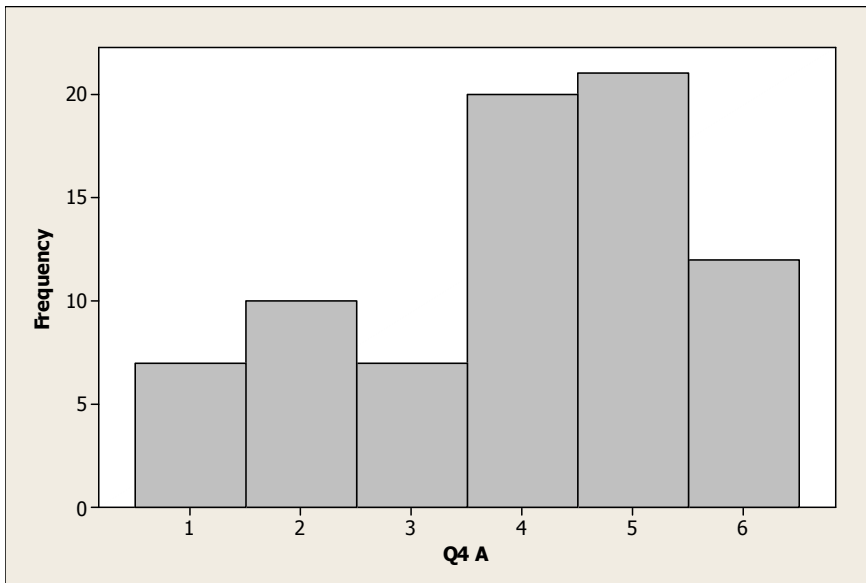


Figure 3. Histogram of responses from fourth quartile – overall average performance.

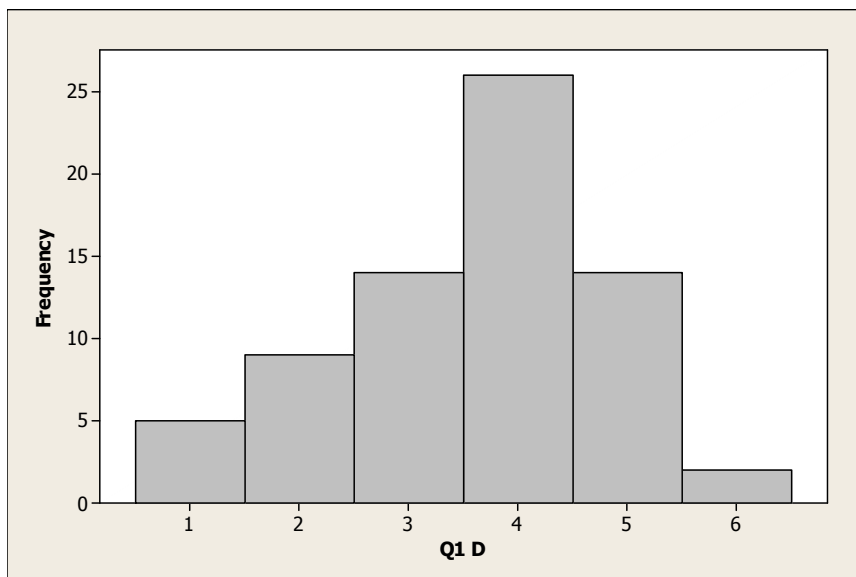


Figure 4. Histogram of responses from first quartile - % difference in performance.

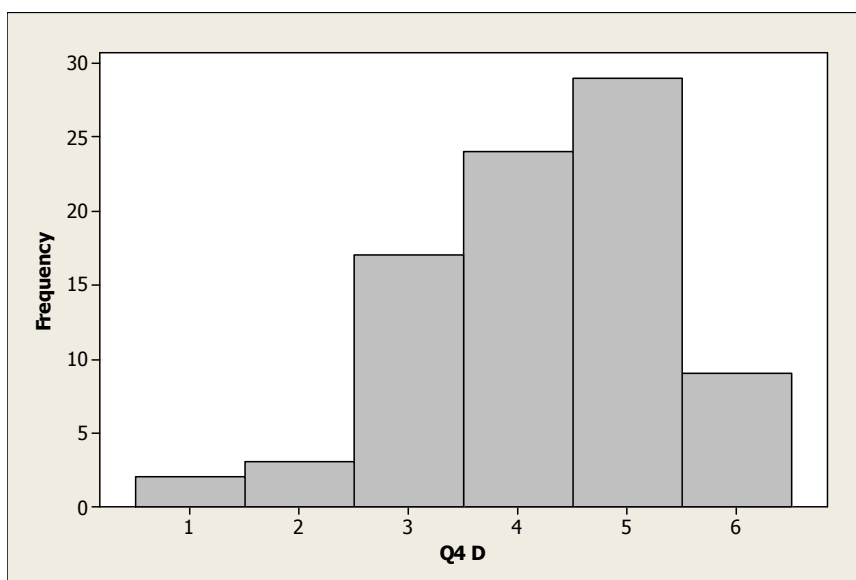


Figure 5. Histogram of responses from fourth quartile - % difference in performance.

The Anderson-Darling normality test was performed for the financial data for each firm that participated in the research. Data analysis was performed using MiniTab®. The null hypothesis is that the data are normal. A summary of the results are presented in Table 8.

Table 8
 Summary of p-values from Anderson-Darling Normality
 Test for Participating Firms.

Company	p-value	
	ROA	ROS
1	0.144	0.117
2	0.572	0.516
3	0.718	<0.005
4	0.049	<0.005
5	0.524	0.127
6	0.028	0.060
7	0.697	0.345
8	0.007	<0.005
9	0.459	0.126
10	0.055	0.155
11	0.909	0.904
12	0.006	<0.005
13	0.228	0.228
14	0.201	0.201
15	0.277	0.277
16	0.013	<0.005
17	<0.005	<0.005
18	0.066	0.066
19	0.072	<0.005
20	<0.005	0.008
21	0.569	0.179
22	0.078	<0.005
23	0.412	0.698
24	0.727	0.010
25	0.042	<0.005

Chapter 5

Discussion

This research was conducted to help fill the void of empirical research regarding the relationship between being a learning organization, or possessing characteristics of one, and financial performance. Such information is critical for executives and practitioners who are trying to make a 'business case' for the learning organization.

Two hypotheses were tested. The first (i.e. firms that demonstrate above-average financial performance possess dimensions of a learning organization to a greater extent than firms that demonstrate below-average financial performance) was not supported by the data collected and analyzed. There was no statistical difference between survey responses from respondents of firms that had above average financial performance (i.e. those in the first quartile) and respondents of firms that had below average financial performance (i.e. those in the fourth quartile). A possible explanation for this is that the financial performance of some of the firms evaluated either improved or declined over the eleven year period. This change in financial performance, although not enough to affect quartile placement overall, may have been reflected in the survey responses. Each of the firms in the first quartile, that had respondents, showed a slight negative change in both ROA and ROS from the first five years to the last five years. Of the firms in the fourth quartile that had respondents, three firms had a negative change in both ROA and ROS; two firms had a negative change in one, but a positive change in the other; and one had a positive change in both.

The second hypothesis (i.e. firms that demonstrate above-average improvement in financial performance possess dimensions of a learning organization to a greater extent than firms that demonstrate below-average improvement in financial performance) was supported by the data collected and analyzed. This result suggests a relationship between implementation of learning organization characteristics, as defined by the Watkins and Marsick model, and improvement in a firm's financial performance. The average of all survey scores was higher for firms in the first quartile than for firms in the fourth quartile and the difference between the two sets of scores was statistically significant. The average scores, for each question, were also higher for firms in the first quartile than firms in the fourth quartile however, the difference was only statistically significant for questions three and six. Question three deals with collaboration and team learning in general and specifically the revision of thinking as a result of new information or discussion. Question six deals with connecting the organization to the environment in general, and specifically with connection to the outside community.

Collaborative and team learning are elements of the learning organization that are ubiquitous in learning organization literature. Two key arguments are: (a) that team learning will more readily transcend into the organization, than individual learning; and (b) that collaboration and team learning allow members to engage in dialogue that promotes the exchange of ideas and that may lead to challenging assumptions and expanding mental frameworks. Connecting the organization to the environment is less explicitly present in the literature however, no less important when the implications are considered. Being attuned to changes at the local, national and international levels and the potential impact of those changes on a business can be extremely valuable.

Employees that are aware of their internal environment, particularly resources within an organization, have an increased opportunity to take advantage of those resources and managers have an increased opportunity to leverage and utilize those resources. Working with the outside community may provide employees a more balanced work life and promote positive feelings towards the organization.

Conclusion

Given the limitations of this research, a conservative approach in drawing conclusions is warranted. However, this research generally supported the notion that a firm's possession of learning organization characteristics is related to improvement in financial performance, and specifically supported two characteristics (i.e. collaborative and team learning, and being connected to the environment). This research also lends credence to the prescriptive argument inherent in the normative perspective of a learning organization (i.e. that there are certain characteristics or conditions that if implemented will help an organization improve performance). It is worth noting that even though authors seem divided in their perspective (i.e. capability, development and normative) regarding a learning organization, when embarking on the journey of becoming a learning organization, all perspectives should be considered. It is more likely that each perspective has merit and that they are supplemental to each other rather than in opposition. It is difficult to disagree that organizations develop over time and have different abilities and needs at various stages throughout this development. It is difficult to disagree that organizations have unique cultures and that these cultures both direct and reflect organizational learning. This research, and the few studies that preceded it, make it

difficult to disagree with the idea that there are certain prescriptive measures that organizations can implement that will promote learning and subsequently continuous improvement. It is also worth noting that while the normative view, and the models that adhere to it, are prescriptive in terms of what should be implemented or accomplished (i.e. collaborative learning, promoting inquiry and dialogue, creating systems to share learning), how to implement or accomplish those things is for the most part left to the organization to determine. This is similar to an organization's implementation of a quality management system. The ISO standards specify requirements but how those requirements are met can vary widely and it is up to the organization to determine the processes and programs to meet the requirements. The challenge for practitioners and executives is understanding where an organization is in terms of its development, culture and capabilities and then tailoring implementation of learning organization dimensions to best suit the organization.

Strengths and Limitations

The research was designed to mitigate certain influencing variables that might affect the results. To address the potential for variation due to industry / product, firms were selected from within one specific NAICS code. To minimize the chance that one or more firms had financial results for one year that were not 'typical' due to various reasons, eleven years of financial data were collected. This also mitigated to some extent differences due to the age of the company in that all companies were at least eleven years old. Firm size was evaluated to determine if this needed to be taken into account as an influencing variable, and more than one respondent per firm was sought. While not an

intentional strength of this research, social desirability bias (i.e. responding in the best light; reluctance to admit perceived flaws or shortcomings) does not seem to be present; the responses were generally normally distributed along the survey scale.

