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THE EFFECTS OF LEADERSHIP STYLE ON TOTAL QUALITY MANAGEMENT IMPLEMENTATION

by

RHONDA DIANE TURVEY, 1968 -

A DISSERTATION

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ABSTRACT

This research attempted to determine whether one leadership style is preferred throughout the different levels of TQM implementation or whether managers prefer to change styles as the situations (levels) change. The leadership styles of CEOs and other managers were assessed using the Leader Behavior Description Questionnaire (LBDQ). The questionnaires were sent to companies that were involved in either manufacturing, service, education, the public sector, or health care, which had applied for the Missouri Quality Award which is based on the Malcolm Baldrige National Quality Award. The questionnaires were sent back along with the companies' award scores. The scores were used to determine each company's level of TQM implementation (Levels I - IV).

Chi-square analyses were performed to determine if a statistically significant relationship existed between the CEO's leadership style and the level of TQM implementation. The results showed no statistically significant relationship between the variables. However, further analyses using z-tests for significance of a proportion suggested that the coaching style may be preferred among managers at various levels in the organization during Level II, a change from coaching to participating may occur in Level III, and the participating style may be preferred in Level IV. Even though these results were statistically unreliable due to limited and incomplete data, the analyses did show support for a possible relationship between different leadership styles and different levels of TQM implementation, and that it may be appropriate to use more than one leadership style as the organization progresses from the early levels of TQM implementation to the final levels.

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TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

1. INTRODUCTION

Traditional management has been defined as performing the functions of planning, organizing, leading, and controlling organizational resources in order to attain organizational goals. Total Quality Management (TQM) takes this definition one step further, and it defines the organization's goals to be continuous quality improvement and customer satisfaction. But, why are these TQM goals singled out as being so important?

On June 8, 1987, *Business Week* featured a special report entitled "The Push for Quality." The article began as follows:

> Quality. Remember it? American manufacturing has slumped a long way form the glory days of the 1950s and '60s when "Made in the U.S.A." proudly stood for the best that industry could turn out....While the Japanese were developing remarkably higher standards for a whole host of products, from consumer electronics to cars and machine tools, many U.S. managers were smugly dozing at the switch. Now, aside from aerospace and agriculture, there are few markets left where the U.S. carries its own weight in international trade. For American industry, the message is simple: Get better or get beat.

The increase in foreign competition and the development of higher quality foreign products led consumers to expect and to demand high quality and reliable goods and services at a fair price (Evans & Lindsay, 1989). Thus, globalization and higher customer expectations have been two important driving forces in the quality movement.

In order to be competitive, companies must design quality into the entire process. Companies must focus on continuous quality improvement throughout all phases of the organizational process, not just the end product. It is no longer good enough to only inspect out defects or to produce products that "meet specifications." Companies must focus their attention on satisfying the customer's wants and expectations the first time and

every time and on continuously improving their processes. The next question, then, is how does a company implement Total Quality Management?

In order to answer this question, a better understanding of the definition of TQM is required. Japanese Industrial Standard Z8101-1981 states that quality control is "a system of means to economically produce goods and services which satisfy customers' requirements." Many companies have tried to train their employees in statistical quality tools, such as control charts and design of experiments, in order to improve quality. However, the above standard makes it clear that quality is much more than a collection of tools and techniques. It includes a focus on customers, and it includes a "system of means", of which the tools are just one part. W. Edwards Deming, who is credited with being one of the most important contributors to the Japanese quality improvement programs, called TQM a "philosophy of management." Deming stressed the importance of management, especially top management, and of the philosophy that management must develop and implement to achieve quality (Sashkin & Kiser, 1993). One of the most important contributors to successful TQM implementation is top management leadership (Caudron, 1993). Researchers and industry leaders, alike, have discovered the importance of leadership commitment to a TQM program (Chase & Ferderle, 1992). However, very few people have studied the effects of top management's leadership style during TQM implementation.

Since Total Quality Management programs affect the entire organization, the organization must adopt a culture that accepts and supports TQM (Johnson, 1993). Management must create a pattern of shared values and beliefs that is aimed at continuous quality improvement and customer satisfaction, and that encourages the commitment of all

organization members to that end (Sashkin and Kiser, 1993). In order to create this new quality culture, the management must promote and foster organizational change. This change can be very difficult to accomplish (Johnson, 1993; Hollander, 1978). The leaders of a company are important facilitators of this change (Hollander, 1978).

The quality culture is created and shaped only by consistent patterns of actions that are carried out over a long period of time. Policies, plans, and procedures can help define the patterns of beliefs and values and can help guide managers in their efforts to make those beliefs and values part of the organization's culture. However, in the end, only consistent actions will create and shape the quality culture. Defining a philosophy that embodies the quality vision of the organization and then ensuring that the quality vision is reflected in action are the tasks of leadership (Sashkin & Kiser, 1993).

Leadership style is defined as the consistent behavior patterns that leaders use when they are working with and through other people, as perceived by those people (Hersey & Blanchard, 1988). Thus, the leadership style of an organization's leader(s) is an important factor in an organization's efforts to create a quality culture.

The TQM philosophy often emphasizes a delegating leadership style in which management empowers the workers. In other words, management gives the workers the responsibility and the authority to improve quality. However, TQM is a change and a process in which top management must provide leadership from the early levels of TQM implementation to the final, empowered levels where delegation can be a reality (Johnson, 1993).

TQM implementation can be divided into four basic levels. In level one, the employees are gaining awareness about TQM, its philosophies, and their importance in

maintaining competitiveness and satisfying customer expectations. In level two, the employees are trained in the tools and techniques that aid the organization's pursuit of quality. These tools include, but are not limited to, flow charts, statistical process control charts, pareto diagrams, and design of experiments. In level three, the employees are fully trained and begin to use their new tools to understand and improve their processes. In level four, the employees are confident with their new skills and can use them effectively for process improvement (Johnson, 1993).

In order to create the quality culture and to progress through the different levels of TQM implementation, top management must lead the way and display the appropriate actions to foster the development of the quality culture. Leadership style defines the patterns of behaviors and actions that top managers will display to lead the organization through the different stages of TQM implementation.

For the purposes of this research, four leadership styles are defined. The directing leader makes leader and subordinate roles explicit. The leader decides in detail what will be done, how it will be done, and who will do it (high task-orientation) without any concern for establishing good relations with the leader's subordinates (low relationship-orientation). The coaching leader is also high on task-orientation, but tries to maintain a good relationship with their subordinates (high relationship-orientation). The coaching leader treats subordinates with respect, helps subordinates with problems, and obtains subordinates' suggestions and approval on some matters. The participating leader lets subordinates do the work the way they think is best (low task-orientation), but maintains good relations with the subordinates and is available to help the subordinates when they feel they need it (high relationship-orientation). Finally, the delegating leader lets

subordinates do the work the way they think is best (low task-orientation), but without any concern for maintaining good relations with the subordinates (low relationship-orientation.)

The purpose of this research is to determine whether one leadership style is preferred throughout the different levels of TQM implementation or whether managers prefer to change styles as the situations (levels) change? In other words, this paper attempts to determine if a relationship exists between leadership style and TQM implementation level.

2. LITERATURE REVIEW

2.1. MANAGEMENT VS. LEADERSHIP

2.1.1. Management. Management is often defined as "the attainment of organizational goals in an effective and efficient manner through planning, organizing, leading, and controlling organizational resources" (Daft, 1988). First, consider the four management functions. Planning means determining the organization's goals and deciding how best to achieve those goals. When determining the organizational goals, a manager must decide how to develop and deploy the organization's strengths and how to cope with threats and opportunities in the environment. Organizing is concerned with how the organization will accomplish its plan. It includes assigning tasks, grouping tasks into departments, and allocating resources to departments. Leading is the use of influence to motivate employees to achieve the organizational goals. Controlling is concerned with monitoring the organization's progress toward goal attainment against the objectives and standards derived during planning. It includes monitoring employees' activities, keeping the organization on track toward its goals, and making corrections as needed (Daft, 1988; Griffin, 1990; Hampton, 1986).

The other part of the definition of management is the attainment of organizational goals in an effective and efficient manner. This part of the definition is important because it highlights the basic purpose of management. An effective manager is able to produce the desired effect of achieving stated, organizational goals. An efficient manger is able to use various resources, including raw materials, money, and people, wisely and without unnecessary waste in order to achieve organizational goals. A good manager carries out

the four functions of management in both an efficient and effective manner to ensure the attainment of the organization's goals (Daft, 1988; Griffin, 1990).

In order to carry out the functions of management, a manager requires three main types of skills: conceptual, interpersonal, and technical (Daft, 1988; Griffin, 1990). Conceptual skill is the cognitive ability to see the organization as a whole and to see the relationship among its parts. This is important for planning and decision making. Interpersonal skill is the ability to communicate with, understand, motivate, and work effectively with individuals and groups. Technical skills are the skills necessary to accomplish specialized tasks associated with the operation of the organization. According to Mintberg, management activities can be divided into ten roles (Daft, 1988; Griffin, 1990; Hampton, 1986). The first three roles are interpersonal roles. They include figurehead, leader, and liaison. As a figurehead, a manager performs ceremonial and symbolic duties such as greeting visitors and attending ribbon-cutting ceremonies. As a leader, the manger motivates and encourages subordinates to improve productivity. As a liaison, the manager coordinates the activities of groups and maintains information links both inside and outside the organization.

The next three roles are informational roles. They include monitor, disseminator, and spokesperson. As a monitor, the manager must seek and receive information in order to stay abreast of developments both inside and outside the organization. Next, the manager must disseminate this information to other members in the organization. Then, as a spokesperson, the manager is able to transmit information to outsiders through speeches, reports, and memos.

The final four roles are decisional roles. They include entrepreneur, disturbance handler, resource allocator, and negotiator. The entrepreneur develops new ideas. The disturbance handler takes corrective action during disputes and crises, including resolving conflicts among subordinates. As a resource allocator, the manager is involved in scheduling and budgeting in order to distribute available resources. Finally, as a negotiator, the manager represents departmental interests during negotiations with other groups, such as suppliers and labor unions.

According to a study by the Center for Creative Leadership in Greensboro, North Carolina, several management skills are important for managerial success (Daft, 1988). Successful mangers use a diverse number of functional skills rather than relying on a single functional skill. They maintain composure under stress, are able to laugh at themselves, and handle mistakes with poise and grace. They also exhibit strong conceptual and problem-solving skills. They are superb negotiators and can confront both people and problems without offending anyone. More importantly, the successful manager has excellent interpersonal skills. In fact, the most striking difference between successful and unsuccessful managers is the ability to deal with others. Only 25 percent of unsuccessful managers were described as having a good ability with people, whereas 75 percent of the successful managers had the ability to deal with others effectively.

2.1.2. Leadership. Often, management and leadership are used interchangeably. However, as shown in the previous section, there is much more to being a manager than becoming a leader. Leadership is just one function of management. Conversely, one can manage an organization without necessarily being the leader of his/her subordinates. Leadership is not so much a function of status and authority as it is of the quality of the

interaction that takes place between the leader and the followers. It is a process of influence between the leader and the followers, rather than an exertion of power over the subordinates. While a manager has ample organizational resources to make subordinates engage in required behavior, a leader, on the other hand, relies chiefly on personal resources to influence subordinates (Cribbin, 1972).

One important aspect of leadership is leadership style. Leadership style is defined as the consistent behavior patterns that leaders use when they are working with and through other people, as perceived by those people (Hersey & Blanchard, 1988). Thus, leadership style defines "how" a manager leads the subordinates toward organizational goals.

This section discusses three types of leadership theories: Behavioral and Attitudinal Leadership, Situational Leadership, and Transformational Leadership. The developers of the Behavioral and Attitudinal theories assume that leaders exhibit relatively stable patterns of behaviors and attitudes across situations. They also assume that leadership can be described by a two-dimensional focus on task and relationship issues. Situational leadership theories suggest that leaders should alter their leadership styles depending on the situation. Transformational leadership is a contrast to transactional leadership. Transactional leadership is based on an exchange between leader and follower--usually, praise or other rewards in exchange for tasks completed. The leader attempts to motivate the follower by meeting immediate, salient needs. On the other hand, transformational leadership attempts to motivate followers by appealing to higher ideals and moral values, as well as what Maslow called higher-level needs, such as self-actualization and self-esteem.