Nevertheless, limitations of this research exist. The firms selected were public firms; private firms were not included and it is possible that inclusion of private firms could have produced different results. Participants were managers and above; it is possible that had non-management employees been selected instead or included, the results would be different. This study used 'return on assets' and 'return on sales' as measures of financial performance. While these are recognized measures, it is possible that the inclusion of additional measures or the use of different measures of financial performance may have yielded different results. The targeted respondents were busy executives; it was difficult to directly access these individuals. Additional responses from each firm and an increase in participating firms may also have produced different results. This study did not evaluate when or if the firms took specific action to adopt or implement conditions to maximize learning or create characteristics of a learning organization; this information would have enriched the evaluation of performance over time. Similarly, the responses were gathered after the financial data time frame. It is possible that the perception of learning organization characteristics held by the respondents might have been different during the financial data time frame.

Recommendations for Further Research

To strengthen the evidence provided by this and prior research, additional research examining the relationship between learning organization characteristics and

financial performance should be done. This research could be replicated using firms in a different NAICS code, or the same firms could be evaluated with different measures of financial performance and different respondents. A more in-depth examination of the firm's that demonstrate the most positive change in financial performance, in terms of depth and timing of adoption of learning organization characteristics could be performed.

Empirical research that addresses strategies for adoption and implementation of learning organization dimensions is also lacking. Research that explores methods to determine which or what types of strategies are most effective for various types of organizations may be beneficial for practitioners and executives trying to make these decisions.

References

- Altman, Y., & Iles, P. (1998). Learning, leadership, teams: corporate learning and organizational change. *The Journal of Management Development*, 17, 44-45.
- Agashe, Z., & Bratton, J. (2001). Leader-follower dynamics: Developing a learning environment. *Journal of Workplace Learning*, 13, 89-102.
- Argyris, C. (1990). *Overcoming organizational defenses: Facilitating organizational learning*. Needham, MA: Allyn & Bacon.
- Argyris, C. (1993). *Organizational learning II: Theory, method and practice*. Reading, MA: Addison-Wesley.
- Argyris, C. (1999). *On organizational learning*. Oxford: Blackwell Publishers.
- Argyris, D. & Schon, D. (1978). *Organizational learning*. Reading, MA: Addison-Wesley.
- Bell, S., Whitmal, G., & Lukas, B. (2002). Schools of thought in organizational learning. *Academy of Marketing Science*, 30, 70-101.
- Boyle, E. (2002). A critical appraisal of the performance of Royal Dutch Shell as a learning organization. *The Learning Organization*, 9(1), 6-19.
- Brodbeck, P.W. (2002). Implications for organization design: Teams as pockets of excellence. *Team Performance Management*, 8, 21-38.
- Burgoyne, J. (1999). Design of the times. *People management*, 5(11), 38-44.
- Cameron, K.S., & Whetten, D.A. (1983). Models of the organizational life cycle: Applications to higher education. *The Review of Higher Education*, 6, Summer, 269-299.
- Cangelosi, V.E., & Dill, W.R. (1965). Organizational learning: Observations toward a theory. *Administrative Science Quarterly*, 10, 175-203.
- Cook, S., & Yanow, D. (1993). Culture and organizational learning. *Journal of Management Inquiry*, 2(4), 373-390.
- Cyert, R., & March, J. (1963). *A Behavioral Theory of the Firm*. Oxford: Blackwell Publishers

- Davis, D. (2005). The learning organization and its dimensions as key factors in firm Performance. Dissertation, University of Wisconsin, AAT 3168204
- Deming, W.E. (1982). *Quality, productivity and competitive position*. Cambridge, MA: Massachusetts Institute of Technology.
- Dibella, A. (1995). Developing learning organizations: A matter of perspective. *Academy of Management Journal*, Best papers proceedings 287-90.
- Dodgson, M. (1993). Organizational learning: A review of some literatures. *Organizational Studies*, 14, 375-394.
- Drucker, P. (1996). *The leader of the future*. New York, NY: The Peter F. Drucker Foundation for Nonprofit Management.
- Easterby-Smith, M. (1997). Disciplines of Organizational Learning: Contributions and Critiques, *Human Relations*, 50(9), 1085-1113.
- Easterby-Smith, M., & Araujo, J. (1999). Organizational learning: Current debates and opportunities. In M. Easterby-Smith, J. Burgoyne, and L. Araujo (eds) *Organizational Learning and the Learning Organization: Developments in Theory and Practice*. London: Sage.
- Ellinger, A.D., Ellinger, A.E., Yang, B., & Howten, S. (2002). The relationship between the learning organization concept and firms' financial performance: An empirical assessment. *Human Resource Development Quarterly*, 13(1), 5-21.
- Foil, C., & Lyles, M.(1985). Organizational Learning. *Academy of Management Review*, 10, 803-813.
- Forrester, J. (1992). Policies, decision, and information sources for modeling. *European Journal of Operational Research*, 1, 42-63.
- Gardiner, P. (1999). Soaring to new heights with learning oriented companies. *Journal of workplace learning*, 11(7), 255-265.
- Gardiner, P., & Whiting, P. (1997), Success factors in learning organizations: an empirical study, *Industrial and Commercial Training*, 29(2), 41-48.
- Garratt, B. (1990). *Creating a learning organization: A guide to leadership, learning, and development*. Cambridge: Simon & Schuster.
- Garvin, D. (1993). Building a learning organization. *Harvard Business Review*, 73, 78-91.

- Garvin, D. (2000). *Learning in action: A guide to putting the learning organization to work*. Boston, MA: Harvard Business School Press.
- Gephart, M, Marsick, V., VanBuren, M. & Spiro, M. (1996). Learning organizations come alive. *Training and Development*, 50(12), 34-45.
- Goh, S. (1998). Toward a learning organization: The strategic building blocks. *S.A.M. Advanced Management Journal*, 63(2), 15-20.
- Griego, O., Geroyu, G., & Wright, P. (2000). Predictors of learning organizations: A human resource development practitioner's perspective. *The Learning Organization*, 7, 5-21.
- Hernandez, M. (2000). The impact of the dimensions of the learning organization on the transfer of tacit knowledge process and performance improvement within private manufacturing firms in Colombia. Dissertation, University of Georgia, AAT 9994101.
- Iles, P. (1994). Developing a learning environment: Challenges for theory, research and practice. *Journal of European Training*, 18(3), 3-9.
- Jacobs, R. (1995). Impressions about the learning organization: Looking to see what is behind the curtain. *Human Resource Development Quarterly*, 6(2), 119-122.
- Jashapara, A. (2003). Cognition, culture and competition: An empirical test of the learning organization. *The Learning Organization*, 10(1), 31-51.
- Hague, M. (2008). A study of the relationship between the learning organization and organizational readiness for change. Dissertation, Pepperdine University, AAT 3311367
- Kolb, D. (1984). *Experiential learning*. Englewood Cliffs, NJ: Prentice-Hall.
- Kontoghiorghes, C., Awbrey, S., & Feurig, P. (2005). Examining the relationship between learning organization characteristics and change adaptation, innovation, and organizational performance. *Human Resource Development Quarterly*, 16(2), 185-211.
- Kouzer, J., & Posner, B. (1995). *The leadership challenge*. San Francisco, CA: Jossey-Bass.
- Laiken, M. (2003). Models of organizational learning: paradoxes and best practices in the post industrial workplace. *Organization Development Journal*, 21, 8-32.
- Lassey, P. (1998). *Developing a learning organization*. London: Kogan Page Limited.

- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
- March, J. (1991). Exploration and exploitation in organizational learning. *Organization Science*, 2(2), 71-87.
- March, J.G., & Olsen, J.P. (1975). The uncertainty of the past: Organizational learning under ambiguity, *European Journal of Political Research*, 3, 147-171.
- Marsick, V., Cederholm, L., Turner, E., & Pearson, T. (1992). Action reflection. *Training and Development*, July, 29-33.
- Marsick, V., & Watkins, K. (2003). Demonstrating the value of an organization's learning culture: The dimension of the learning organization questionnaire. *Advances in Developing Human Resources*, 5(2), 132-151.
- McHargue, S. (1999). Learning for performance in nonprofit organizations. *Advances in Developing Human Resources*, 5(2), 196-204.
- Murugiah, S. (2008). Facilitating organizational learning to enhance capacity to manage emerging business challenges: Case study of safe finance in Malaysia
Dissertation, Columbia University, AAT 3327067
- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, 5(1), 14-37.
- Ortenblad, A. (2001). On differences between organizational learning and learning organization. *The learning organization*, 8(3/4), 125-134.
- Parkes, D. (1998). Action learning: Business application in North America. *Journal of Workplace Learning*, 10, 3.
- Pedler, M., & Aspinwall K. (1998). *A concise guide to the learning organization*. London: Lemos & Crane.
- Pedler, M., Boydell, T., & Burgoyne, J. (1989). Towards the learning company. *Management Education and Development*, 20, 1-8.
- Pinchot, E., & Pinchot, G. (1994). *The end of bureaucracy and the rise of the intelligent organization*. San Francisco, CA: Berrett-Koehler.
- Popper, M., & Lipshitz R. (2002). Installing mechanisms and instilling values: the role of leaders in organizational learning. *The Learning Organization*, 7, 135-144.

- Porth, S.J., McCall, J., & Bausch, T.A. (1999), Spiritual themes of the learning organization, *Journal of Organizational Change Management*, 12(3), 211-220.
- Prahalad, C.K., & Hamel, G. (1990). The core competencies of the corporation. *Harvard Business Review*, May-June, 79-91.
- Rothwell, W., & Sredl, H. (Eds.) (3rd ed.) (2000). *The ASTD reference guide to workplace learning and performance: Present and future roles and competencies*. Amherst, MA: HRD Press.
- Schein, D. (1992). *Organizational culture and leadership* (2nd Ed.). San Francisco: Jossey-Bass.
- Seldon, G. (1998). Family businesses as learning organizations: An explanatory model of knowledge and financial performance. Dissertation, University of Georgia, AAT 9828362.
- Senge, P. (1990). *The fifth discipline*. New York, NY: Doubleday
- Simon, H. (1991). Bounded rationality and organizational learning. *Organization Science*. 2(1), 125-134.
- Spillan, J., Mino, M., & Rowles, M. (2002). Sharing organizational messages through effective lateral communication. *Communication Quarterly*, 59, 96-104.
- Fatima Sta. Maria, R. (2000). Innovation and organizational learning culture in the Malaysian public sector. *Advances in Developing Human Resources*, 6(2), 205-214.
- Sternman, J. (2000). *Business dynamics: Systems-thinking and modeling for a complex world*. McGraw-Hill Inc.
- Swieringa J., & Wierdsma, A. (1992). *Becoming a learning organization*. Reading MA: Addison-Wesley.
- Torbert, W.R. (1994). Managerial learning, organizational learning: A potentially powerful redundancy. *Journal of Management Learning*, 1, 57-70.
- Weldy, T. (2007). An assessment of the relationship between the learning organization construct and the transfer of training construct. Dissertation, University of South Alabama, AAT 3269318
- Wenger, E., & Snyder, W. (2001). *The Harvard business school review on organization learning*. Harvard, MA: Harvard Business School Publishing Corporation.