In order to be an effective leader, a manager must translate all of the leader's leadership knowledge into behavior that the subordinates will find meaningful and acceptable. A manager is a leader when the subordinates allow the manager to influence their thinking, their attitudes, and their behavior. A manager is an effective leader when the subordinates accept the manager, look to the manager for guidance and direction, and perceive the manager as capable of helping them satisfy their needs and aims. More importantly, the effective leader stimulates the subordinates to strive willingly to attain organizational goals (Cribbin, 1972; Hollander, 1978).

2.1.2.1. Behavioral and Attitudinal Styles: In the 1950's, researchers at the University of Michigan and at the Ohio State University developed a leadership model based on two dimensions: initiating structure and consideration. A leader at the high end of the initiating structure dimension is task-oriented. He/she engages in actions such as organizing work, inducing subordinates to follow rules, setting goals, and making leader and subordinate roles explicit (Greenberg & Baron, 1995). This type of leader insists in meeting deadlines, decides in detail what will be done and how it should be done, and establishes clear channels of communication and clear patterns of work organization (Bass, 1990). In contrast, leaders low in this dimension are hesitant about taking initiatives in the group, make suggestions only when members ask for it, and lets members do the work the way they think is best (Bass, 1990).

Leaders at the high end of the consideration dimension are people-oriented. They are concerned with establishing good relations with their subordinates and being liked by them. They engage in actions such as doing favors for subordinates, explaining things to them, and assuring their welfare (Greenberg & Baron, 1995). They express appreciation

for good work, stress the importance of job satisfaction, maintain and strengthen the self-esteem of subordinates by treating them as equals, make special efforts to help subordinates feel at ease, are easy to approach, put subordinates' suggestions into operation, and obtain subordinates' approval on important matters before going ahead (Bass, 1990). In contrast, leaders low on the consideration dimension do not care how they get along with subordinates. The inconsiderate leader criticizes subordinates in public, treats them without considering their feelings, threatens their security, and refuses to accept their suggestions or to explain his/her actions (Bass, 1990).

Both dimensions are independent of each other. Thus, a leader can be high in both dimensions, high in one and low in the other, or low in both dimensions (Greenberg & Baron, 1995). However, there are mixed opinions about which of the four leadership styles is the best.

In 1964, Blake and Mouton drew on the Ohio State Leadership Studies and developed the Managerial Grid shown in Figure 2.1 (Babcock, 1991).

Blake and Mouton define their leadership styles in terms of two dimensions: concern for people and concern for production. Although in theory, a leader's orientation could fall in any of the 81 possible positions in the grid, Blake and Mouton emphasize only five orientations (Blake & Mouton, 1964; Babcock, 1991; Forsyth, 1990). The apathetic, impoverished [1,1] leaders are not interested in either their subordinates' feelings or in the production of results; they are hardly leaders at all. The [1,1] manager's supervisory approach is to assign the subordinates to jobs and to then let them do their work as they see fit. The [9,1] leader is a taskmaster who seeks productivity at any cost. The [9,1] manager feels that it is his/her responsibilities to plan, direct, and control all the

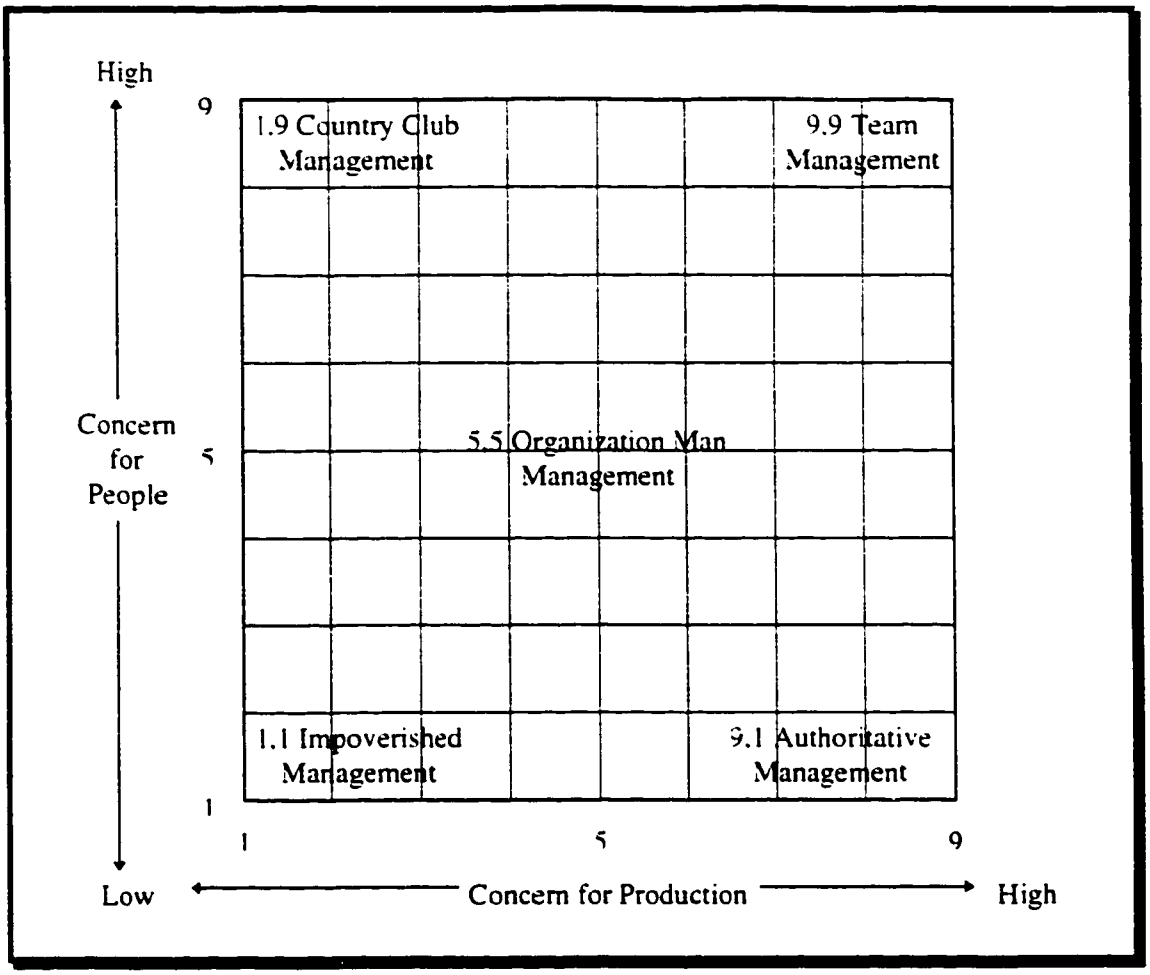


Figure 2.1: Managerial Grid.

activities necessary to reach the production objectives of the organization. The subordinates, on the other hand, only execute the manager's plans. The [1,9] leader, in contrast, makes subordinates feel comfortable, relaxed, and secure while in the group. The [1,9] manager avoids pressuring his/her subordinates for production at a rate higher than that which would win acceptance from them. The "middle-of-the-roader," the [5,5] leader, tries to balance both performance and morale, but sometimes sacrifices both when results and individuals' feelings come into conflict. The [5,5] manager, like the [1,9]

manager, plans, directs, and controls the work activities of his/her subordinates. However, the [5,5] manager also feels that he/she needs to communicate, to get understanding, and to elicit suggestions from the subordinates. Finally, the [9,9] leader values both people and products highly and, therefore, tackles organizational goals through teamwork. The [9,9] manager views his/her responsibility as making sure that planning, directing, and controlling are accomplished soundly. However, he/she does not believe that it is necessary for he/she to plan, direct, and control all of the work him/herself. In general, the [9,9] leader tries to create work conditions where the subordinates understand the problem and have stakes in the outcome and where their ideas make a real contribution to the results.

Blake and Mouton assume that [9,9] "team management" is the most effective leadership style. They also assume that concern for only people [1,9] leads to an enjoyable, but unproductive workplace; that concern for only tasks [9,1] leads to a nonresponsive workforce; and that settling for "adequate" performance and morale [5,5] leads only to mediocrity (Babcock, 1991).

In the 1950's, Fiedler began developing his theory called the Contingency Model (Babcock, 1991; Forsyth, 1990). He believed leadership effectiveness was contingent on both the personal characteristics of the leader and the nature of the group situation. Fiedler defined leaders as either relationship-motivated or task-motivated. Relationship-motivated leaders try to find acceptance within their groups and seek to establish strong interpersonal links with the other members of their groups, while task-motivated leaders concentrate on completing the task as the primary goal of the group. In order for the leader to determine his/her leadership style, the leader had to rate his/her least-preferred

coworker (LPC), who is the one individual with whom he/she was least able to work on a particular task. However, the LPC is not necessarily the person who the leader liked the least (Fiedler, 1967).

Next, Fiedler believed that different leadership situations require different leadership styles. In addition, he proposed that the effectiveness of the leadership style depends on whether the group situation is "favorable" for the leader. Whether the situation is favorable or not is based on three factors: (a) leader/member relations, (b) task structure, and (c) position power (Babcock, 1991). The leader/member relations refer to the quality of the relationship between the leader and the group. Task structure refers to whether the task is clear and straightforward (structured) or ambiguous and vague (unstructured). Position power refers to the leader's power (for example, organizational rank and reward and punishment power) over the other group members. The above three factors combine to create the eight group situations shown in Figure 2.2.

Octant I (good leader-member relations, structured task, and strong position power) is the most favorable situation for the leader, while Octant VIII (poor leader-member relations, unstructured task, and weak position power) is the least favorable situation. Overall, Fiedler found statistical evidence that the task-motivated leader is more effective than the relationship-motivated leader in highly favorable or highly unfavorable situations (Octants I, II, III, and VIII). On the other hand, the relationship-motivated leader is more effective in moderately favorable situations (Octants IV, V, VI, and VII) (Fiedler, 1967).

Fiedler is also a proponent of teaching individuals to recognize the conditions under which they perform best and to modify the situation to suit their leadership style

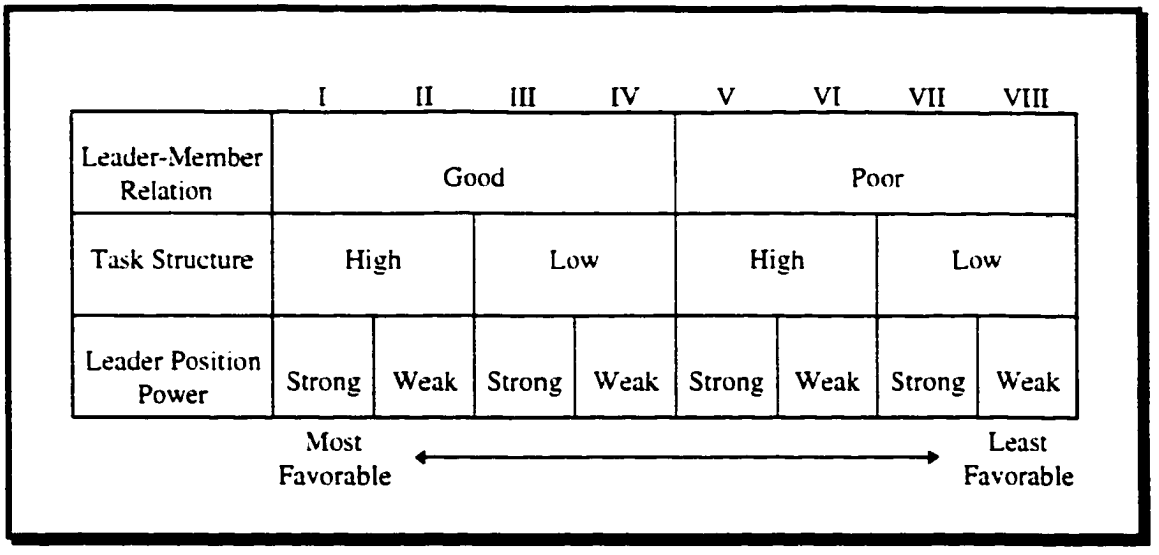


Figure 2.2: Fiedler's Eight Group Situations.

rather than trying to change their leadership style to fit the situation (Fiedler, 1967). Once the leader assesses his/her leadership style and the favorableness of the situation, the organization can modify the leader's situation to fit his/her style in one of several ways. For example, the organization can only assign the leader very structured tasks or tasks that are nebulous and vague. The organization could also change the leader's position power by giving the leader a promotion or by assigning subordinates to the leader who are equal to the leader in organizational rank and prestige or who are two or three ranks below the leader. Finally, the organization can change the leader-member relations by having the leader work with groups whose members are either very similar or very different to the leader in attitude, opinion, technical background, race, and cultural background. The organization can also assign the leader to a group with a tradition of getting along well with their supervisors or to a group with a history of conflict (Fiedler, 1967).

2.1.2.2. Situational Leadership: In 1958, Tannenbaum and Schmidt defined their leadership styles along a continuum (Babcock, 1991). These styles extend from complete retention of power by the manager to complete freedom for the workers. The manager's choice of styles should be dependent on the situation. The continuum consists of the following four styles: autocratic, diplomatic, consultative, and participative. The autocratic manager makes decisions with little or no involvement of the workers. The diplomatic manager does not consult the workers either, but does attempt to persuade the workers to accept the manager's decisions. The consultative manager uses input from the workers in the decision making process. Finally, the participative manager involves the workers completely in decision making and may even delegate the decisions to the workers entirely.

Some researchers feel that Tannenbaum and Schmidt's autocratic leader represents task-oriented behaviors, while the participative leader represents relationship-oriented behaviors. It is generally agreed that leaders who tell their followers what to do and how to do it use the traditional authoritarian style, which emphasizes task concerns. On the other hand, leaders who share their leadership responsibilities with their followers by involving them in the planning and execution of the task use the more nondirective democratic style, which stresses the concern for human relationships (Hersey & Blanchard, 1988).

Tannenbaum and Schmidt proposed that the leader should choose his/her leadership style based on three types of forces: (a) forces in the manager, (b) forces in the subordinate, and (c) forces in the situation (Babcock, 1991). The forces in the manager refer to the leader's value system regarding leadership and his/her own leadership

inclinations, his/her confidence in the subordinates, and his/her feelings of security in an uncertain situation. The forces in the subordinate refer to the subordinates' need for independence, readiness for responsibility, tolerance for ambiguity, interest in the problem, understanding of the organizational goals, knowledge and experience, and expectations to share in decision making. The forces in the situation refer to the type of organization and the amount of delegation common in it, the experience and success the subordinates have had in working together as a group, the nature and complexity of the problem, and the pressure of time.

In 1974, Hersey and Blanchard combined the ideas of Blake and Mouton and Tannenbaum and Schmidt. They developed the two-dimensional grid shown in Figure 2.3 that is based on supportive actions and directive actions (Johnson, 1993).

Directive actions refer to the leader's task-orientation, while supportive actions refer to the leader's relationship-orientation. Hersey named his four leadership styles as follows: telling, selling, participating, and delegating. Blanchard preferred to call the first two styles directing and coaching.

Hersey and Blanchard rejected the notion that one leadership style is the best. This idea is strongly supported by Korman (1966) who studied the relationships between the Ohio State behavior dimensions of Initiating Structure (task-orientation) and Consideration (relationship-orientation). Korman found that Initiating Structure and Consideration had no significant predictive value in terms of effectiveness. Thus, since situations differ, so must leadership style.

Hersey and Blanchard believed that the fit between leadership style and the group members' needs is determined by the readiness of the group (Hersey & Blanchard, 1988).

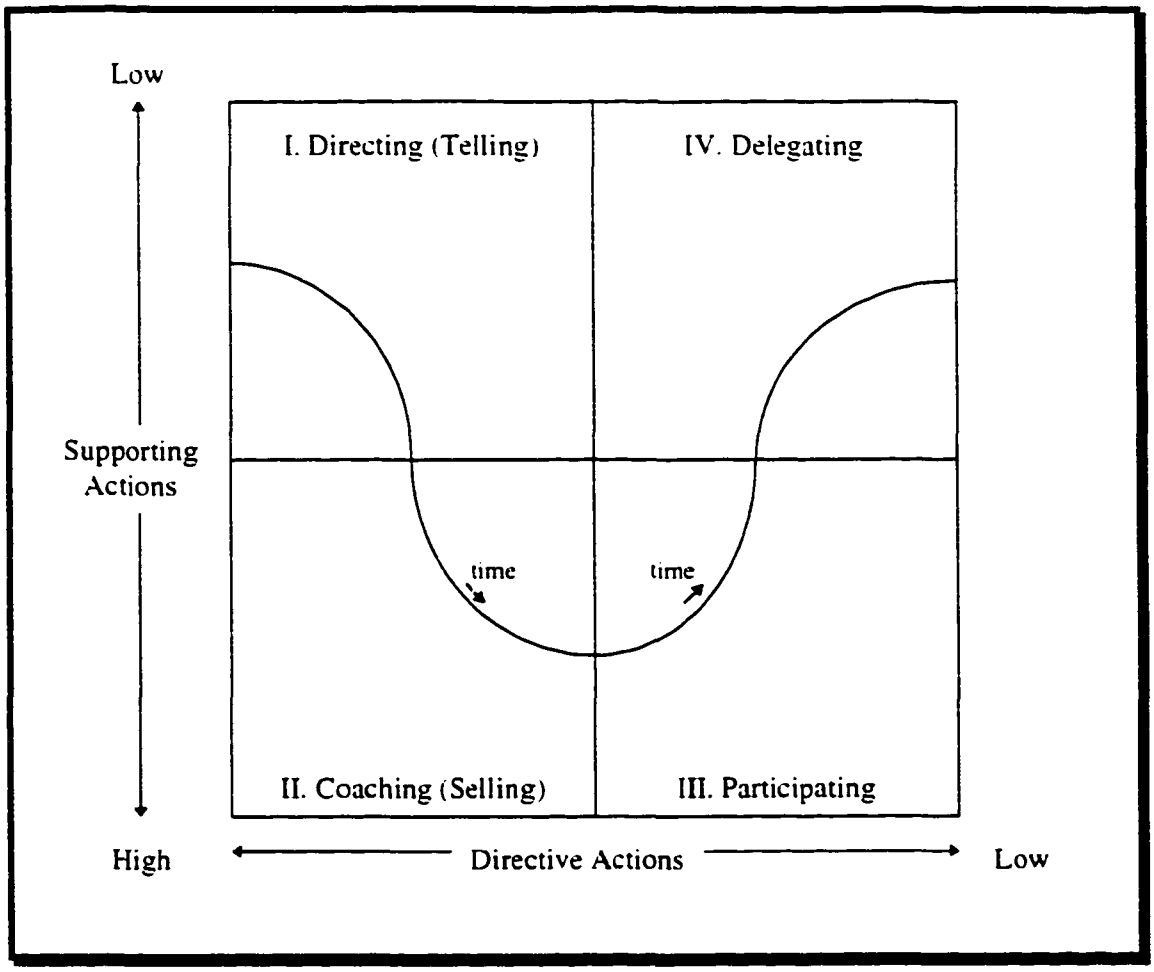


Figure 2.3: Hersey and Blanchard Model.

The two major components that define the readiness of the group are ability and willingness. Ability is the knowledge, experience, and skill that the group brings to the particular task or activity. Willingness is the extent to which the group has the confidence, commitment, and motivation to accomplish the specific task. The subordinates' readiness follows a continuum that can be divided into four levels: (I) unable-unwilling, (II) unable-willing, (III) able-unwilling, and (IV) able-willing. As the subordinates' readiness level changes over time, the leader's leadership style should change as seen in Figure 2.3. Thus,

when the employees are faced with learning a new task, the leader must be more directive during the employees' initial training. As the employees learn new skills for this new task, the leader changes his/her style to a coaching style. The leader must then change to a participative style when the employees are fully trained and ready to start using their new skills. After the employees are confident with their new skills, the leader can finally start empowering the workers (Greenberg & Baron, 1995; Bass, 1990). Hersey and Blanchard also note that whenever a follower's performance begins to decline--for whatever reason--and ability or motivation decreases, the leader should reassess the readiness level of the follower and move backward through the curve shown in Figure 2.3 to provide the appropriate socioemotional support and task direction (Hersey and Blanchard, 1988).

2.1.2.3. Transformational Leadership: Beginning in 1977, researchers including House, Bass, and Conger developed the leadership theory known as Transformational, or Charismatic, Leadership. Transformational leadership involves a special kind of leader-follower relationship. Transformational leaders generate reactions from their followers such as (a) levels of performance beyond those that would normally be expected, (b) high levels of devotion, loyalty, and reverence toward the leader, (c) enthusiasm for and excitement about the leader and the leader's ideas, and (d) a willingness on the part of subordinates to sacrifice their own personal interests for the sake of a larger collective goal. In order to generate these reactions, transformational leaders use many different tactics to exert profound influence over others. First, they articulate a vision. They also provide a plan for attaining their vision. Next, they engage in what is termed framing; they define the purpose of their movement or organization in a way that gives meaning and purpose to whatever actions they are requesting from followers. They generally show

greater than average willingness to take risks and engage in unconventional actions to reach their stated goals. Finally, transformational leaders usually express high levels of self-confidence, show a high degree of concern for their followers' needs, and demonstrate excellent communication skills (Greenberg & Baron, 1995). In general, the transformational leader appeals to people's higher levels of motivation to contribute to a cause and add to the quality of life. It is not like traditional (also known as transactional) leadership that only relies on position power, or the status and influence that comes from one's organizational rank in the hierarchy (Schuster, 1994). In general, the transactional leader motivates his/her followers by exchanging rewards for services rendered (Bass, 1985).

2.2. LEADERSHIP TRAITS VS. LEARNED LEADERSHIP STYLE

All the above research defines different leadership styles. However, the question that remains is whether or not leadership styles can be learned and changed. This section discusses whether leadership is an inborn trait or whether it can be learned.

Prior to 1945, the most common approach to the study of leadership concentrated on inherent leadership traits (Hersey & Blanchard, 1988). Although trait research is still continuing, a review of the research literature using the trait approach has revealed few significant or consistent findings.

Researchers at the University of Minnesota compared twins raised apart with those raised together to determine whether or not leadership is a inborn trait (Kouzes & Posner, 1987). In the study, the researchers defined a person high in social potency (leadership) as masterful, a forceful leader who likes to be the center of attention. They concluded that

61 percent of the leadership trait, or 'social potency', is inherited. However, that leaves 39 percent that is determined by other factors. In addition, one must take issue with how the Minnesota researchers defined leadership. Social potency--dominance, taking charge, wanting to be the center of attention--may be one aspect of leadership, but it is certainly not the only leadership practice uncovered in leadership research.

In 1956, AT&T conducted the Managerial Progress Study to determine a set of traits that would predict managerial progress through the ranks (Kouzes & Posner, 1987). Of the college trained recruits in the study, 64 percent of those predicted to reach middle management by their eighth year did so. Of the noncollege recruits, 40 percent of those predicted to reach middle management did so. However, that leaves 36 percent of the college group and 60 percent of the noncollege group predicted to advance to middle management who did not. In addition, 32 percent of the college group and 9 percent of the noncollege group who were predicted not to reach middle management by their eighth year actually did so. Thus, leadership and leadership success do not seem to be based on inherent personality traits.

Even though some of the research supports the idea that certain traits may hinder or facilitate leadership, no one set of traits has been identified that clearly predicts success or failure. According to Yukl (1981), "The old assumption that 'leaders are born' has been discredited completely, and the premise that certain leader traits are absolutely necessary for effective leadership has never been substantiated in several decades of trait research. Today there is a more balanced viewpoint about traits. It is now recognized that certain traits increase the likelihood that a leader will be effective, but they do not guarantee

effectiveness, and the relative importance of different traits is dependent upon the nature of the leadership situation."

Next, this section addresses whether or not leadership styles can be learned. There have been several training programs based on the leadership theories discussed in the previous section and other theories that have been developed and evaluated to train individuals to use these different styles more effectively (Bass, 1990). The evaluations of these training programs and the results of other research support the idea that leadership styles can be learned and changed (Bass, 1990; Levin, 1993).