- Yang, B. (2003). Identifying Valid and reliable measures for dimensions of a learning culture. *Human Resource Development Quarterly*, 5(2), 152-162.
- Yang, B., Watkins, K., & Marsick, V. (2004). The construct of the learning organization: Dimensions, measurement, and validation. *Human Resource Development Quarterly*, 15(1), 31-55.
- Yeager, N., & Hough, L. (1998). *Power interviews: Job winning tactics from fortune 500 recruiters*. New York, NY: John Wiley & Sons, Inc.

Appendix A

Seven Dimensions of a Learning Organization Questionnaire

Directions:

Please select the most appropriate score from 1 (almost never) to 6 (almost always).

Place an 'X' in the appropriate box. Only one selection per question is permitted.

An analysis of your completed questionnaire will be provided to you.

Your participation is greatly appreciated.

Question	Almost Never 1	2	3	4	5	Almost Always 6
1. In my organization, people are rewarded for learning.						
2. In my organization, people spend time building trust with each other.						
3. In my organization, teams/groups revise their thinking as a result of group discussions or information collected.						
4. My organization makes its lessons learned available to all employees.						
5. My organization recognizes people for taking initiative.						
6. My organization works together with the outside community to meet mutual needs.						
7. In my organization, leaders continually look for opportunities to learn.						

Thank you.

Dissertation Script

Hello, my name is Debora Demers.

I'm a doctoral candidate at the Pennsylvania State University. I'm conducting research in the area of organizational learning. Your participation is needed for two reasons. First, empirical research in this area is lacking, and therefore is needed. Second, my graduation depends on completion of this research, which depends on participation from people like you.

Participation will take only a few minutes of your time. I'm asking that you complete a very brief, seven-item survey, which can be completed electronically and emailed back to me. I want to assure you that strict confidentiality will be maintained, neither your name nor your company will be identified.

The research examines the relationship between an organization possessing characteristics of a learning organization and financial performance. To be eligible to participate, you need to have been with your company for at least two years. If you are willing to participate, I will email you a copy of the survey along with an implied consent form, which is your to keep.

If you are interested in this research, but have not been with the company for at least two years, please consider recommending a colleague that I may contact or forward my email to them.

I will be happy to answer any questions.

Appendix B

Table B1
Raw Data for Initial Sample of Firms

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
1995	AB1	334.52	0.1794	0.169
1996	AB1	330.36	0.1692	0.171
1997	AB1	301.27	0.1737	0.176
1998	AB1	564.14	0.1765	0.187
1999	AB1	893.83	0.169	0.186
2000	AB1	950.54	0.1823	0.203
2001	AB1	861.5	0.0666	0.095
2002	AB1	1192.82	0.1152	0.158
2003	AB1	969.76	0.1031	0.14
2004	AB1	1004.23	0.1125	0.164
2005	AB1	1070.33	0.1157	0.151
1995	BV2	9.63	0.0964	0.285
1996	BV2	44.05	0.3972	0.397
1997	BV2	36.06	0.3759	0.504
1998	BV2	46.28	0.2272	0.449
1999	BV2	42.6	0.0984	0.412
2000	BV2	461.54	-0.1336	-0.507
2001	BV2	209.54	0.0657	0.15
2002	BV2	346.27	0.0479	0.111
2003	BV2	547.09	-0.0142	-0.033
2004	BV2	265.01	0.0941	0.182
2005	BV2	194.93	0.1164	0.252
1995	BM3	246.36	0.1301	0.132
1996	BM3	253.59	0.1941	0.189
1997	BM3	546.71	0.214	0.192
1998	BM3	494.64	0.193	0.172
1999	BM3	888.1	0.2435	0.206
2000	BM3	1456.9	0.268	0.259
2001	BM3	1331.59	0.1738	0.265
2002	BM3	2194.02	0.0831	0.114
2003	BM3	1499.76	0.1131	0.149
2004	BM3	1547.74	0.0785	0.123
2005	BM3	1488.57	0.1066	0.156
1995	HI4	*	-1.927	0
1996	HI4	3.97	-0.9758	-77.692
1997	HI4	11.59	-0.6015	-20.5
1998	HI4	25.79	-0.8503	-8.905
1999	HI4	37.74	-1.2826	-2.689
2000	HI4	94.76	-2.4431	-3.709
2001	HI4	71	-2.1432	-1.337
2002	HI4	340.92	-4.0303	-3.624
2003	HI4	765.49	-2.7742	-7.611
2004	HI4	262.76	-2.1778	-5.233
2005	HI4	231.37	-1.5671	-20.372
1995	CE5	22.09	-0.7403	-8.991

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
1996	CE5	32.87	-0.851	-7.128
1997	CE5	32.85	-1.3968	-22.723
1998	CE5	47.68	-2.1014	-6.597
1999	CE5	64.21	-0.6737	-0.831
2000	CE5	329.23	-0.047	-0.193
2001	CE5	450.59	-0.0054	-0.017
2002	CE5	248.06	-0.3055	-0.737
2003	CE5	380.63	0.0171	0.05
2004	CE5	704.54	0.0476	0.14
2005	CE5	599.88	0.0511	0.119
1995	CE6	119.08	-0.1491	-0.702
1996	CE6	199.13	-0.2996	-2.494
1997	CE6	139.51	-0.3996	-2.611
1998	CE6	107.09	-0.5853	-3.538
1999	CE6	126.12	-0.2988	-1.557
2000	CE6	226.77	-0.328	-0.905
2001	CE6	293.06	-0.0399	-0.208
2002	CE6	577.65	0.1016	0.338
2003	CE6	463.74	0.0352	0.117
2004	CE6	320.07	-0.0302	-0.073
2005	CE6	362.67	-0.0621	-0.144
1995	EL7	51.04	0.1289	0.398
1996	EL7	120.49	-0.0011	-0.003
1997	EL7	76.38	0.1558	0.462
1998	EL7	140.14	0.0385	0.216
1999	EL7	510.01	0.0718	0.333
2000	EL7	471.32	0.0423	0.263
2001	EL7	437.15	-0.094	-0.586
2002	EL7	1274.03	-0.7663	-3.115
2003	EL7	1020.33	-0.2571	-1.07
2004	EL7	1525.86	-0.1172	-0.794
2005	EL7	3036.14	0.2449	1.435
1995	FR8	53.47	0.1159	0.233
1996	FR8	54.03	0	0
1997	FR8	86.76	0.0493	0.086
1998	FR8	99.37	0.0882	0.141
1999	FR8	132.87	0.1027	0.128
2000	FR8	403.67	0.1487	0.182
2001	FR8	341.9	0.1731	0.215
2002	FR8	844.53	0.2131	0.281
2003	FR8	739.18	0.1905	0.277
2004	FR8	668	0.2264	0.269
2005	FR8	538.89	0.2271	0.243
1995	DN9	55.09	0.0728	0.171
1996	DN9	28.49	0.0532	0.14
1997	DN9	29.04	0.0515	0.136
1998	DN9	47.35	0.0637	0.171
1999	DN9	198.78	-0.1746	-0.859
2000	DN9	532.35	-0.0111	-0.045

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
2001	DN9	563.82	0.0211	0.072
2002	DN9	607.3	0.0094	0.024
2003	DN9	792.73	0.0644	0.17
2004	DN9	1169.48	0.0835	0.17
2005	DN9	1069.45	0.1053	0.193
1995	JN10	259.89	0.1344	0.128
1996	JN10	584.24	0.1443	0.134
1997	JN10	654	0.154	0.146
1998	JN10	594.16	0.1167	0.129
1999	JN10	615.41	0.1429	0.152
2000	JN10	904.69	0.1533	0.165
2001	JN10	2162.22	0.1473	0.172
2002	JN10	2079.07	0.1627	0.182
2003	JN10	2081.09	0.1491	0.172
2004	JN10	1704.71	0.1596	0.18
2005	JN10	1938.3	0.1794	0.206
1995	KG11	*	*	*
1996	KG11	*	-0.0061	-0.012
1997	KG11	*	0.063	0.138
1998	KG11	18.85	0.0313	0.128
1999	KG11	110.91	0.0558	0.129
2000	KG11	294.09	0.0503	0.104
2001	KG11	422.64	0.0869	0.25
2002	KG11	497.05	0.0664	0.162
2003	KG11	543.99	0.0333	0.07
2004	KG11	545.74	-0.0548	-0.123
2005	KG11	480.86	0.0397	0.066
1995	LL112	321.84	0.159	0.339
1996	LL12	337.44	0.1065	0.207
1997	LL12	677.5	-0.0306	-0.045
1998	LL12	787.37	0.1666	0.227
1999	LL12	706.25	0.2122	0.274
2000	LL12	863.02	0.2081	0.282
2001	LL12	854.01	0.1692	0.241
2002	LL12	939.51	0.1422	0.244
2003	LL12	890.64	0.1181	0.204
2004	LL12	912.53	0.0728	0.131
2005	LL12	1032.16	0.0805	0.135
1995	MR13	654.02	0.1399	0.2
1996	MR13	669.23	0.1598	0.196
1997	MR13	777.37	0.1788	0.195
1998	MR13	717.27	0.1648	0.195
1999	MR13	1241.21	0.1653	0.18
2000	MR13	1453.61	0.1709	0.169
2001	MR13	1453.08	0.1655	0.153
2002	MR13	1783.53	0.1503	0.138
2003	MR13	1785.77	0.1683	0.304
2004	MR13	2692.37	0.1366	0.248
2005	MR13	2526.42	0.1033	0.21
1995	MY14	164.03	0.1479	0.26
1996	MY14	141.62	0.0812	0.143

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
1997	MY14	148.7	0.1189	0.181
1998	MY14	215.26	0.0956	0.16
1999	MY14	191.19	0.115	0.195
2000	MY14	224.27	0.0253	0.044
2001	MY14	228.62	0.161	0.236
2002	MY14	312.62	0.1561	0.215
2003	MY14	588.69	0.1784	0.243
2004	MY14	698.86	0.0953	0.162
2005	MY14	428	0.0987	0.147
1995	PE15	389.19	0.1236	0.157
1996	PF15	328.63	0.1315	0.171
1997	PF15	811.02	0.1443	0.177
1998	PF15	1037.38	0.1831	0.247
1999	PF15	2802.9	0.1545	0.196
2000	PF15	2938.04	0.1112	0.126
2001	PF15	3258.52	0.1989	0.243
2002	PF15	4172.92	0.1969	0.282
2003	PF15	4877.03	0.0335	0.087
2004	PF15	5849.73	0.0919	0.216
2005	PF15	7388.49	0.0688	0.158
1995	SG16	244.97	0.1901	0.174
1996	SG16	237.34	0.2247	0.214
1997	SG16	387.46	0.2219	0.213
1998	SG16	852.41	0.224	0.217
1999	SG16	846.03	0.2251	0.23
2000	SG16	1230.12	0.2242	0.247
2001	SG16	1587.42	0.1596	0.198
2002	SG16	1727.31	0.1396	0.194
2003	SG16	1784.59	-0.0061	-0.011
2004	SG16	1443.3	-0.0595	-0.114
2005	SG16	1479.46	0.0174	0.028
1995	SE17	67.59	-0.1648	-2.061
1996	SE17	63.49	-0.4098	-3.997
1997	SE17	109.19	-0.2033	-1.703
1998	SE17	108.8	-0.1692	-5.358
1999	SE17	133.78	-0.4502	-8.079
2000	SE17	306.34	-0.2717	-2.393
2001	SE17	349.98	-0.2049	-1.473
2002	SE17	496.34	-0.3803	-1.157
2003	SE17	372.09	-0.1332	-0.395
2004	SE17	609.14	-0.2845	-0.776
2005	SE17	481.29	0.0039	0.006
1995	TE18	115.15	0.0916	0.12
1996	TE18	142.18	0.0591	0.077
1997	TE18	160.35	0.0854	0.091
1998	TE18	106.74	0.0479	0.062
1999	TE18	67.31	0.0687	0.092
2000	TE18	269.34	0.052	0.085
2001	TE18	330.14	0.0804	0.134
2002	TE18	564.37	0.0887	0.163
2003	TE18	606.96	0.1168	0.211