Kouzes and Posner (1987) suggest three major categories of opportunities for learning to lead. They include the following: (1) trial and error, or learning by doing, (2) other people who can provide guidance, teaching, and role modeling, and (3) formal leadership education and training. Studies by the Center for Creative Leadership and by the Honeywell Corporation resulted in similar categories.

One popular training model is based on Blake and Mouton's Managerial Grid theory (1985). Blake and Mouton believe that the leader's assumptions, or beliefs and attitudes, guide the leader's behavior. Their Managerial Grid helps leaders to examine their assumptions about leadership. Once the leader is aware of the depth and character of his/her assumptions, the leader can analyze them and identify the positive and negative consequences of actions based on them. The leader can then consider alternative assumptions and practice applying them until they become characteristic.

Blake and Mouton also identify several obstacles, including personal motivations, self-deception, and organizational structure and culture, that hinder the leader's ability to change his/her assumptions. Thus, the Grid Seminar recognizes these obstacles and

provides an "approach to change which involves theory-centered, self-convincing, experience-based, deception-free learning of leadership effectiveness..." (Blake & Mouton, 1985). Since Blake and Mouton believe that [9,9] leadership is the most effective, the Grid Seminar allows the leaders to experiment with the kinds of behavior that follow as a consequence of [9,9]-oriented thinking and assumptions. During the seminar, top leadership engages in Grid Seminar learning (Phase 1) and in [9,9]-oriented team building (Phase 2) before others in the organization participate. Then, in the last three phases, the leaders investigate the current assumptions and behavior that is embedded within the firm's business logic and conduct and replace them with [9,9]-oriented kinds of business logic and conduct.

Another popular training model is based on Hersey and Blanchard's Situational Leadership Theory (Forsyth, 1990). However, their training model focuses on improving leadership style flexibility and determining the maturity level of the followers. Hersey and Blanchard do not believe that there is "one best" leadership style. Thus, they apply Behavioral Science Theory to teach leaders how to change their leadership style to fit different situations (Hersey & Blanchard, 1988). According to behavioral sciences, people learn by practice, by doing what they are attempting to learn. However, people must recognize that they will feel anxious, nervous, and uncomfortable the first few times that they "try out" new patterns of behavior. In addition, it will take time to learn these new patterns of behavior. Managers must avoid responding to the training program negatively if they are unsuccessful in using their new patterns of behavior effectively during the first few tries.

Another training model, based on Fiedler's Contingency Model, provides the leader with methods for diagnosing the favorableness of the leadership situation and for adapting the leadership situations to the leader's style of leadership (Fiedler, 1967). Fiedler believes that it is much easier to adapt the situation to fit the manager's leadership style than it is to train the leader to develop a flexible leadership style. However, he does acknowledge that there is evidence that leadership training programs do result in some behavioral and attitudinal changes.

Thus, the number and popularity of leadership training programs that advocate leadership style change and the lack of validity in trait approaches show that leadership style can be changed and that leader behavior can be learned (Bass, 1990, Levin, 1993; Kouzes & Posner, 1987; Blake & Mouton, 1985; Hersey & Blanchard, 1988).

2.3. REVIEW OF LEADERSHIP STYLE INSTRUMENTS

This section discusses seven leadership style assessment tools (Zorn & Violanti, 1993). They are divided into three groups: Behavioral and Attitudinal Styles, Situational Leadership, and Transformational Leadership. The instruments in each of these groups represent historically important instruments used in leadership research and the most popular instruments in current management training.

2.3.1. Behavioral and Attitudinal Styles. The following three instruments are within the behavioral and attitudinal styles approach: (a) the Leader Behavior Description Questionnaire (LBDQ), (b) the Managerial Grid, and (c) the Least Preferred Coworker (LPC) scale. These instruments share the assumption that leadership can be captured by a two-dimensional focus on task and relationship issues.

Researchers at Ohio State University developed the Leader Behavior Description Questionnaire (LBDQ) in the late 1940s and early 1950s. A preliminary version of the questionnaire was composed of ten dimensions: Initiation, Membership, Representation, Integration, Organization, Domination, Communication Up, Communication Down, Recognition, and Production (Hemphill & Coons, 1957). The researchers used a statistical technique known as factor analysis to reduce the dimensions to the following four: Consideration, Initiating Structure, Production Emphasis, and Sensitivity. Since the first two dimensions accounted for over 80% of the variation in followers' ratings of their leaders, the Ohio State researches incorporated theses two dimensions into their Leadership Behavior Description Questionnaire (Forsyth, 1990). Consideration measures the extent to which the leader acts in a friendly and supportive manner, shows concern for subordinates, and looks out for their welfare. Initiating structure measures the extent to which a leader is concerned with attaining the group and organization's formal goals and completing the task at hand.

There are several versions of the LBDQ, including Hemphill's original 40-item instrument, a 10-item version (the LBDQ-Form XII), and Randolph and Blackburn's 30-item, self-report version (Zorn & Violanti, 1993). Each version lists possible behaviors of the leader. After reading each behavior, the rater rates the leader on a scale from 1 (never engages in the behavior as a leader) to 5 (always engages in the behavior as a leader). All of the odd-numbered questions refer to initiating structure behaviors, while all of the even-numbered questions refer to consideration behaviors. By summing the responses for initiating structure and for consideration, the leader can determine his/her leadership style

as seen in Figure 2.4. A copy of the instrument and instructions for calculating and interpreting the scores are available in Randolph and Blackburn (1989).

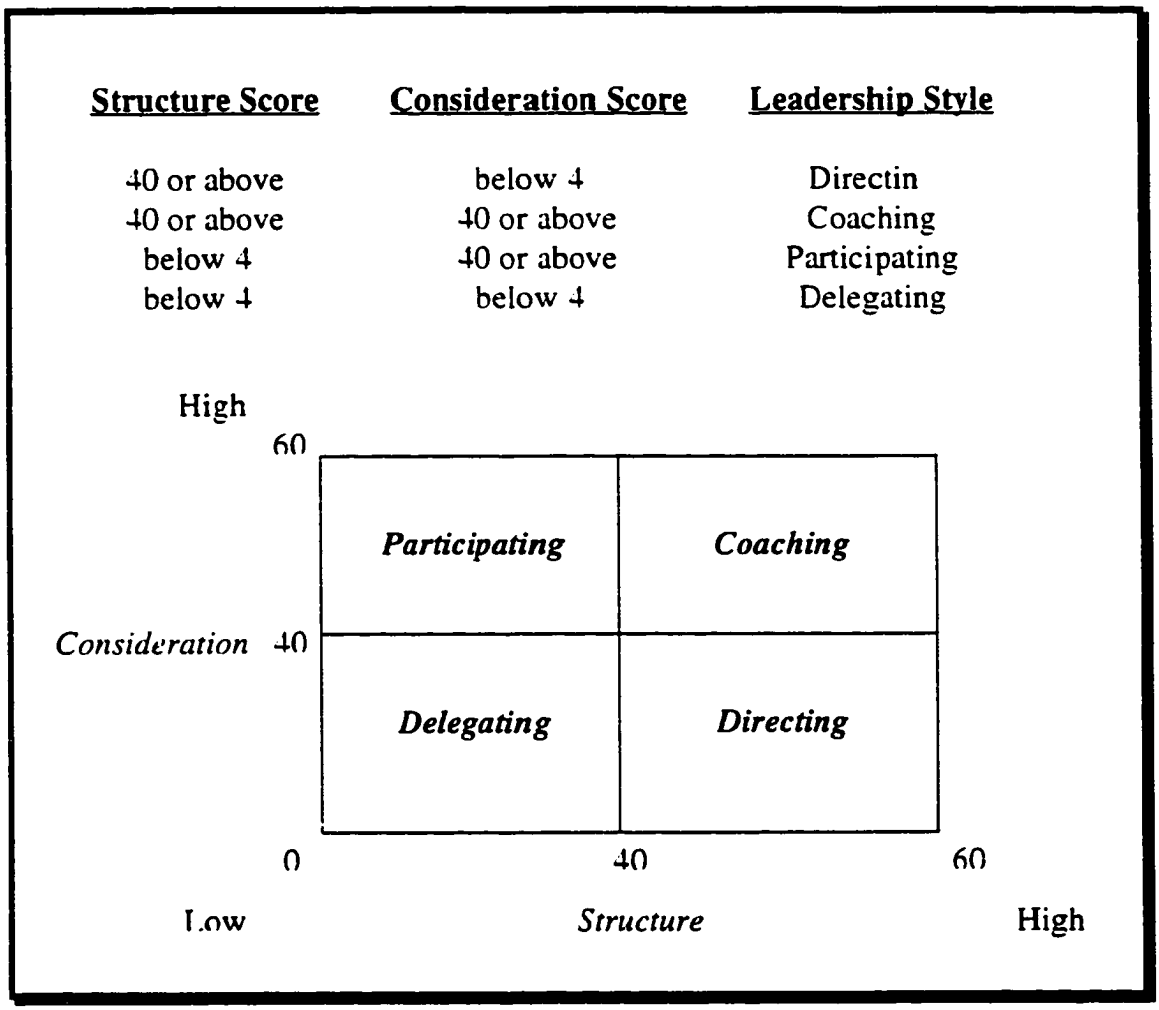


Figure 2.4: Leadership Styles for LBDQ.

In 1964, Blake and Mouton developed the Managerial Grid, a six-item questionnaire (Zorn & Violanti, 1993). Each question represents a different aspect of leadership--decisions, convictions, conflict, emotions (temper), humor, and effort (Blake & Mouton, 1964). For each leadership aspect, there are five behaviors listed, and the

person completing the instrument ranks each of these behaviors from 1 (least likely to engage in this behavior) to 5 (most likely to engage in this behavior). The leader obtains a score for each of the styles from these rankings. The style with the highest score is the person's dominant style leadership style. The highest possible score of 30 indicates that the leader sees himself or herself as most likely to show the same amount of concern for production and people regardless of the element of style being ranked. The lowest possible score is six. A copy of the questionnaire and scoring instructions and interpretations are available in Blake and Mouton (1970).

Fiedler developed his Least Preferred Coworker (LPC) scale in 1967 (Zorn & Violanti, 1993). The LPC scale asks the leader to rate a coworker with whom he/she is least able to work. According to Fiedler, a high LPC score indicates a relationship-oriented leader, and a low LPC score indicates a task-oriented leader (Fiedler, 1967). In general, Fiedler believes that a high LPC leader (who perceives his/her least-preferred coworker in a relatively favorable manner) distinguishes between the person that he/she is least able to work on a common task and the way the person works. Thus, the high LPC leader derives his/her major satisfaction from successful interpersonal relationships. On the other hand, the low LPC leader (who describes his/her least-preferred coworker in a very negative, rejecting manner) links an individual's poor performance on a task with undesirable personality characteristics. Thus, the low LPC leader derives his/her major satisfaction from task performance.

There are 20 bi-polar adjectives with eight spaces between the adjectives. Each space has a corresponding number from one to eight. Examples include scales from unfriendly to friendly, from guarded to open, from frustrating to helpful, and from boring

to interesting (Fiedler, 1967). The leader describes the coworker by placing an "X" in one of the eight spaces between each set of adjectives. The leader obtains his/her score by summing each of the ratings. A score of 57 or less indicates a task-oriented leader, and a score greater than 64 indicates a relationship-oriented leader. A copy of the instrument and scoring procedures are available in Randolph and Blackburn (1989).

2.3.2. Situational Leadership. Situational leadership theories suggest that different leadership styles are effective in different situations. The following two instruments are within the situational leadership group: (a) the Leadership Effectiveness and Adaptability Description (LEAD), and (b) the Leader Behavior Analysis II (LBA II). The instruments differ slightly in their labeling schemes and in their order of the follower's maturity or development level. The combinations of low/high ability and low/high motivation define the four developmental levels.