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
2004	TE18	1369.4	0.0344	0.069
2005	TE18	1162.03	0.1032	0.204
1995	WY19	140.17	0.0787	0.126
1996	WY19	292.37	0.0906	0.134
1997	WY19	396.82	0.0981	0.144
1998	WY19	929.44	0.1174	0.184
1999	WY19	891.67	-0.0513	-0.091
2000	WY19	931.26	-0.1124	-0.179
2001	WY19	901.69	0.0995	0.162
2002	WY19	1413.43	0.1711	0.305
2003	WY19	1319.41	0.0661	0.129
2004	WY19	1172.08	0.0367	0.071
2005	WY19	1153.49	0.102	0.195
1995	AL20	16.29	0.1144	0.114
1996	AL20	51.33	*	*
1997	AL20	78.82	-0.0624	-0.062
1998	AL20	56.64	-0.0881	-0.088
1999	AL20	92.25	-0.0236	-0.024
2000	AL20	296.04	-0.1049	-0.105
2001	AL20	184.73	-0.1942	-0.194
2002	AL20	264.84	-0.066	-0.066
2003	AL20	341.53	-0.2272	-0.227
2004	AL20	217.6	-0.3155	-0.315
2005	AL20	266.04	-0.2146	-0.215
1995	AG21	31.85	-0.0562	-0.056
1996	AG21	58.39	0.0028	0.003
1997	AG21	47.64	-0.1244	-0.124
1998	AG21	64.15	*	*
1999	AG21	195.27	0.0541	0.054
2000	AG21	208.33	0.0391	0.039
2001	AG21	219.56	0.0627	0.063
2002	AG21	320.66	-0.0499	-0.05
2003	AG21	234.3	0.1072	0.107
2004	AG21	210.24	0.0953	0.095
2005	AG21	260.69	0.0789	0.079
1995	AZ22	20	0.0095	0.01
1996	AZ22	18.65	-0.0061	-0.006
1997	AZ22	14.96	0.0458	0.046
1998	AZ22	44.11	0.0449	0.045
1999	AZ22	106.87	0.0396	0.04
2000	AZ22	107.14	*	*
2001	AZ22	139.15	0.029	0.029
2002	AZ22	264.12	0.051	0.051
2003	AZ22	350.31	0.0509	0.051
2004	AZ22	347.21	0.0463	0.046
2005	AZ22	239.99	0.046	0.046
1995	BR23	1.86	16.2744	16.274
1996	BR23	2.94	17.5334	17.533
1997	BR23	9.41	13.9156	13.916
1998	BR23	32.78	9.7668	9.767
1999	BR23	35.66	10.9604	10.96

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
2000	BR23	86.84	11.103	11.103
2001	BR23	183.04	5.7063	5.706
2002	BR23	146.57	*	*
2003	BR23	217.68	0.0053	0.005
2004	BR23	302.54	0.0053	0.005
2005	BR23	204.39	0.0131	0.013
1995	BL24	34.98	4.9651	4.965
1996	BL24	161.05	1.8834	1.883
1997	BL24	26.56	2.2788	2.279
1998	BL24	52.37	5.0929	5.093
1999	BL24	69.19	13.206	13.206
2000	BL24	74.68	8.0913	8.091
2001	BL24	11.16	10.7699	10.77
2002	BL24	14.01	25.204	25.204
2003	BL24	21.21	6.7237	6.724
2004	BL24	25.45	*	*
2005	BL24	4.19	-1.3451	-1.345
1995	CY25	92.06	*	*
1996	CY25	135.77	-0.4766	-0.477
1997	CY25	78.15	-0.5016	-0.502
1998	CY25	102.27	-2.1128	-2.113
1999	CY25	81.38	-1.3418	-1.342
2000	CY25	494.06	-1.7767	-1.777
2001	CY25	94.89	-2.4165	-2.416
2002	CY25	7.19	-4.0357	-4.036
2003	CY25	34.66	-1.1419	-1.142
2004	CY25	30.04	-2.5794	-2.579
2005	CY25	47.42	-5.633	-5.633
1995	GS26	273.37	-0.0027	-0.003
1996	GS26	305.13	0.0022	0.002
1997	GS26	175.88	0.005	0.005
1998	GS26	132.18	0.0092	0.009
1999	GS26	125.57	0.012	0.012
2000	GS26	170.74	-1.7873	-1.787
2001	GS26	195.15	*	*
2002	GS26	257.39	-0.0003	0
2003	GS26	241.89	-0.0003	0
2004	GS26	346.21	-0.0003	0
2005	GS26	334.92	-0.0001	0
1995	IC27	25.06	-0.3397	-0.34
1996	IC27	45.15	-0.211	-0.211
1997	IC27	48.76	-0.2404	-0.24
1998	IC27	119.85	-0.1407	-0.141
1999	IC27	89.99	-0.1756	-0.176
2000	IC27	104.48	-0.0504	-0.05
2001	IC27	169.57	-0.0214	-0.021
2002	IC27	350.71	-0.122	-0.122
2003	IC27	434.29	*	*
2004	IC27	282.42	5.0929	5.093
2005	IC27	202.64	12.8841	12.884
1995	LG28	24.78	32.418	32.418

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
1996	LG28	51.11	29.8414	29.841
1997	LG28	59.34	27.2274	27.227
1998	LG28	66.64	40.3542	40.354
1999	LG28	85.52	33.4062	33.406
2000	LG28	91.09	55.8401	55.84
2001	LG28	71.02	68.2877	68.288
2002	LG28	173.44	30.4736	30.474
2003	LG28	231.36	26.7525	26.752
2004	LG28	400.49	26.3243	26.324
2005	LG28	368.77	*	*
1995	MR29	99.99	-1.6874	-1.687
1996	MR29	41.28	-1.0832	-1.083
1997	MR29	86.9	-0.0855	-0.086
1998	MR29	66.85	0.0889	0.089
1999	MR29	49.01	-0.071	-0.071
2000	MR29	55.36	-0.1976	-0.198
2001	MR29	55.52	-0.1461	-0.146
2002	MR29	66.72	-0.1844	-0.184
2003	MR29	91.37	-0.134	-0.134
2004	MR29	156.59	-0.1838	-0.184
2005	MR29	294.36	-0.0717	-0.072
1995	MO30	14.51	-0.3359	-0.341
1996	MO30	15.16	*	*
1997	MO30	14.06	-3.5278	-3.528
1998	MO30	32.8	-1.7666	-1.767
1999	MO30	17.61	-3.457	-3.457
2000	MO30	52.05	-2.2353	-2.235
2001	MO30	34.02	-0.765	-0.765
2002	MO30	34.8	-0.8961	-0.896
2003	MO30	104.79	-0.2102	-0.21
2004	MO30	325.9	-0.0747	-0.075
2005	MO30	316.02	-0.0794	-0.079
1995	NT31	29.94	-0.3637	-0.364
1996	NT31	63.15	-0.2501	-0.25
1997	NT31	68.14	-1.2938	-1.294
1998	NT31	310.03	*	*
1999	NT31	175.19	0.003	0.003
2000	NT31	189.24	0.0131	0.013
2001	NT31	167.29	0.0245	0.024
2002	NT31	157.31	-0.0169	-0.017
2003	NT31	143.33	0.0344	0.034
2004	NT31	177.46	0.0349	0.035
2005	NT31	140.16	0.0273	0.027
1995	NK32	3.62	2.1514	2.151
1996	NK32	13.23	1.2355	1.235
1997	NK32	23.31	0.2575	0.258
1998	NK32	43.96	0.4832	0.483
1999	NK32	33.11	0.2649	0.265
2000	NK32	180.44	*	*
2001	NK32	271.46	-0.0039	-0.004
2002	NK32	118.33	-0.0109	-0.011

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
2003	NK32	151.95	-0.0029	-0.003
2004	NK32	267.78	0.0006	0.001
2005	NK32	307.12	0.0055	0.006
1995	ON33	*	2.1869	2.187
1996	ON33	12.89	0.5959	0.596
1997	ON33	11.67	1.2305	1.231
1998	ON33	15.28	1.1268	1.127
1999	ON33	16.89	4.4286	4.429
2000	ON33	132.99	0.9209	0.921
2001	ON33	35.48	1.7004	1.7
2002	ON33	30.56	1.6899	1.69
2003	ON33	91.9	0.9913	0.991
2004	ON33	253.45	*	*
2005	ON33	278.31	-0.026	-0.026
1995	PA34	79.55	-1.0476	-1.048
1996	PA34	66.06	-1.336	-1.336
1997	PA34	59.21	-2.1805	-2.181
1998	PA34	73.69	-4.7646	-4.765
1999	PA34	66.53	-12.5032	-12.503
2000	PA34	270.59	-8.1225	-8.122
2001	PA34	46.21	-2.4282	-2.428
2002	PA34	32.64	-2.6687	-2.669
2003	PA34	241.24	-1.4765	-1.476
2004	PA34	393.17	-3.2098	-3.21
2005	PA34	50.18	-2.5378	-2.538
1995	VR35	47.79	-0.0868	-0.087
1996	VR35	40.05	-0.0601	-0.06
1997	VR35	68.85	-0.0638	-0.064
1998	VR35	167.67	-0.031	-0.031
1999	VR35	123.96	*	*
2000	VR35	135.7	-0.0055	-0.005
2001	VR35	194.81	-0.0046	-0.005
2002	VR35	256.99	-0.0053	-0.005
2003	VR35	241.48	-0.0024	-0.002
2004	VR35	208.14	-0.003	-0.003
2005	VR35	188.39	-0.0052	-0.005
1995	VR36	17.3	0.051	0.051
1996	VR36	35.34	-0.119	-0.119
1997	VR36	75.41	-0.0626	-0.063
1998	VR36	59.55	-0.0825	-0.082
1999	VR36	48.22	-0.0126	-0.013
2000	VR36	294.88	-0.023	-0.023
2001	VR36	262.13	*	*
2002	VR36	206.85	-0.0132	-0.013
2003	VR36	190.74	-0.0047	-0.005
2004	VR36	188.26	-0.0214	-0.021
2005	VR36	326.45	-0.0285	-0.029
1995	VV37	17.89	-0.0054	-0.005
1996	VV37	42.73	0.1076	0.108
1997	VV37	440.34	0.1347	0.135
1998	VV37	294.3	1.4077	1.408