Hersey and Blanchard developed the 12-item LEAD questionnaire in 1974 (Zorn & Violanti, 1993). The person completing the instrument chooses one of four alternatives that most closely describes what the leader would do in 12 different situations. Each of the four alternatives corresponds to one of Hersey and Blanchard's four quadrants--telling, selling, participating, and delegating. The leader determines his/her primary and secondary leadership styles by counting the number of times each style was selected. It is possible for a leader to have more than one primary style and to not have any secondary styles or up to three secondary styles (Hersey & Blanchard, 1988). The leader can also determine his/her flexibility by observing the range of styles chosen. Selecting each style three times indicates maximum flexibility (Zorn & Violanti, 1993). However, flexibility is not as important as style adaptability, the degree to which a leader is able to vary his/her style

effectively to match the demands of the situation (Hersey & Blanchard, 1988). Thus, the leader may obtain an effectiveness score ranging from -24 to +24. Theoretically, each of the twelve situations has one answer that is the most effective choice. The leader receives +2, +1, -1, or -2 for choosing the most, the second most, the third most, or the least effective alternative, respectively. A positive score is indicative of an effective leader, and a negative score indicates an ineffective leader (Zorn & Violanti, 1993). Hersey and Blanchard developed two LEAD instruments: the LEAD-Self and the LEAD-Other. The LEAD-Self measures self-perceptions of how the individual behaves as a leader, while the LEAD-Other reflects the perceptions of the leader's subordinates, superiors, and peers (Hersey & Blanchard, 1988). A copy of the instrument and scoring instructions are available for a fee from Pfieffer & Company, 8517 Production Avenue, San Diego, CA 92121-2280.

In 1991, Blanchard developed the LBA II based on a revision of the situational leadership theory (Zorn & Violanti, 1993). The 20-item instrument uses the same general format as LEAD. However, the four leadership styles have different labels--directing, coaching, participating, and delegating. The major change in the LBA II is that Blanchard considered high commitment (or motivation) to be the lowest developmental level and low commitment to be the next lowest level. In the original version, Hersey and Blanchard used the reverse of these two levels. Like the LEAD, the LBA II allows the leader to determine his/her primary and secondary leadership styles and an effectiveness score. A copy of the instrument and scoring procedures are available for a fee from Blanchard Training and Development, Inc., 125 State Place, Escondido, CA 92029.

2.3.3. Transformational Leadership. The transformational leadership approach includes the following two instruments: (a) the Multifactor Leadership Questionnaire (MLQ), and (b) the Leadership Practices Inventory (LPI).

Bass developed the 73-item MLQ in 1985 (Zorn & Violanti, 1993). He identified seven leadership factors. Four are transformational (charisma, inspiration, intellectual stimulation, and individualized consideration), two are transactional (contingent reward and management-by-exception), and the final one is laissez-faire leadership. The questionnaire includes behavioral items and items that describe followers' responses. The leader rates how frequently he/she engages in the listed behaviors and how frequently subordinates respond to him/her in a particular manner on a scale from 0 (not at all) to 4 (frequently, if not always). A shorter version, the MLQ Form 4, includes ten questions for each of the following five leadership factors: charisma, intellectual stimulation, individualized consideration, contingent reward, and management-by-exception (Bass, 1985). A copy of the instrument is available in Bass (1985).

In 1987, Kouzes and Posner developed the 30-item LPI (Zorn & Violanti, 1993). The leader rates how often he/she engages in a particular behavior on a scale from 1 (rarely) to 5 (very frequently). Each of the questions corresponds to one of five practices (challenging the process, inspiring a shared vision, enabling others to act, modeling the way, and encouraging the heart). Each of the five leadership practices consists of two basic strategies (Kouzes & Posner, 1987). Challenging the process includes searching for opportunities and experimenting and taking risks. Inspiring a shared vision includes envisioning the future and enlisting others. In order to enable others to act, the leader must both foster collaboration and strengthen others. The leader models the way by

setting an example and by planning small wins. Finally, encouraging the heart includes recognizing contributions and celebrating accomplishments. After answering all of the questions, the leader sums the ratings for all the questions corresponding to each practice, producing a score between 6 and 30 for each practice. A higher or lower score indicates that the leader is more or less likely, respectively, to engage in the behaviors associated with that practice. A copy of the instrument is available for a fee from Pfieffer & Company, 8517 Production Avenue, San Diego, CA 92121-2280.

2.4. VALIDITY OF LBDQ

When choosing a feedback instrument, the instrument should meet the following criteria: (a) test/retest reliability should be at least 0.4, (b) internal consistency should be between 0.65 and 0.85, (c) inter-rater agreement should be at least 0.4, and (d) the instrument should be tested for validity (Van Velsor, 1992). There is little information about the validity of the original LBDQ. However, Schriesheim and Kerr did discuss the validity of the revised LBDQ-XII (Schriesheim & Kerr, 1974). One study found test/retest coefficients between 0.57 and 0.72 for Structure and, between 0.71 and 0.79 for Consideration for one-, two-, and three-month intervals. The internal consistency is around 0.8. They did not discuss any coefficients for inter-rater agreement. They did, however, find that the LBDQ-XII has been successfully tested for content, experimental, and concurrent validity. However, there is some evidence that the LBDQ may still suffer from leniency or halo effects and response skewedness. The responses may elicit more favorable responses about the leader rather than completely realistic responses. However, there is not adequate research to confirm this finding. In conclusion, Schriesheim and

Kerr state that despite the shortcomings of the Ohio State scales, "...they probably remain superior to those hastily developed and superficially investigated alternatives sometimes used in leadership research." Thus, despite the LBDQ's possible shortcomings, it is a valid instrument for research.

2.5. TOTAL QUALITY MANAGEMENT

2.5.1. Definition and Purpose. Total Quality Management (TQM) is a philosophy of management in which the culture of an organization is defined by and supports the constant attainment of customer satisfaction through an integrated system of tools, techniques, and training. This involves the continuous improvement of organizational processes, resulting in high quality products and services (Sashkin & Kiser, 1993). TQM consists of three main components: philosophy, policies and procedures, and tools (Snee, 1986). Ideally, management develops both an overall guiding philosophy and also policies and procedures to guide the organization in its total quality effort. They can also select a variety of tools to aid organizational members in doing their jobs (Snee, 1986).

The philosophies of TQM are based on customer satisfaction and continuous improvement (Caudron, 1993; Wells, 1992). The customer is the company's reason for existence. The company should strive to satisfy the customer's wants and expectations the first time and every time. The company should focus on continuous quality improvement throughout all phases of an organizational system, not just the end product. The organization should also attempt to involve its external suppliers and customers in the TQM effort (Waldman, 1993). Management commitment is essential to instill these philosophies throughout the organization. Management must also stress that everyone in

the organization, not just the quality control department, is responsible for quality (Snee, 1986; Waldman, 1993).

In order to carry out these philosophies, management must develop policies and procedures. To improve quality, the company must focus on improving all operations, functions and work processes (Wells, 1992). Quality must be designed into the process to prevent defects from occurring. The company should streamline its operations to get rid of all unnecessary activities and work to reduce scrap and defects. The company must stop relying on inspection to catch defects.

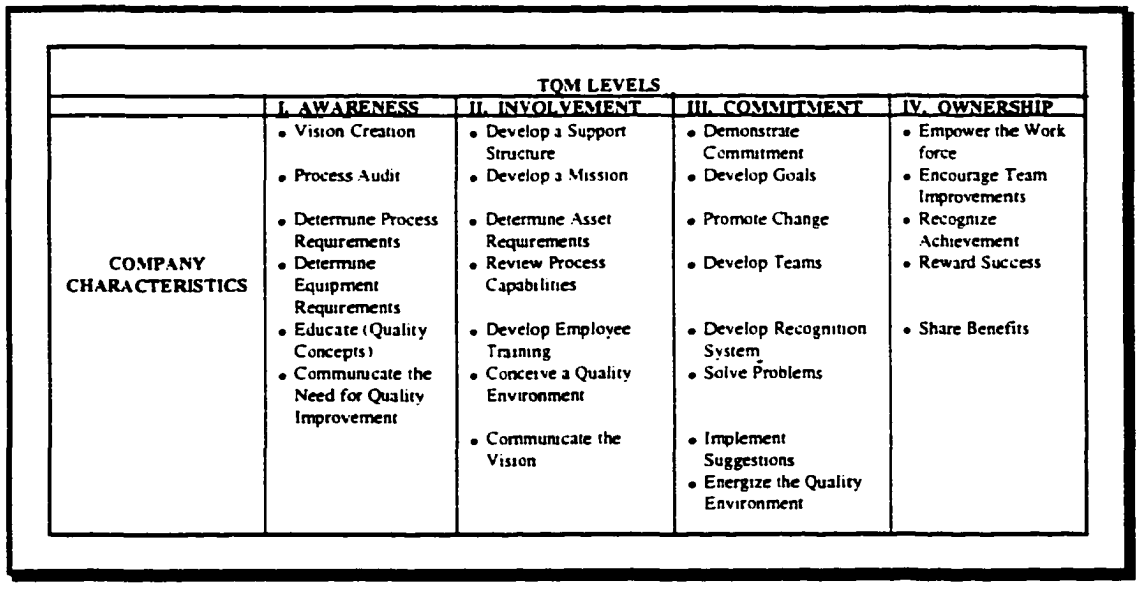
Management must also institute a system for communication among all business functions (Snee, 1986). There must be total participation and teamwork at all levels of the organization and within and across functions (Waldman, 1993). Management must empower the workers (Johnson, 1993). They must give the employees the authority and responsibility to participate in improving the quality of the company. If employees are to participate in quality improvement effectively, management must institute training programs at every level in the organization (Snee, 1986). Management must also allocate resources to support total quality management. Finally, management should create polices and procedures to monitor the organization's progress toward total quality and to reward individual employees and groups for good quality (Snee, 1986; Waldman, 1993).

Finally, a wide variety of tools are available to aid an organization in its pursuit of Total Quality Management. These tools include CAD/CAM and robotics, data management and analysis systems, statistical design of experiments, process control procedures, laboratory measurement control procedures, and Taguchi methods for product and process design (Snee, 1986). Systematic problem solving and statistical

analysis are the basic tools of TQM (Wells, 1992). Some basic tools and techniques to improve work processes and to prevent defects include flow charts, brainstorming, pareto diagrams, statistical process control charts, and design reviews.

TQM is the result of America's quickly eroding position in the international marketplace in the 1980's (Schmidt & Finnigan, 1992; Hoffherr, Moran, & Nadler, 1994). In the years following World War II, American industry was unchallenged. It was an age of expansion and prosperity for America while the rest of the world played catch-up. By the 1990's, the industrialized world had not only caught up, but in some cases it passed the United States (Schmidt & Finnigan, 1992). This was especially true in Japan. In fact, a number of American companies that have aggressively adopted quality management practices still lag far behind some of their global competitors (Hunt, 1992). Thus, it is still important for American businesses to understand and implement TQM. It is also important to note that there is no quick fix to improving quality. The cultural change required by TQM takes time and is hard work. American companies must also avoid just copying from German or Japanese companies. American companies must come up with their own methods for improving quality (Hunt, 1992). Research is one way to help American business determine the best way(s) to implement TQM in the United States.

2.5.2. Levels of Total Quality Management Implementation. TQM implementation can be divided into four basic levels (Johnson, 1993). In application, these levels are an ongoing process with steps that tend to overlap. Individuals progress from step to step almost without notice. The organization progresses in the same manner; it moves to the next level as a majority of its employees progress to that level. The four levels of TQM implementation can be seen in Figure 2.5.



	TQM LEVELS			
	I. AWARENESS	II. INVOLVEMENT	III. COMMITMENT	IV. OWNERSHIP
COMPANY CHARACTERISTICS	• Vision Creation • Process Audit • Determine Process Requirements • Determine Equipment Requirements • Educate (Quality Concepts) • Communicate the Need for Quality Improvement	• Develop a Support Structure • Develop a Mission • Determine Asset Requirements • Review Process Capabilities • Develop Employee Training • Conceive a Quality Environment • Communicate the Vision	• Demonstrate Commitment • Develop Goals • Promote Change • Develop Teams • Develop Recognition System • Solve Problems • Implement Suggestions • Energize the Quality Environment	• Empower the Work force • Encourage Team Improvements • Recognize Achievement • Reward Success • Share Benefits

Figure 2.5: Levels of TQM Implementation.

In level one, the employees are gaining awareness about TQM. Everyone in the organization must know where they are now, where they are going, why they are going there, how they are going to get there, and who is leading the way. In level two, the employees begin to learn basic TQM tools and techniques and become involved in making TQM happen. In level three, the employees are fully trained and begin to use their new tools. Commitment to quality is built by developing goals, solving problems, and using teamwork fueled by the development of a recognition and reward system. Finally, in level four, the employees are confident with their new skills and can use them effectively. They become empowered to continually improve the organization.