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
1999	VV37	166.7	0.5637	0.564
2000	VV37	171.09	3.6225	3.623
2001	VV37	44.56	4.7132	4.713
2002	VV37	65.38	5.4149	5.415
2003	VV37	40.21	-6.2533	-6.253
2004	VV37	65.04	0.8521	0.852
2005	VV37	49.88	*	*
1995	WP38	66.25	0.2091	0.209
1996	WP38	110.77	0.2072	0.207
1997	WP38	184.37	0.1509	0.151
1998	WP38	93.59	-0.329	-0.329
1999	WP38	215.18	0.0825	0.082
2000	WP38	219.27	0.035	0.035
2001	WP38	254.18	0.0254	0.025
2002	WP38	192.67	-0.0506	-0.051
2003	WP38	313.04	-0.0169	-0.017
2004	WP38	321.51	-0.0523	-0.052
2005	WP38	236.46	-0.0611	-0.061
1995	AB39	51.65	-0.5949	-6.08
1996	AB39	36.18	-0.4404	-9.107
1997	AB39	56.08	-0.417	-0.874
1998	AB39	126.54	-0.5879	-0.505
1999	AB39	140.32	-0.3839	-0.28
2000	AB39	170.66	-0.4997	-0.269
2001	AB39	247.7	-0.2534	-0.228
2002	AB39	22.01	0.4586	0.443
2003	AB39	88.76	0.0995	0.109
2004	AB39	57.62	0.1405	0.142
2005	AB39	392.8	*	*
1995	AL40	9.39	0.0296	0.036
1996	AL40	15.67	-0.0187	-0.024
1997	AL40	12.92	0.0276	0.035
1998	AL40	26.11	0.0266	0.04
1999	AL40	47.76	0.0319	0.05
2000	AL40	117.69	0.0345	0.062
2001	AL40	125.4	-0.0159	-0.039
2002	AL40	129.43	-0.0434	-0.081
2003	AL40	93.72	0.0059	0.011
2004	AL40	112.1	-0.1571	-0.235
2005	AL40	159.55	0.0824	0.242
1995	AL41	20.21	-0.2275	0
1996	AL41	38.99	-0.4674	0
1997	AL41	29.07	-0.7583	0
1998	AL41	66.96	-0.953	0
1999	AL41	34.32	-0.7277	-18.217
2000	AL41	38.01	-0.7147	0
2001	AL41	15.27	-0.8753	0
2002	AL41	12.58	-0.9326	0
2003	AL41	118.16	-0.8372	0
2004	AL41	70.83	-1.1993	0
2005	AL41	67.52	-1.7686	0

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
1995	AM42	30.2	-0.4725	-1.717
1996	AM42	52.66	-0.5139	-1.056
1997	AM42	80.76	-0.8361	-1.282
1998	AM42	89.51	-2.7152	-3.147
1999	AM42	87.44	-1.1567	0
2000	AM42	86.21	-0.4859	0
2001	AM42	156.27	-1.1329	0
2002	AM42	158.08	-0.6514	-8.193
2003	AM42	232.07	-0.3948	-1.434
2004	AM42	227.77	-0.4392	-4.586
2005	AM42	696.6	-0.3641	-1.472
1995	AV43	53.28	-0.9288	0
1996	AV43	65.05	-0.2683	-1.99
1997	AV43	53.86	-0.7063	-16.582
1998	AV43	48.37	-1.0732	0
1999	AV43	82.36	-4.8305	0
2000	AV43	119.32	-0.0247	-0.057
2001	AV43	42.84	0.0085	0.018
2002	AV43	34.51	-0.5042	-1.158
2003	AV43	69.3	-0.7838	-9.525
2004	AV43	140.22	-0.7529	-7.844
2005	AV43	117.16	-0.7394	-1.834
1995	AV44	21.98	-0.4458	-2.086
1996	AV44	40.64	-0.6266	-9.634
1997	AV44	34.66	-1.3337	-11.017
1998	AV44	39.24	-2.287	-24.093
1999	AV44	33.24	-0.5689	-7.642
2000	AV44	126.04	-0.3458	-28.921
2001	AV44	118.19	-0.4253	-6.791
2002	AV44	85.85	-0.3926	-2.061
2003	AV44	151.12	-0.4047	-2.737
2004	AV44	123.54	-0.2882	-2.716
2005	AV44	89.76	-0.4966	-5.858
1995	BO45	71.11	0.0439	0.058
1996	BO45	70.67	0.0319	0.043
1997	BO45	49.33	0.0178	0.026
1998	BO45	62.11	0.0072	0.011
1999	BO45	105.34	0.1359	0.253
2000	BO45	138.08	0.027	0.047
2001	BO45	122.04	0.0071	0.012
2002	BO45	164.82	0.0249	0.04
2003	BO45	125.34	0.0417	0.062
2004	BO45	119.28	0.0528	0.071
2005	BO45	150.7	*	*
1995	CB46	*	-0.766	-4.252
1996	CB46	0.9	-0.162	-0.762
1997	CB46	8.06	-0.3355	-2.663
1998	CB46	6.96	-0.5112	-7.258
1999	CB46	45.5	-0.5897	-3.329
2000	CB46	107.79	-0.2291	-8.487
2001	CB46	116.88	-0.2219	-4.854

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
2002	CB46	115.55	-0.372	-7.172
2003	CB46	123.59	-0.5167	-30.914
2004	CB46	149.46	-0.3544	-1.124
2005	CB46	164.42	-0.1461	-0.264
1995	DO47	0.79	-0.8264	0
1996	DO47	7.16	-1.568	0
1997	DO47	0.32	-0.1701	0
1998	DO47	0.52	-1.3451	0
1999	DO47	3.33	-0.8091	0
2000	DO47	10.77	-0.3511	0
2001	DO47	2.83	-1.3252	0
2002	DO47	5.83	-0.851	0
2003	DO47	26.98	-0.8464	-66.125
2004	DO47	120.79	-1.1578	-5.87
2005	DO47	58.73	-1.4006	-1.532
1995	EN48	*	-0.7596	-10.859
1996	EN48	8.53	-0.0881	-1.03
1997	EN48	13.04	-0.1367	-1.374
1998	EN48	107.26	-0.3414	-2.618
1999	EN48	57.66	-1.1586	-7.349
2000	EN48	91.45	-1.5533	-13.294
2001	EN48	41.98	-0.937	-23.285
2002	EN48	41.91	-1.4031	-33.068
2003	EN48	210.52	-0.4854	-12.335
2004	EN48	107.92	-0.3203	-24.745
2005	EN48	97.95	-0.4477	-2.755
1995	FL49	*	-1.7176	-2.385
1996	FL49	7.41	-0.2294	-1.392
1997	FL49	3.37	-0.318	-0.899
1998	FL49	5.91	-0.3085	-0.82
1999	FL49	5.93	-0.4484	-0.606
2000	FL49	38.65	-0.4646	-0.868
2001	FL49	10	-0.1582	-0.219
2002	FL49	11.57	0.1304	0.163
2003	FL49	204.37	-0.0274	-0.139
2004	FL49	141.32	0.0858	0.226
2005	FL49	53.71	-0.2202	-1.16
1995	ID50	53.63	0.0688	0.114
1996	ID50	77.48	0.0873	0.122
1997	ID50	190.08	-0.056	-0.08
1998	ID50	79.48	-0.039	-0.048
1999	ID50	79.77	0.0905	0.091
2000	ID50	80.23	0.1091	0.1
2001	ID50	75.19	0.1008	0.097
2002	ID50	71.1	0.1089	0.11
2003	ID50	75.19	0.1094	0.12
2004	ID50	65.51	0.1523	0.143
1995	IM51	25.16	-1.1648	0
1996	IM51	42.22	-2.2233	-45.048
1997	IM51	44.1	-1.4299	-21.619
1998	IM51	42.55	-1.2942	-24.548

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
1999	IM51	54.35	-0.569	-1.2
2000	IM51	185.78	-0.0124	-0.021
2001	IM51	108.69	-0.0961	-3.413
2002	IM51	77.65	-0.0961	-2.488
2003	IM51	41.83	-0.1693	-2.619
2004	IM51	56.18	-0.0483	-0.228
2005	IM51	53.09	-0.0994	-0.307
1995	ID52	49.76	-0.4792	-5.197
1996	ID52	114.69	-0.1501	-1.244
1997	ID52	133.09	-0.3613	-0.814
1998	ID52	76.06	-0.8946	-10.78
1999	ID52	65.55	-1.4174	-23.6
2000	ID52	129.17	0.4262	0.719
2001	ID52	98.4	-0.0427	-0.098
2002	ID52	99.68	-0.4004	-3.989
2003	ID52	103.01	-0.3532	-6.059
2004	ID52	182.52	-0.3924	-3.642
2005	ID52	114.22	-0.4729	-1.596
1995	IS53	41.8	-0.2381	-1.828
1996	IS53	64.47	-0.2618	-1.175
1997	IS53	39.77	-0.2636	-0.957
1998	IS53	53.98	-0.4474	-1.097
1999	IS53	72.42	-0.5744	-1.746
2000	IS53	130.91	-0.2919	-1.436
2001	IS53	103.38	-0.177	-1.386
2002	IS53	160.38	-0.1647	-0.901
2003	IS53	149.11	-0.2836	-1.9
2004	IS53	130.81	-0.6837	-3.344
2005	IS53	98.28	-0.4352	-1.804
1995	KO54	*	-4.678	0
1996	KO54	*	-9.2061	0
1997	KO54	35.7	-0.3551	0
1998	KO54	34.47	-3.6699	-6.071
1999	KO54	14.65	-2.0773	-1.501
2000	KO54	29.24	-1.1895	-0.586
2001	KO54	39.18	0.0288	0.026
2002	KO54	42.84	-0.2998	-0.121
2003	KO54	92.64	0.176	0.21
2004	KO54	101.59	0.2425	0.286
2005	KO54	166.73	0.1298	0.157
1995	MA55	19.2	0	0
1996	MA55	24.8	-0.3896	-24.154
1997	MA55	41.54	-0.1393	-29.75
1998	MA55	62.96	-0.225	-17.286
1999	MA55	47.77	-0.4163	-14.761
2000	MA55	43.25	-0.5423	-15.476
2001	MA55	62.1	-0.6752	-14.855
2002	MA55	20.65	-0.7423	-188
2003	MA55	41.19	-0.6861	-5.604
2004	MA55	52.88	-1.1646	0
2005	MA55	112.38	-1.5238	0

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
1995	NO56	26.8	-0.1353	-0.63
1996	NO56	42.43	-0.0448	-0.097
1997	NO56	28.82	-0.2501	-0.67
1998	NO56	18.4	-0.1016	-0.251
1999	NO56	27.6	0.1839	0.33
2000	NO56	103.99	0.1887	0.457
2001	NO56	104.28	0.0887	0.263
2002	NO56	77.2	0.1008	0.251
2003	NO56	74.71	0.0661	0.259
2004	NO56	66.6	0.0556	0.244
2005	NO56	81.56	0.0536	0.213
1995	PR57	16.86	0.0067	0.009
1996	PR57	13.88	-0.0976	-0.143
1997	PR57	11.22	-0.1224	-0.167
1998	PR57	19.64	-0.1161	-0.159
1999	PR57	13.06	-0.0214	-0.022
2000	PR57	11.57	-0.0104	-0.011
2001	PR57	78.48	0.2486	0.199
2002	PR57	98.45	0.2636	0.208
2003	PR57	160.38	0.1606	0.185
2004	PR57	210.65	0.038	0.042
2005	PR57	191.05	-0.0105	-0.019
1995	PR58	106.71	0.0799	0.062
1996	PR58	85.07	0.0725	0.051
1997	PR58	98.87	0.0792	0.053
1998	PR58	92.19	-0.0867	-0.057
1999	PR58	59.14	0.0025	0.002
2000	PR58	83.16	0.0397	0.026
2001	PR58	147.17	0.048	0.037
2002	PR58	119.46	0.0845	0.061
2003	PR58	81.18	0.0839	0.065
2004	PR58	108.91	0.1061	0.09
2005	PR58	151.7	-0.207	-0.345
1995	RE59	48.78	-0.2506	-0.964
1996	RE59	54.17	-0.2356	-1.642
1997	RE59	40.24	-0.0688	-0.431
1998	RE59	20.74	-0.055	-0.225
1999	RE59	18.11	-0.1684	-0.669
2000	RE59	72.52	-0.1115	-0.392
2001	RE59	61.01	-0.1538	-3.467
2002	RE59	110.34	-0.3176	-5.656
2003	RE59	229.26	-0.2241	-1.869
2004	RE59	102.54	0.0881	0.24
2005	RE59	99.29	-0.2254	-1.442
1995	SC60	37.75	-0.2729	-54.741
1996	SC60	70.37	-0.3452	-21.071
1997	SC60	37.78	-0.7292	-6.306
1998	SC60	42.23	-1.7962	-5.649
1999	SC60	53.95	-0.4169	-0.582
2000	SC60	159.39	-0.0476	-0.112
2001	SC60	30.83	-0.1941	-0.45

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
2002	SC60	28.48	-0.2705	-0.565
2003	SC60	83.31	-0.063	-0.162
2004	SC60	60.31	-0.1905	-0.544
2005	SC60	120.1	-0.1295	-0.272
1995	TA61	5.79	0.041	0.041
1996	TA61	6.8	0.0356	0.039
1997	TA61	13.77	0.0193	0.023
1998	TA61	8.62	0.0308	0.034
1999	TA61	18.71	0.0609	0.066
2000	TA61	30.46	0.0833	0.097
2001	TA61	173.35	0.0844	0.173
2002	TA61	130.15	0.1173	0.211
2003	TA61	91.7	0.0992	0.194
2004	TA61	159.19	0.0159	0.039
2005	TA61	119.05	0	0
1995	TG62	17.16	0.1049	0.225
1996	TG62	47.33	0.1431	0.274
1997	TG62	56.26	0.1335	0.387
1998	TG62	112.61	0.1588	0.369
1999	TG62	68.97	0.1482	0.366
2000	TG62	44.08	0.1429	0.425
2001	TG62	30.98	0.1051	0.303
2002	TG62	24.64	0.0367	0.133
2003	TG62	23.88	-0.002	-0.009
2004	TG62	24.51	-0.029	-0.129
2005	TG62	20.84	-0.2377	-0.655
1995	US63	0.91	0.2271	0.094
1996	US63	2	0.2391	0.089
1997	US63	2.34	0.2495	0.077
1998	US63	12.06	0.2377	0.078
1999	US63	7.64	0.1605	0.046
2000	US63	6.82	0.0809	0.023
2001	US63	1.84	0.0622	0.019
2002	US63	11.48	0.2173	0.064
2003	US63	101.29	0.3197	0.104
2004	US63	64.7	0.4295	0.113
2005	US63	62.85	0.529	0.119
1995	BD64	20.75	-0.2572	-0.652
1996	BD64	10.99	0.0773	0.125
1997	BD64	14.11	0.0501	0.061
1998	BD64	23.04	0.0408	0.058
1999	BD64	7.99	0.0249	0.03
2000	BD64	19.64	-0.1189	-0.111
2001	BD64	59.09	0.103	0.14
2002	BD64	45.79	0.1737	0.192
2003	BD64	83.33	0.0827	0.225
2004	BD64	98.9	0.0253	0.082
2005	BD64	64.45	0.0269	0.06
1995	CH65	2.37	0.1435	0.119

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
1996	CH65	6.83	0.0215	0.028
1997	CH65	8.72	0.033	0.041
1998	CH65	18.85	0.0414	0.069
1999	CH65	21.61	0.041	0.068
2000	CH65	23.12	-0.0041	-0.006
2001	CH65	6.24	0.0512	0.077
2002	CH65	28.07	0.0282	0.045
2003	CH65	56.3	0.0643	0.1
2004	CH65	41.76	0.0043	0.006
2005	CH65	71.56	0.0979	0.129
1995	CB66	40.73	-0.1248	-0.097
1996	CB66	32.45	-1.3106	-2.315
1997	CB66	52.53	0.0507	0.032
1998	CB66	51.53	-1.1667	-1.374
1999	CB66	42.07	-0.1701	-0.114
2000	CB66	61.63	-0.1675	-0.197
2001	CB66	22.49	-1.8516	-8.568
2002	CB66	24.14	-1.3195	-1.789
2003	CB66	91.8	-0.4979	-0.943
2004	CB66	55.87	-0.8586	-1.407
2005	CB66	26.38	-0.632	-0.422
1995	DE67	*	*	*
1996	DE67	*	-1.4242	-1.469
1997	DE67	0.37	-0.2702	-2.033
1998	DE67	4.73	-0.2704	-3.658
1999	DE67	11.25	-0.7669	-143.417
2000	DE67	6.96	-1.1111	-5.449
2001	DE67	5.04	-2.0114	-4.796
2002	DE67	6.3	-0.5824	-8.133
2003	DE67	21.74	-0.6295	-30.633
2004	DE67	36.02	-1.1749	-134.35
2005	DE67	84.44	-0.3686	-5.549
1995	DR68	14.18	0.069	0.157
1996	DR68	32.03	-0.0024	-0.012
1997	DR68	20.27	-0.3542	-0.899
1998	DR68	16.53	0.0556	0.095
1999	DR68	20.2	-0.094	-0.196
2000	DR68	60.54	-0.0371	-0.083
2001	DR68	15.27	-0.0245	-0.048
2002	DR68	13.77	-0.0226	-0.047
2003	DR68	26.67	0.0976	0.171
2004	DR68	64.99	0.0892	0.114
2005	DR68	29.19	0.0812	0.098
1995	DU69	8.57	-0.1752	0
1996	DU69	27.88	-0.3378	0
1997	DU69	24.44	-0.5443	0

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
1998	DU69	26.55	-0.8011	0
1999	DU69	39.98	-0.1964	0
2000	DU69	43.53	-0.0793	-3.085
2001	DU69	31.5	-0.097	-1.365
2002	DU69	20.53	0.0945	0.226
2003	DU69	17.26	-0.3318	-15.289
2004	DU69	50.85	-0.2759	-1.956
2005	DU69	33.81	-0.3544	-1.323
1995	EM70	18.44	-1.0305	-259.333
1996	EM70	39.93	-0.3049	-1.952
1997	EM70	28.38	-0.1984	-1.356
1998	EM70	19.59	-0.1317	-0.445
1999	EM70	32.43	-0.7973	-3.014
2000	EM70	87.4	-0.1172	-4.567
2001	EM70	51.51	-0.3105	-11.951
2002	EM70	66.05	-0.6607	-21.107
2003	EM70	39.17	-0.6793	-112.175
2004	EM70	26.8	-1.0339	-19.241
2005	EM70	25.05	-0.9505	-5.099
1995	HI71	7.62	0.0662	0.068
1996	HI71	4.33	0.0394	0.04
1997	HI71	3.42	0.0805	0.077
1998	HI71	2.55	0.081	0.08
1999	HI71	5.68	0.0654	0.063
2000	HI71	4.21	0.0869	0.08
2001	HI71	8.58	0.1061	0.104
2002	HI71	12.46	0.1307	0.12
2003	HI71	87.12	0.0872	0.116
2004	HI71	20.62	0.1016	0.122
2005	HI71	45.92	*	*
1995	IS72	12.15	-1.6518	-180.286
1996	IS72	30.26	-0.6833	-16.222
1997	IS72	17.2	-0.9308	-196.4
1998	IS72	25.58	-4.1005	-428.5
1999	IS72	18.67	0.1542	0.242
2000	IS72	29.29	-0.172	-0.763
2001	IS72	11.06	-0.8652	-956
2002	IS72	6.5	-5.8556	-273.75
2003	IS72	12.35	-4.7872	-51.923
2004	IS72	22.47	-0.9667	-10.204
2005	IS72	54.76	-2.9961	0
1995	KV73	4.16	0.1385	0.081
1996	KV73	4.05	0.2157	0.154
1997	KV73	5.29	0.1653	0.115
1998	KV73	5.84	0.1824	0.203
1999	KV73	7.17	0.1732	0.167

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
2000	KV73	17.62	0.1561	0.129
2001	KV73	12.81	0.1612	0.154
2002	KV73	20.7	0.0797	0.115
2003	KV73	37.66	0.0868	0.161
2004	KV73	58.04	0.0596	0.11
2005	KV73	72.47	0.0255	0.043
1995	MR74	12.4	-1.04	-22.519
1996	MR74	14.09	-0.2695	-4.483
1997	MR74	24.29	-0.3247	-13.25
1998	MR74	42.89	-1.1785	-2.756
1999	MR74	27.78	-0.6369	-1.527
2000	MR74	43.92	-0.9272	-5.662
2001	MR74	18.49	-1.0142	-3.504
2002	MR74	56.55	-4.2334	-31.92
2003	MR74	16.6	-3.0996	0
2004	MR74	74.74	-2.1172	0
2005	MR74	28.91	*	*
1995	NX75	7.86	0.0203	0.024
1996	NX75	38.15	-0.202	-0.295
1997	NX75	21.61	-0.5341	-0.604
1998	NX75	26.11	0.0506	0.051
1999	NX75	39.2	0.1699	0.207
2000	NX75	70.08	0.1579	0.198
2001	NX75	10.58	0.0275	0.046
2002	NX75	8.04	-0.2139	-0.41
2003	NX75	72.05	-0.5555	-0.99
2004	NX75	60.98	-0.3604	-0.577
2005	NX75	66.3	-0.3577	-0.657
1995	PC76	1.67	-2.9605	-131
1996	PC76	6.3	-0.3293	-27.467
1997	PC76	17.92	-0.2584	-342
1998	PC76	28.55	-0.1326	-2.742
1999	PC76	37.16	-0.3465	-9.436
2000	PC76	43.69	-0.1276	-14.769
2001	PC76	65.86	-0.1921	-9.913
2002	PC76	44.81	-0.3023	0
2003	PC76	27.97	-0.3081	0
2004	PC76	44.04	-0.2787	0
2005	PC76	66.97	-0.4164	0
1995	QS77	64.72	-0.2193	-12.44
1996	QS77	23.64	-0.1524	-1.994
1997	QS77	18.98	-0.3129	-2.64
1998	QS77	7.68	-0.2822	-1.539
1999	QS77	9.26	-0.516	-2.638
2000	QS77	30.31	-0.9192	-3.833
2001	QS77	15.03	-0.5773	-1.534