2.6. LEADERSHIP IN TOTAL QUALITY MANAGEMENT

2.6.1. The Role of the Leader in TQM. According to Yukl (1989), leadership incudes influence processes involving the determination of a group's or organization's objectives, motivating task-oriented behavior to accomplish these objectives, and influencing group maintenance and culture. These processes parallel the role of management in the pursuit of total quality management (Waldman, 1993). Management is responsible for developing the philosophy, policies, and procedures to shift the organization's emphasis toward quality-oriented goals and process improvements. Leadership oriented toward employee and group recognition for good quality and inspirational leadership behavior can help motivate employees toward quality improvement. In addition, leadership can help create a culture that fosters the philosophies of TQM (Waldman, 1993).

Organizational culture plays a strong role in shaping organizational behaviors, philosophies, and polices; and the management of an organization can use leadership as one mechanism to embed cultural assumptions, values, and norms into the organization (Waldman, 1993). Thus, management plays a critical role in creating the TQM culture (Caudron, 1993; Hollander, 1978; Snee, 1986; Wells, 1992). The organizational members must change how they think and behave and what they value and reward (Snee, 1986). Several behavioral approaches that leaders can use to redirect their cultures include role-modeling, helping organizational members believe that change is possible and desirable, providing a total quality vision, and only rewarding employee behavior that represents a positive change (Waldman, 1993).

Quality and management gurus, including W. Edwards Deming, Joseph Juran, and Tom Peters, agree that leadership, especially upper management leadership, is a key element to TQM success (Cocheu, 1993; Snee, 1986). Senior management must be committed to quality improvement. One of the leading reasons for the failure of TQM is the lack of senior management support (Aalbregtse, Hejka, & McNeley, 1991; McGrath, 1993; Spiess, 1993). The implementation of TQM demands leadership (Aalbregtse, Hejka, & McNeley, 1991).

Leadership involves defining and fostering the need for change. A large part of the battle is convincing organizational members of the relevance of quality techniques and to participate in quality improvement efforts. Top management must create new visions for the organization, communicate these visions clearly, and provide the tools and incentives to ensure implementation by all organizational members. It is up to management to create an environment that encourages innovation, promotes open exchange of ideas, gives problem-solving responsibility to the front line, and accepts mistakes as part of the learning process (Aalbregtse, Hejka, & McNeley, 1991). It is up to the leaders of the organization to motivate organizational members to perform at their best and to involve subordinates in searching for ways that will make it easier and more rewarding for them to do their jobs (Butler, 1990). The leadership of the organization, especially the CEO and senior leadership, must become coaches and teachers for the entire organization (Spiess, 1993). In general, the CEO and senior leadership are in the best position to influence positive change that promotes financial success, continuous improvement, and total customer satisfaction (McGrath, 1993).

2.6.2. Situational Leadership Style in TQM Implementation.

2.6.2.1. A Theoretical Model: Richard Johnson suggests that the manager's leadership style must change as TQM implementation progresses from its initial to final levels (1993). The manager should use a directing leadership style while the employees are gaining awareness about TQM. When the employees begin to learn basic TQM tools and techniques, the manager should switch to a coaching leadership style. After the employees are fully trained and begin to use their new tools, the manager can use a participative style. Finally, the manager can delegate and empower the employees after they have become confident with their new skills for implementing TQM principles.

A case study at Oregon State University (OSU) supports Johnson's theory. Nancy Lee Howard is the quality manager for OSU (Howard, 1993). In the early levels of OSU's quality initiative, she engaged in planning, training, and organizing for quality. Her leadership roles were more directing and coaching in nature. As employees become more proficient in continuous quality improvement, she sees herself working with emerging resident experts, who in turn will work with teams in their own departments. Thus, she will become a more participative leader. Finally, as the quality initiative matures, she sees her role as one of monitoring, recognition, and continuous improvement. She will be a delegating leader.

2.6.2.2. Support for Situational Leadership: Many professionals support the use of situational leadership styles to enhance business leadership and to facilitate positive changes in organizations (Van Auken, 1992; Vigil, 1993; Hay, 1993). The situational component of leadership is crucially important to supervisory success. No one leadership style is appropriate in all situations. To lead effectively, managers must adapt their

leadership styles as organizational change progresses (Hay, 1993). It is important to recognize the impact decisions will have on team members and how technically self-sufficient they are in their current task (Van Auken, 1992). The process of organizational change begins with motivating employees, and then allowing them to handle projects themselves once they are confident in their abilities (Vigil, 1993). In other words, a leader may act more as a coach in the beginning and then, will switch to a more participative or delegative style once the employees and the organization have advanced in their effort for organizational change.

2.6.2.3. Case Studies of Situational Leadership in TQM Implementation:

Several organizations have found situational leadership beneficial in their pursuit of Total Quality Management. At Associated Company Inc., a Witchita, Kansas-based supplier of machine parts to aviation companies, top management used group meetings and various leadership styles to implement TQM (Ross, 1995). At the first meeting, top management used a directive leadership approach. The quality manager described the quality program, including its magnitude, the improvements planned, and the actions required for implementation. Next, the quality manager acted more as a coach. He helped to both motivate the employees and to direct their attention to the costs of quality. He did this by placing orange tags on defective parts and broken equipment. Messages such as "This casting cost $1,378. Can you afford to throw it away?" and "This machine costs $6,000 to repair. Can you afford to break it?" helped make the cost of quality meaningful to each employee. In the third phase of meetings, management set goals, rewarded success, and encouraged teamwork. They began a more participative style of leadership. In the final phase, top management continued to expand its reward program. As a result, employees

gradually accepted more authority and responsibility for quality. Management used a participative and/or delegative style as its empowered employees became more involved in all aspects of the business.

A second company, Varifilm, provides specialty plastic films and recycled products to the food and industrial market segments. In their application for the 1993 Malcolm Baldrige National Quality Award, they discuss the transformation of their senior executive leadership (Ross, 1995). They state that their leadership model has shifted from telling coworkers what to do and "getting things done through people" to "meeting the needs of coworkers as they work to accomplish their jobs and achieve process supremacy and customer satisfaction." They discuss introducing quality principles through broad training (coaching). They then introduced quality action through team-based activity. Their keyword for coworkers (and their leadership style) was Participation. In the next phase of implementation, their keyword for coworkers was Empowerment. Management, taking on a delegative leadership style, realized the need "to more dynamically involve [their] people as individuals and team members in feeling personal responsibility for and ownership of the Varifilm quality environment and the values that support it."

2.6.3. Profile of the "Ideal" Leader in a Level IV Company. As a final note in the discussion of leadership in TQM implementation, an informal study was conducted to develop a profile of the "ideal" leader for a Level IV company. Eleven members of "The Conference Board, Inc." from the Total Quality Management Center were asked to complete the LBDQ to develop the profile. The results of the survey suggested that the leader of a Level IV company should have a participating style.

2.7. THE MALCOLM BALDRIGE NATIONAL QUALITY AWARD AND THE MISSOURI QUALITY AWARD

2.7.1. The Malcolm Baldrige National Quality Award. On August 20, 1987, President Reagan signed the Malcolm Baldrige National Quality Improvement Act into law (Garvin, 1991). The act created the Malcolm Baldrige National Quality Award (MBNQA) and called for the development of guidelines and criteria to help organizations evaluate their quality improvement efforts. The intent of the award is to promote quality awareness, the benefits of quality improvement, the impact of quality on competitiveness, understanding of the requirements for excellence in quality, and the sharing of successful strategies for quality improvement (Heaphy & Gruska, 1993; MBNQA Criteria, 1993). The Baldrige Award also provides companies with a comprehensive framework for assessing their progress toward such goals as customer satisfaction, increased employee involvement, and continuous quality improvement (Garvin, 1991). The award has become an important catalyst for transforming American business and for reshaping managers' thinking and behavior.

The National Institute of Standards and Technology (NIST) manages the Baldrige award program. Each year, it presents up to two awards in each of three categories: manufacturing, service, and small business. The award criteria contains seven categories which cover the following: leadership, information and analysis, strategic quality planning, human resource development and management, process quality management, quality results, and customer satisfaction (Heaphy & Gruska, 1993). The framework for the integrating the seven categories of the Baldrige award criteria is shown in Figure 2.6 (MBNQA Criteria, 1993).

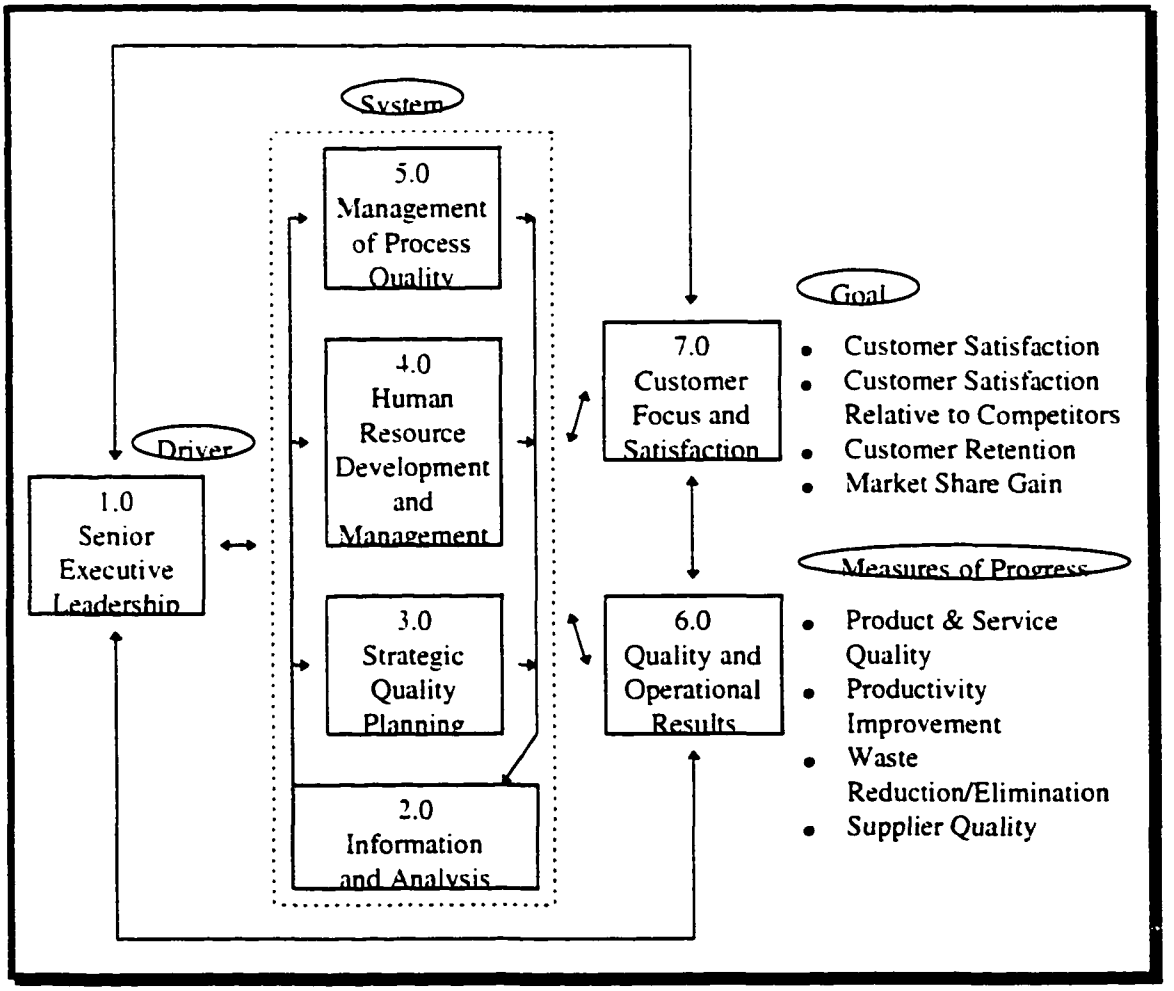


Figure 2.6: Framework for the Baldrige Award Criteria.