Year	Company Code	Size	Return on Sales (ROS)	Return on Assets (ROA)
2002	QS77	12.55	-0.2185	-0.19
2003	QS77	20.22	-0.1653	-0.27
2004	QS77	27.53	-0.0295	-0.045
2005	QS77	32.24	0.2357	0.522
1995	RP78	2.3	-0.6451	-1.511
1996	RP78	13.34	-0.6907	-3.136
1997	RP78	68.14	-0.1712	-0.978
1998	RP78	59.81	-0.2101	-1.213
1999	RP78	61.68	-0.2582	-49.792
2000	RP78	30.59	-0.2764	-4.749
2001	RP78	7.57	-0.0228	-0.359
2002	RP78	6.85	-0.1418	-0.855
2003	RP78	9.53	-0.1386	-5.55
2004	RP78	8.35	-0.5598	-30.833
2005	RP78	11.54	-0.418	0
1995	TT79	*	-2.4715	-83.5
1996	TT79	0.69	-0.7856	-49.462
1997	TT79	15.89	0.0231	0.034
1998	TT79	20.3	-0.8675	0
1999	TT79	34.61	-0.2386	-33.235
2000	TT79	60.69	-0.1586	-9.995
2001	TT79	79.14	-0.163	-3.821
2002	TT79	48.67	-0.3711	-9.751
2003	TT79	52.12	-0.6099	-332.111
2004	TT79	52.11	-0.6731	-866.667
2005	TT79	37.19	-1.1378	-249.556
1995	ZI80	17.42	-0.2057	-0.158
1996	ZI80	34.75	-0.069	-0.121
1997	ZI80	35.37	-0.2737	-0.167
1998	ZI80	57.45	0.0329	0.037
1999	ZI80	83.3	-0.0257	-0.028
2000	ZI80	60.45	0.0377	0.038
2001	ZI80	16.83	-0.0824	-0.086
2002	ZI80	15.7	-0.2094	-0.344
2003	ZI80	27.56	0.1056	0.155
2004	ZI80	42.57	-0.0699	-0.088
2005	ZI80	37.11	0.0168	0.025

Table B2
 Percent Change and Overall Average for Return of Sales (ROS) and
 Return on Assets (ROA) by Firm

Company Code	Percent Change		Overall Average	
	ROS	ROA	ROS	ROA
AB1	-0.2036	-1.80134	0.164	0.1421
BV2	-0.6766	-1.25931	0.2	0.1247
BY3	-0.0943	-1.56951	0.178	0.1634
HI4	0.6636	-1.25158	-13.788	-1.8884
CE5	0.9904	0.966147	-4.265	-0.5459
CE6	1.0028	1.002655	-1.071	-0.1869
EL7	-3.9374	-3.51257	-0.224	-0.0503
FR8	1.1854	1.893008	0.187	0.1395
DN9	3.6100	3.25976	0.031	0.0308
JN10	0.3237	0.152824	0.16	0.1494
KG11	-0.1273	-0.11734	0.091	0.0366
LL12	-0.0469	-0.05035	0.204	0.1277
MR13	0.0901	-0.10463	0.199	0.1549
MY14	0.0682	0.234336	0.181	0.1158
PF15	0.0401	-0.19946	0.187	0.1307
SG16	-0.7185	-0.76883	0.145	0.1419
SE17	0.8210	0.28505	-2.49	-0.2425
TE18	0.7670	0.200737	0.119	0.0753
WY19	0.7344	0.425487	0.107	0.0633
AL20	-5.1636	-5.18165	-0.118	-0.1182
AG21	4.5000	4.477541	0.021	0.021
AZ22	0.6519	0.669409	0.036	0.0357
BR23	-0.7541	-0.75409	8.528	8.5284
BL24	0.8028	0.802794	7.687	7.687
CY25	-0.5062	-1.54554	-2.202	-2.2016
GS26	1.0000	-70.5837	-0.176	-0.1763
IC27	17.0505	17.05852	0.343	1.6676
LG28	0.2722	0.27217	37.093	37.0925
MR29	0.7463	0.746318	-0.341	-0.3415
MO30	0.8212	0.821119	-1.335	-1.3348
NT31	1.0544	1.055089	-0.179	-0.1787
NK32	-1.0025	-1.00264	0.438	0.4381
ON33	-0.4487	-0.44857	1.485	1.4845
PA34	0.4357	0.435642	-3.843	-3.8432
VR35	0.9190	0.917071	-0.027	-0.0268
VR36	0.5973	0.597696	-0.032	-0.0316
VV37	2.7783	2.780917	1.056	1.0558
WP38	-1.4875	-1.48488	0.018	0.0182
AB39	1.0117	0.977517	-1.665	-0.2479
AL40	-1.7445	-2.32062	0.009	0.0003
AL41	1.0000	-0.79106	-1.656	-0.8601
AL42	-1.1779	0.476257	-2.081	-0.833
AV43	-0.0954	0.644964	-2.081	-0.833
AV44	0.6298	0.61851	-3.543	-0.964
BO45	-0.4066	-0.3515	0.062	0.039

Company Code	Percent Change		Overall Average	
	ROS	ROA	ROS	ROA
CB46	-1.4271	0.318601	-6.462	-0.3822
DO47	0.0000	-0.18274	-6.684	-0.9682
EN48	-3.1407	-0.44643	-12.065	-0.6938
FL49	0.8150	0.937258	-0.736	-0.3342
ID50	1.9799	3.161609	0.081	0.0811
IM51	0.9020	0.923786	-9.226	-0.6548
ID52	0.6305	0.496881	-5.118	-0.4126
IS53	-0.3722	0.023021	-1.598	-0.3474
KO54	1.0737	1.013874	-0.691	-1.8999
MA55	-1.4253	-3.09503	-30.989	-0.6505
NO56	1.9332	2.048577	0.034	0.0187
PR57	2.2759	2.996294	0.011	0.0308
PR58	-1.8288	-0.21642	0.004	0.0275
RE59	-2.1020	-0.06989	-1.502	-0.1566
SC60	0.9774	0.761937	-8.223	-0.4051
TA61	2.0394	0.688699	0.083	0.0534
TG62	-1.2202	1.184314	0.153	0.064
US63	0.0911	0.39842	0.075	0.2502
BD64	2.8492	7.421217	0.019	0.0208
CH65	0.0985	-0.12304	0.061	0.0475
CB66	-2.3943	-0.89587	-1.563	-0.7317
DE67	-0.1758	-0.24045	-33.949	-0.861
DR68	1.3368	1.677607	-0.059	-0.0129
DU69	0.0000	0.530563	-2.072	-0.2817
EM70	0.3647	-0.47592	-40.022	-0.565
HI71	1.1121	0.541353	0.087	0.0845
IS72	-0.5732	-1.14509	-192.164	-2.0777
KV73	-0.1903	-0.52828	0.13	0.1313
MR74	0.0774	-2.3023	-8.562	-1.4841
NX75	-3.1945	-1.94771	-0.273	-0.1634
PC76	0.9807	0.628138	-48.848	-0.5139
QS77	0.9286	0.490896	-2.418	-0.287
RP78	0.3361	0.351491	-8.998	-0.3211
TT79	-7.7980	0.319163	-148.915	-0.6776
ZI80	0.2265	0.557834	-0.067	-0.0675

Table B3
 Survey Scores by Question (Q) for First Quartile Overall Average
 Financial Performance

Company	Q1	Q2	Q3	Q4	Q5	Q6	Q7
1	3	5	6	4	5	4	6
	*	*	*	*	*	*	*
2	4	4	6	5	5	4	4
	*	*	*	*	*	*	*
3	5	4	5	3	5	5	6
	6	3	5	2	6	3	4
4	2	4	5	1	4	5	4
	3	3	4	4	4	5	3
5	3	2	4	3	3	4	3
	3	1	5	4	5	6	4
6	4	4	4	2	5	3	1
	1	4	4	2	3	3	3

Table B4
 Survey Scores by Question (Q) for Fourth Quartile Overall Average
 Financial Performance

Company	Q1	Q2	Q3	Q4	Q5	Q6	Q7
1	4	5	4	3	5	4	4
	*	*	*	*	*	*	*
2	5	4	4	2	2	1	3
	4	4	5	5	4	5	5
3	6	5	5	4	5	4	5
	3	5	6	4	5	4	6
4	2	2	2	1	3	1	1
	*	*	*	*	*	*	*
5	6	3	5	2	6	3	4
	4	2	2	1	5	1	2
6	3	6	6	2	4	6	6
	*	*	*	*	*	*	*
7	4	5	6	4	6	1	5
	6	5	5	4	5	4	5

Table B5
Survey Scores by Question (Q) for First Quartile Change in
Financial Performance

Company	Q1	Q2	Q3	Q4	Q5	Q6	Q7
1	3	2	2	1	3	2	3
	*	*	*	*	*	*	*
2	4	4	5	5	4	5	5
	5	4	4	2	2	1	3
3	4	5	5	5	4	3	4
	4	5	6	4	6	1	5
4	4	4	4	3	4	3	5
	3	4	3	3	4	4	4
5	4	4	2	3	4	3	3
	*	*	*	*	*	*	*
6	2	4	5	1	4	5	4
	5	4	4	2	2	1	3

Table B6
Survey Scores by Question (Q) for Fourth Quartile Change in
Financial Performance

Company	Q1	Q2	Q3	Q4	Q5	Q6	Q7
1	4	4	5	3	5	5	6
	6	3	5	2	6	3	4
2	4	4	5	5	4	5	5
	5	4	5	3	5	5	6
3	3	5	6	4	5	4	6
	6	5	5	4	5	4	5
4	4	5	5	3	3	3	4
	5	4	5	3	4	5	6
5	5	4	5	3	4	5	6
	4	5	5	3	3	3	4
6	4	4	4	2	5	3	1
	1	4	4	2	3	3	3

Appendix C

Minitab Output for Data Analysis

Regression Analysis: ROA versus size

The regression equation is
 ROA = 0.392 - 0.000115 size

847 cases used, 33 cases contain missing values

Predictor	Coef	SE Coef	T	P
Constant	0.3919	0.1770	2.21	0.027
size	-0.0001149	0.0002929	-0.39	0.695

S = 4.71168 R-Sq = 0.0% R-Sq(adj) = 0.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	3.42	3.42	0.15	0.695
Residual Error	845	18758.93	22.20		
Total	846	18762.35			

Regression Analysis: ROS versus size

The regression equation is
 ROS = - 8.35 + 0.00506 size

847 cases used, 33 cases contain missing values

Predictor	Coef	SE Coef	T	P
Constant	-8.347	2.030	-4.11	0.000
size	0.005058	0.003360	1.51	0.133

S = 54.0561 R-Sq = 0.3% R-Sq(adj) = 0.1%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	6621	6621	2.27	0.133
Residual Error	845	2469141	2922		
Total	846	2475762			

Descriptive Statistics: % DIFF ROS, % DIFF ROA

Variable	Total Count	N*	Q1	Q3
% DIFF ROS	80	0	-0.492	0.980
% DIFF ROA	80	0	-0.515	0.817

Descriptive Statistics: AVE ROA, AVE ROS

Variable	Total Count	N*	Q1	Q3
AVE ROA	80	0	-0.538	0.084
AVE ROS	80	0	-2.36	0.12

Two-Sample T-Test and CI: Q1 A, Q4 A (First Quartile Average vs. Fourth Quartile Average)

Two-sample T for Q1 A vs Q4 A

	N	Mean	StDev	SE Mean
Q1 A	70	3.87	1.28	0.15
Q4 A	77	3.96	1.53	0.17

Difference = mu (Q1 A) - mu (Q4 A)

Estimate for difference: -0.089610

95% CI for difference: (-0.553376, 0.374156)

T-Test of difference = 0 (vs not =): T-Value = -0.38 P-Value = 0.703 DF = 145

Both use Pooled StDev = 1.4208

Two-Sample T-Test and CI: Q4 D, Q1 D (First Quartile % Diff. vs. Fourth Quartile % Diff.)