The framework has four basic elements: the Driver, the System, Measures of Progress, and the Goal. Senior executive leadership, the Driver, creates the values, goals, and systems, and guides the sustained pursuit of customer value and company performance. The System comprises the set of well-defined and well-designed processes for meeting the company's customer, quality, and performance requirements. Measures of progress provide a results-oriented basis for channeling actions to delivering ever-

improving customer value and company performance. The basic aim, or goal, of the quality process is the delivery of ever-improving value to customers (MBNQA Criteria, 1993).

NIST representatives judge three types of company activities--approach, deployment, and results--against the award criteria. The company's approach refers to the methods, processes, and practices that the company uses to achieve the requirements addressed in the criteria. Some of the factors that NIST representatives use to evaluate these methods include the following: their appropriateness, their effectiveness, the degree to which they are systematic and consistently applied, the degree to which they are based upon objective and reliable quantitative information, and the degree to which they are prevention-based. Deployment addresses how broad or specific the company's approaches are in respect to the criteria. NIST representatives evaluate deployment according to the appropriate and effective application of the stated approach to one or more of the following: company processes and activities, product and service features, and transactions and interactions with customers, suppliers, and the public. Finally, NIST representatives evaluate the company's results. They evaluate results according to performance levels, the rate of performance improvement, and the demonstration of sustained improvement or high-level performance. They look for three to five years of positive trends and for industry-leading levels of performance (Heaphy & Gruska, 1993; MBNQA Criteria, 1993).

2.7.2. The Missouri Quality Award. By 1994, many other award programs, including over 30 statewide quality programs and more than twenty international programs, have been created using the Baldrige criteria as a guideline (Timmons, 1994).

One such program is the Missouri Quality Award program. Governor John Ashcroft signed Executive Order 92-15 on June 29, 1992 and created the Missouri Quality Award. According to the Executive Order (Missouri Quality Award Criteria, 1994):

> The Missouri Quality Award will be patterned after the Malcolm Baldrige National Quality Award and will recognize the achievements of those organizations which implement a total quality philosophy and improve the quality of their products and services, thereby providing an example for others to follow. It will lead to the continuous improvement of quality, customer satisfaction, and global competitiveness of Missouri organizations by educating Missourians about quality improvement, fostering the pursuit of quality in all aspects of Missouri life, and recognizing excellence in quality leadership.

2.7.3. Defining the Level of TQM Implementation Using the MQA. Applicants for the MQA could score a total of 1000 points. MQA examiners judge applicants on three dimensions discussed earlier--approach (A), deployment (D), and results (R). According to the scoring guidelines, there are five scoring divisions for approach/deployment and for results (Missouri Quality Award Criteria, 1994). The scoring guidelines are in Appendix A. From these guidelines, the scores were used to define four theoretical levels of TQM implementation as seen in Figure 2.7.

However, the actual scores given for the both the Malcolm Baldrige National Quality Award (MBNQA) and the Missouri Quality Award did not comply to these theoretical distributions. The 1994 and 1995 Missouri Quality Awards were based on the 1993 and 1994 Malcolm Baldrige National Quality Awards. According to the National

Level	Score (points)	Description
I	0 - 300	early stages of or no Approach; little or no Deployment; few or no Results
II	301 - 600	sound Approach; early stages of Deployment; some positive Results
III	601 - 900	sound Approach; improved Deployment; good Results
IV	901 - 1000	sound, fully responsive Approach; strong, fully deployed Deployment; excellent Results

Figure 2.7: The Four Levels of TQM Implementation.

Institute of Standards and Technology (NIST), the governing body for the MBNQA, the scores for 1993 and 1994 were distributed as seen in Figure 2.8.

MBNQA Score Range	Percent of Applicants in Range 1993	1994
0-125	2	2
125-250	8	10
251-400	24	28
401-600	47	50
601-750	19	10
751-875	0	0
876-1000	0	0

Figure 2.8: Distribution of MBNQA Scores.

MBNQA winners are generally classified as world-class quality, or Level IV, companies. Since the winners of the MBNQA did not score above 750 points, the scores were divided more accurately into four TQM implementation levels by dividing the highest score of 750 by four. Therefore, Levels I, II, III, and IV companies had a Missouri Quality Award score of 0 to 187, 188 to 375, 376 to 563, and 564 to 1000, respectively.

3. PROBLEM DEFINITION AND JUSTIFICATION

It takes time for an organization to implement change. TQM is a change in which top management must provide leadership from the early levels of TQM implementation to the empowered levels where delegation is a reality. This research attempts to determine whether one leadership style is used throughout the different levels of TQM implementation or whether managers change styles as the situations (levels) change. In other words, it attempts to determine whether leadership style affects the level of TQM implementation that an organization can achieve.

TQM implementation can be divided into four basic levels. In level one, the employees are gaining awareness about TQM. In level two, the employees begin to learn basic TQM tools and techniques. In level three, the employees are fully trained and begin to use their new tools. Finally, in level four, the employees are confident with their new skills and can use them effectively (Johnson, 1993).

One theory suggests that the manager's leadership style must change as TQM implementation progresses from its initial to final levels (Johnson, 1993). The manager should use a directing leadership style while the employees are gaining awareness about TQM. When the employees begin to learn basic TQM tools and techniques, the manager should switch to a coaching leadership style. After the employees are fully trained and begin to use their new tools, the manager can use a participative style. Finally, the manager can delegate and empower the employees after they have become confident with their new skills for implementing TQM principles. Other papers also show support for using a situational leadership style during TQM implementation (Van Auken, 1992; Vigil, 1993; Hay, 1993).

An alternative approach would be to manipulate TQM implementation to fit each manager's leadership style. As stated earlier, Fiedler believed that different leadership situations require different leadership styles and that the effectiveness of the leadership style depends on whether the group situation is "favorable" for the leader. Whether the situation is favorable or not is based on three factors: (a) leader/member relations, (b) task structure, and (c) position power (Babcock, 1991). The leader/member relations refer to the quality of the relationship between the leader and the group. Task structure refers to whether the task is clear and straightforward (structured) or ambiguous and vague (unstructured). Position power refers to the leader's power (for example, organizational rank and reward and punishment power) over the other group members. The above three factors combine to create the eight group situations shown in Figure 3.1.

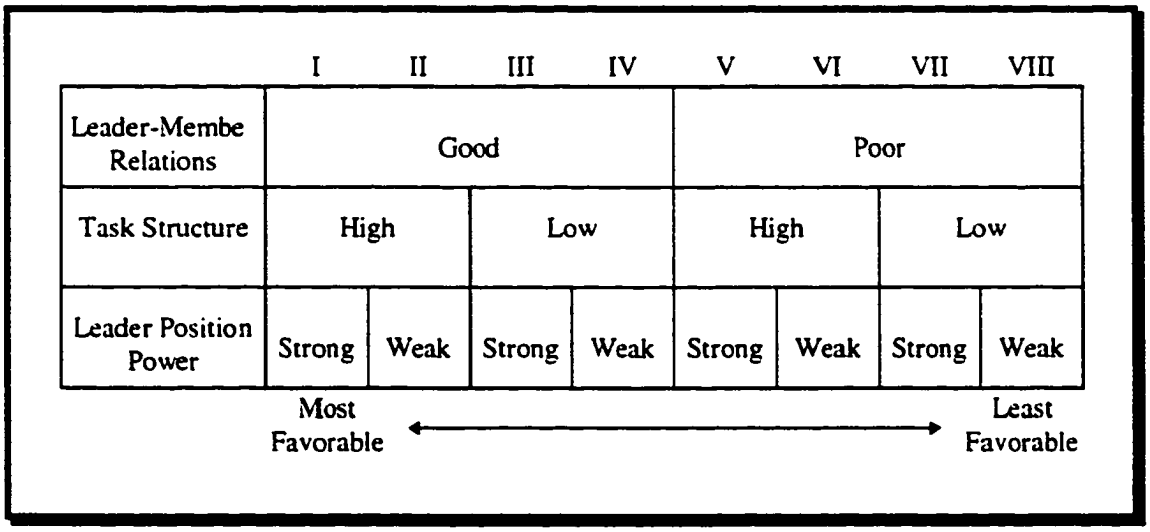


Figure 3.1: Fiedler's Eight Group Situations.

Octant I (good leader-member relations, structured task, and strong position power) is the most favorable situation for the leader, while Octant VIII (poor leader-

member relations, unstructured task, and weak position power) is the least favorable situation. Overall, Fiedler found statistical evidence that the task-motivated leader is more effective than the relationship-motivated leader in highly favorable or highly unfavorable situations (Octants I, II, III, and VIII). On the other hand, the relationship-motivated leader is more effective in moderately favorable situations (Octants IV, V, VI, and VII) (Fiedler, 1967).

In levels one and two of TQM implementation, the task structure is assumed to be low since the employees are in the initial levels of learning about TQM tools and techniques. In levels three and four, the task structure is assumed to be high since the employees have a better understanding about how to use TQM tools and techniques properly. Thus, if an organization wishes to create a proper "fit" between leaders and followers, it must manipulate the leader-member relations and/or the leader's position power.

First, consider a task-oriented leader. In levels one and two, the organization can assign the leader to subordinates that are below the leader in organizational rank and who are very similar to the leader in attitude, opinion, and technical background (Octant III); or, the organization can assign the leader to a group who is equal to the leader in organizational rank and very different from the leader in attitude, opinion, and technical background (Octant VIII). When the organization reaches levels three and four, the organization and the leader must ensure that leader-member relations are good. In order to ensure good relations, the organization could assign the leader to a group with similar attitudes, opinions, and technical backgrounds or to a group with a tradition of getting

along well with their supervisors. However, the leader's organizational rank is unimportant (Octants I and II).

Next, consider the relationship-oriented leader. In levels one and two, the organization can assign the leader to subordinates that are below the leader in organizational rank and who are either very different from the leader in attitude, opinion, and technical background or else have a history of conflict with their supervisors (Octant VII); or, the organization can assign the leader to a group who is equal to the leader in organizational rank and very similar to the leader in attitude, opinion, and technical background (Octant IV). During levels three and four, the leader will work best with groups that are very different from the leader or who have a history of conflict with their supervisors. The leader's position power is unimportant (Octants V and VI).

In order to avoid reassigning leaders to new groups as the organization progresses from level two to level three of TQM implementation, the organization must do the following: (1) assign task-oriented leaders to subordinates that are similar to the leader or who have a history of getting along well with their supervisors, and (2) assign relationship-oriented leaders to subordinates that are very different from the leader or who have a history of conflict with their supervisors. Thus, as the organization progresses from the initial levels of TQM implementation to the latter levels, the task-oriented leader will switch from Octant III to Octant I, and the relationship-oriented leader will switch from Octant VII to Octant V. Since it may be difficult or impossible to ensure that leaders and followers are matched in this way, it may be more suitable for leaders to change their leadership style to fit the different situations.

Thus, the first theory, which supports situational, or changing, leadership styles during TQM implementation, merits research. Leadership from top management drives every successful quality program (Johnson, 1993; Sashkin & Kiser, 1993). Top management must be fully committed to the quality transformation. However, commitment to quality does not tell management "how" to achieve the transformation. Leadership style is defined as the consistent behavior patterns that leaders use when they are working with and through other people, as perceived by those people (Hersey & Blanchard, 1988). Thus, leadership style defines "how" a manager will lead the company through the different levels of TQM implementation. The research of Hersey and Blanchard describe different leadership styles for different situations (Hersey & Blanchard, 1988; Babcock, 1991). To only use one leadership style during TQM implementation seems like a limited and idealistic view. Successful TQM implementation is partly dependent on the leadership style(s) of top management (Milakovich, 1993). Thus, it is imperative to understand how leadership style affects the success of TQM implementation. Managers need to know what leadership style(s) they should use to lead the employees and the company from the initial level of TQM implementation to the final delegation level. This research explores the relationship between leadership style and TQM implementation level by correlating the leadership style(s) used by managers at various companies with each company's TQM level.