Two-sample T for Q4 D vs Q1 D

	N	Mean	StDev	SE Mean
Q4 D	84	4.21	1.14	0.12
Q1 D	70	3.59	1.23	0.15

Difference = mu (Q4 D) - mu (Q1 D)

Estimate for difference: 0.628571

95% CI for difference: (0.249963, 1.007180)

T-Test of difference = 0 (vs not =): T-Value = 3.28 P-Value = 0.001 DF = 152

Both use Pooled StDev = 1.1841

Two-Sample T-Test and CI: Q11 D, Q41 D (Question 1)

Two-sample T for Q11 D vs Q41 D

	N	Mean	StDev	SE Mean
Q11 D	10	3.800	0.919	0.29
Q41 D	12	4.25	1.36	0.39

Difference = mu (Q11 D) - mu (Q41 D)

Estimate for difference: -0.450000

95% CI for difference: (-1.503962, 0.603962)

T-Test of difference = 0 (vs not =): T-Value = -0.89 P-Value = 0.384 DF = 20

Both use Pooled StDev = 1.1800

Two-Sample T-Test and CI: Q12 D, Q42 D (Question 2)

Two-sample T for Q12 D vs Q42 D

	N	Mean	StDev	SE Mean
Q12 D	10	4.000	0.816	0.26
Q42 D	12	4.250	0.622	0.18

Difference = mu (Q12 D) - mu (Q42 D)
 Estimate for difference: -0.250000
 95% CI for difference: (-0.889403, 0.389403)
 T-Test of difference = 0 (vs not =): T-Value = -0.82 P-Value = 0.424 DF = 20
 Both use Pooled StDev = 0.7159

Two-Sample T-Test and CI: Q13 D, Q43 D (Question 3)

Two-sample T for Q13 D vs Q43 D

	N	Mean	StDev	SE Mean
Q13 D	10	4.00	1.33	0.42
Q43 D	12	4.917	0.515	0.15

Difference = mu (Q13 D) - mu (Q43 D)
 Estimate for difference: -0.916667
 95% CI for difference: (-1.785296, -0.048037)
 T-Test of difference = 0 (vs not =): T-Value = -2.20 P-Value = 0.040 DF = 20
 Both use Pooled StDev = 0.9725

Two-Sample T-Test and CI: Q14 D, Q44 D (Question 4)

Two-sample T for Q14 D vs Q44 D

	N	Mean	StDev	SE Mean
Q14 D	10	2.90	1.45	0.46
Q44 D	12	3.083	0.900	0.26

Difference = mu (Q14 D) - mu (Q44 D)
 Estimate for difference: -0.183333
 95% CI for difference: (-1.236665, 0.869998)
 T-Test of difference = 0 (vs not =): T-Value = -0.36 P-Value = 0.720 DF = 20
 Both use Pooled StDev = 1.1793

Two-Sample T-Test and CI: Q15 D, Q45 D (Question 5)

Two-sample T for Q15 D vs Q45 D

	N	Mean	StDev	SE Mean
Q15 D	10	3.70	1.16	0.37
Q45 D	12	4.333	0.985	0.28

Difference = μ (Q15 D) - μ (Q45 D)

Estimate for difference: -0.633333

95% CI for difference: (-1.586266, 0.319599)

T-Test of difference = 0 (vs not =): T-Value = -1.39 P-Value = 0.181 DF = 20

Both use Pooled StDev = 1.0669

Two-Sample T-Test and CI: Q16 D, Q46 D (Question 6)

Two-sample T for Q16 D vs Q46 D

	N	Mean	StDev	SE Mean
Q16 D	10	2.80	1.55	0.49
Q46 D	12	4.000	0.953	0.28

Difference = μ (Q16 D) - μ (Q46 D)

Estimate for difference: -1.20000

95% CI for difference: (-2.32268, -0.07732)

T-Test of difference = 0 (vs not =): T-Value = -2.23 P-Value = 0.037 DF = 20

Both use Pooled StDev = 1.2570

Two-Sample T-Test and CI: Q17 D, Q47 D (Question 7)

Two-sample T for Q17 D vs Q47 D

	N	Mean	StDev	SE Mean
Q17 D	10	3.900	0.876	0.28
Q47 D	12	4.67	1.56	0.45

Difference = μ (Q17 D) - μ (Q47 D)

Estimate for difference: -0.766667

95% CI for difference: (-1.923755, 0.390422)

T-Test of difference = 0 (vs not =): T-Value = -1.38 P-Value = 0.182 DF = 20

Both use Pooled StDev = 1.2955

Two-Sample T-Test and CI: Q11 A, Q41 A (Question 1)

Two-sample T for Q11 A vs Q41 A

	N	Mean	StDev	SE Mean
Q11 A	10	3.40	1.43	0.45
Q41 A	11	4.27	1.35	0.41

Difference = mu (Q11 A) - mu (Q41 A)

Estimate for difference: -0.872727

95% CI for difference: (-2.141674, 0.396219)

T-Test of difference = 0 (vs not =): T-Value = -1.44 P-Value = 0.166 DF = 19

Both use Pooled StDev = 1.3876

Two-Sample T-Test and CI: Q12 A, Q42 A (Question 2)

Two-sample T for Q12 A vs Q42 A

	N	Mean	StDev	SE Mean
Q12 A	10	3.40	1.17	0.37
Q42 A	11	4.18	1.33	0.40

Difference = mu (Q12 A) - mu (Q42 A)

Estimate for difference: -0.781818

95% CI for difference: (-1.931650, 0.368014)

T-Test of difference = 0 (vs not =): T-Value = -1.42 P-Value = 0.171 DF = 19

Both use Pooled StDev = 1.2573

Two-Sample T-Test and CI: Q13 A, Q43 A (Question 3)

Two-sample T for Q13 A vs Q43 A

	N	Mean	StDev	SE Mean
Q13 A	10	4.800	0.789	0.25
Q43 A	11	4.55	1.44	0.43

Difference = mu (Q13 A) - mu (Q43 A)

Estimate for difference: 0.254545

95% CI for difference: (-0.821954, 1.331045)

T-Test of difference = 0 (vs not =): T-Value = 0.49 P-Value = 0.626 DF = 19

Both use Pooled StDev = 1.1771

Two-Sample T-Test and CI: Q14 A, Q44 A (Question 4)

Two-sample T for Q14 A vs Q44 A

	N	Mean	StDev	SE Mean
Q14 A	10	3.00	1.25	0.39
Q44 A	11	2.91	1.38	0.41

Difference = μ (Q14 A) - μ (Q44 A)
 Estimate for difference: 0.090909
 95% CI for difference: (-1.112653, 1.294472)
 T-Test of difference = 0 (vs not =): T-Value = 0.16 P-Value = 0.876 DF = 19
 Both use Pooled StDev = 1.3161

Two-Sample T-Test and CI: Q15 A, Q45 A (Question 5)

Two-sample T for Q15 A vs Q45 A

	N	Mean	StDev	SE Mean
Q15 A	10	4.500	0.972	0.31
Q45 A	11	4.55	1.21	0.37

Difference = μ (Q15 A) - μ (Q45 A)
 Estimate for difference: -0.045455
 95% CI for difference: (-1.056591, 0.965682)
 T-Test of difference = 0 (vs not =): T-Value = -0.09 P-Value = 0.926 DF = 19
 Both use Pooled StDev = 1.1057

Two-Sample T-Test and CI: Q16 A, Q46 A (Question 6)

Two-sample T for Q16 A vs Q46 A

	N	Mean	StDev	SE Mean
Q16 A	10	4.20	1.03	0.33
Q46 A	11	3.09	1.81	0.55

Difference = μ (Q16 A) - μ (Q46 A)
 Estimate for difference: 1.10909
 95% CI for difference: (-0.25880, 2.47698)
 T-Test of difference = 0 (vs not =): T-Value = 1.70 P-Value = 0.106 DF = 19
 Both use Pooled StDev = 1.4958

Two-Sample T-Test and CI: Q17 A, Q47 A (Question 7)

Two-sample T for Q17 A vs Q47 A

	N	Mean	StDev	SE Mean
Q17 A	10	3.80	1.48	0.47
Q47 A	11	4.18	1.60	0.48

Difference = mu (Q17 A) - mu (Q47 A)

Estimate for difference: -0.381818

95% CI for difference: (-1.792908, 1.029271)

T-Test of difference = 0 (vs not =): T-Value = -0.57 P-Value = 0.578 DF = 19

Both use Pooled StDev = 1.5430

Vita

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EDUCATION

- PhD Candidate, Workforce Education and Development, May, 2009*
 - M.S. Workforce Education and Development, 2004*
 - B.S. Secondary Education, 1987* (Certification Biology & Science)
 - A.A. Liberal Arts, 1983*
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Continuing Education / Professional Development Courses:

- Six Sigma Green Belt Training, Motorola University, 2003
- Statistical Control of Manufacturing Processes, 1996
- Auditor / Lead Auditor Training, 1991
- Statistics for Productivity, 1989
- Regulatory Compliance, 1990
- Quality Assurance for the Analytical Lab, 1989
- Pharmaceutical Quality Assurance & Quality Control, 1988

PROFESSIONAL AFFILIATIONS:

- American Society for Quality (ASQ) / ASQ Certified Quality Auditor
- Regulatory Affairs Professionals Society (RAPS)

WORK EXPERIENCE

- Piezo Resonance Innovations, Inc./Director, Quality Assurance & Regulatory Affairs, 2008 – current
- Avail Medical Products / Corporate Director, Quality Assurance & Compliance, 2000 – 2008
- Avail Medical Products / Director, Manufacturing, 1999 – 2000
- Centrex Precision Plastics / Director, Quality Assurance, 1994 – 1999
- Zetachron, Pharmaceuticals / Manager, Quality Assurance, 1989 – 1994
- Zetachron, Pharmaceuticals / Research Scientist, 1988 – 1989
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