4. METHODOLOGY

Since the objective of this research is to more clearly define the relationship between leadership style and level of TQM implementation, it was necessary to obtain information about the leadership styles of CEOs and managers from different companies that were at different levels of TQM. The Leader Behavior Description Questionnaire (LBDQ) was used to assess the leadership styles of the CEOs and other managers of several companies. The LBDQ, which determines leadership style relative to both the manager's task-orientation and the manager's relationship-orientation, is a survey for determining whether a manager's leadership style is either directing, coaching, participating, or delegating. The CEOs and other managers completed a modified version of Randolph and Blackburn's Leader Behavior Description Questionnaire (LBDQ) (Zorn & Violanti, 1993; Randolph & Blackburn, 1989). The LBDQ was one of several leadership scales developed by researchers at Ohio State University. Appendix B contains a copy of Randolph and Blackburn's version (the unmodified version) of the LBDQ. The scoring procedure for the LBDQ is in Appendix C.

In the modified version of the questionnaire, only the person being addressed by the questions changed. The questions themselves did not change. In the modified version, the subordinates, rather than the manager, assessed the manager's leadership style. For example, the statement "I make my attitudes clear to the group" changed to "He/she makes his/her attitudes clear to the group." Researchers have found that assessment by at least three subordinates is less lenient and more reliable than self-assessment (Mount, 1984). In addition, both the original, 40-item LBDQ developed by Hemphill and Coons in 1957 and the revised, 10-item LBDQ-XII developed by Stogdill in 1963 assessed

leadership style from the subordinate's point of view (Bass, 1990). Appendix D contains a copy of the revised, 30-item version of the Randolph and Blackburn's LBDQ.

To obtain companies with measurable differences in their level of TQM implementation, the LBDQ questionnaires were sent to companies who had applied for the Missouri Quality Award (MQA) in 1994 and 1995. The LBDQ questionnaires were returned along with all of the companies' award scores. The MQA, which is based on the Malcolm Baldrige National Quality Award, measured each company's progress in seven key areas of quality. From the scores, each company's level of TQM implementation was determined. The scores returned included each company's overall score (both their application score and their consensus score) and their seven individual category scores. The overall award scores were divided into four groups with each group representing one of the four levels of TQM implementation. Level I, II, III, and IV companies had a consensus score of 0 to 187, 188 to 375, 376 to 563, and 564 to 1000, respectively.

Each company sent additional background information including the following: a) the number of years the company has been implementing TQM, b) the number of employees in the organization, and c) the type of industry in which the company is involved. The companies were involved in either manufacturing, service, education, the public sector, or health care.

The leadership styles of each company's CEO and other managers were correlated with the level of TQM implementation using nonparametric statistics. It was expected that the results of the correlation would show whether there is a relationship between the

CEO's and other managers' leadership styles and the company's level of TQM implementation. High correlations may have shown which leadership style(s), if any, work best at the different levels of TQM implementation.

5. RESULTS

5.1. RESPONDENTS

A total of eight companies responded with usable data for testing data with the CEO leadership styles. From three of the companies, the CEOs returned self-evaluations of their leadership style. Another company only had one subordinate rate the CEO's leadership style. Two of the companies had two subordinates rate the CEO's leadership style, and the final two companies had three subordinates rate the CEO's leadership style. In addition, the application score and the individual category scores were missing from one of the companies. Another company did not have a consensus score. Finally, the scores from one of the companies was from the 1994 Missouri Quality Award, while the others were all from the 1995 Missouri Quality Award. Since the individual category scores were weighted differently in 1994 and in 1995 (for example, the Leadership category was worth 95 points in 1994 and worth 90 points in 1995), the category scores have been converted to a percentage of the total score in order to compare the category scores for each company. Each applicant, their CEO's leadership style, and the company's award scores are in Appendix E. Appendix E also contains the number of years each company has been implementing TQM and the number of employees in each company.

A total of 16 companies responded with usable data for testing leadership style data from managers at various organizational levels. Thus, various hypotheses were tested using the z-test for significance of a proportion. The statistics for all the respondents are in Appendix F. As seen in Appendix F, the number of respondents for each company ranged from one to 52. Thus, every management level was not represented

in each company. Also, the respondents did not indicate which manager was being evaluated, and some of the respondents did not indicate their management level.

5.2. CORRELATION OF DATA

This type of research is ex post facto research rather than experimental research. In experimental research, the independent variable to be studied is manipulated by the experimenter while all other independent variables are held constant. In ex post facto research, the investigator selects rather than manipulates the independent variable. Thus, experimental research is regarded as the best way to establish cause-and-effect relationships. In ex post facto research, there is a danger that the effects observed might be caused by some variable other than the independent variable (Roscoe, 1975). For this reason and due to the amount of data available, this research was more exploratory in nature. It was hoped that the results would show a need for further research in this area. It should also be noted that ex post facto research is subjected to the same kind of statistical analysis as data from similar experimental research (Roscoe, 1975).

In order to determine if there was a relationship between leadership style and the level of TQM implementation, the CEO's leadership style was correlated with the company' award scores. There were two overall scores and seven individual category scores. The first overall score was the first-level application score (Missouri Quality Award Criteria, 1994). During the first level, at least five examiners scored the applicant individually. The application score was an average of these scores. The next overall score was the consensus score (Missouri Quality Award Criteria, 1994). For this score, at least five examiners reviewed and discussed the application score to determine the consensus

score. Thus, it was expected that this score would give a more precise overall score. In general, however, the application score and the consensus score were fairly close. The average difference between the application score and the consensus score for the respondents in this research was 19.4 points out of a total of 1,000 points. In addition, the application score was divided into seven individual categories discussed earlier. For this research, the relationships between the CEO's leadership style and each of the individual category scores were also investigated.

The data were correlated using the chi-square test of independence. For ex post facto research, a sample size of 30 or more was recommended (Roscoe, 1975). Since the subjects of this research were drawn from a single parent population, and neither the leadership styles nor the award scores of the respondents were known in advance, a bivariate frequency table was constructed for each chi-square test. The probability of Type I error, the rejection of a true hypothesis, was determined by the selection of the level of significance. Most behavioral research is conducted using a .01 or a .05 level of significance. However, in exploratory research, a level of .10 or .20 may be more appropriate (Roscoe, 1975). Thus, this research used a .10 level of significance for the test of independence. The degree to which the variables in a bivariate frequency table were related was measured by the contingency coefficient. Thus, for those variables that bore a statistical relationship to each other, the degree to which they were related was measured using Cramer's coefficient.

In addition, the z-test for significance of a proportion was used to test various hypotheses to see if any of the leadership styles were more or less predominant that the

other styles during TQM implementation. These tests used either a .05 or a .10 level of significance.

5.3. ANALYSES

First, the chi-square test of independence was used to determine if a relationship existed between the CEO's leadership style and the level of TQM implementation using both the application score and the consensus score. For each of these scores, a 4 X 4 contingency table was constructed. Using a .10 level of significance with 9 *df*, the null hypothesis (the CEO's leadership style and the TQM level are independent) was rejected if $\chi^2 \geq 14.684$. The χ^2 was equal to 0.88 for the application score and to 0.19 for the consensus score. Thus, there was no statistical relationship between the CEO's leadership style and the level of TQM implementation.

Next, the CEO's leadership style was correlated with the individual category scores. A 4 X 4 contingency table was constructed for each category score. Using a .10 level of significance with 9 *df*, the null hypothesis (the CEO's leadership style and the individual category score are independent) was rejected if $\chi^2 \geq 14.684$. The results of the χ^2 for each category can be seen in Figure 5.1. As shown, there was no correlation between the CEO's leadership style and any of the individual category scores.

Finally, the CEO's leadership style was correlated with the number of years each company has been implementing TQM and with the number of employees in each company. For the first test, a 4 X 4 contingency table was constructed. This test also used a .10 level of significance with 9 *df*. The null hypothesis (the CEO's leadership style

Category	χ^2	Result
Leadership	0.88	variables are independent
Information and Analysis	5.54	variables are independent
Strategic Quality Planning	3.50	variables are independent
Human Resource Development and Management	0.88	variables are independent
Management of Process Quality	2.10	variables are independent
Quality and Operational Results	2.92	variables are independent
Customer Focus and Satisfaction	0.88	variables are independent

Figure 5.1: Chi-Square Results for Individual Category Scores.

and the number of years implementing TQM are independent) was rejected if $\chi^2 \geq 14.684$. The χ^2 for this test was equal to 10.40. Thus, there was no statistical relationship between the CEO's leadership style and the number of years the company has been implementing TQM. For the second test, a 4 X 3 contingency table was constructed. This test used a .10 level of significance with 6 *df*. The null hypothesis (the CEO's leadership style and the number of employees are independent) was rejected if $\chi^2 \geq 10.645$. The χ^2 for this test was equal to 3.50. Thus, the CEO's leadership style and the number of employees in the company were independent.

All of the above chi-square tests for independence can be found in Appendix G. Since all of the tests showed no statistical relationship, it was not necessary to compute the Cramer's coefficient for any of the above tests.

Since different leadership styles did not appear to be correlated with the different levels of TQM implementation, two more hypotheses were tested using a one-tailed z-test for significance of a proportion. For the first hypothesis, the null hypothesis stated that the probability of the four leadership styles was equal ($p = p_o$, where $p_o = 1/4 = .25$) during

all levels of TQM implementation, while the alternate hypothesis stated that the probability of one leadership style was greater than the other leadership styles ($p > p_o$). This hypothesis was tested for each of the four different leadership styles using a .05 level of significance. When both the application and the consensus score data were tested, the null hypothesis was rejected for the coaching leadership style with a p-value that was equal to 0.0248 in both cases. Thus, the coaching leadership style was more predominant than any of the other styles.

For the second hypothesis, the null hypothesis stated that the probability of the four leadership styles was equal ($p = p_o$, where $p_o = 1/4 = .25$) during all levels of TQM implementation, while the alternate hypothesis stated that the probability of one leadership style was less than the other styles ($p < p_o$). This hypothesis was tested for each of the four different leadership styles using a .10 level of significance. For the directing leadership style, the p-value was equal to 0.0633 for both the application and the consensus score data. Thus, the directing leadership style was less predominant during TQM implementation than expected. When testing the consensus score data, the participating leadership style, with a p-value of 0.0633, was also found to be less predominant during TQM implementation than expected.

Due to the limited amount of CEO data, these hypotheses were tested again using the data returned by all 16 companies. A total of 165 LBDQ surveys were returned. As before, for the first hypothesis, the null hypothesis stated that the probability of the four leadership styles was equal ($p = p_o$, where $p_o = 1/4 = .25$) during all levels of TQM implementation, while the alternate hypothesis stated that the probability of one leadership style was greater than the other leadership styles ($p > p_o$). Using a .05 level of

significance, the null hypothesis was rejected for both the coaching and the participating styles with p-values of 0.0004 for both. Thus, the coaching and the participating leadership styles were more predominant than expected.

For the second hypothesis, the null hypothesis stated that the probability of the four leadership styles was equal ($p = p_o$, where $p_o = 1/4 = .25$) during all levels of TQM implementation, while the alternate hypothesis stated that the probability of one leadership style was less than the other styles ($p < p_o$). Using a .05 level of significance, the null hypothesis was rejected for the directing leadership style (p-value of 0.0000). Thus, the directing leadership style was less predominant than expected. Using a .10 level of significance, the null hypothesis was rejected for both the directing leadership style (p-value of 0.0000) and the delegating leadership style (p-value of 0.0962).

Finally, both hypotheses were also tested using all the data for companies in Level II, III, and IV. For Level II companies, the coaching style (p-value of 0.0003) was more predominant than expected. For Level III companies, both the coaching style (p-value of 0.0048) and the participating style (p-value of 0.0013) were more predominant. For Level IV companies, the participating style (p-value of 0.0010) was more predominant than expected. The directing leadership style (p-values of 0.0208, 0.0000, and 0.0607 for Levels II, III, and IV, respectively) was less predominant than expected. All of the above z-tests for significance of a proportion are in Appendix H.

6. DISCUSSION

The purpose of this research was to explore whether managers preferred to use only one leadership style or to change leadership styles as their organization advanced through different levels of TQM implementation. According to the results, there was no statistically significant relationship between the CEO's leadership style and the level of TQM implementation. However, it was not truly possible to conclude that a statistically significant relationship did not exist.

In order to establish whether or not a statistical relationship exists, a sample size of at least 30 was needed. This research only had eight companies respond with usable data for correlating the CEO leadership styles. When correlating the CEO's leadership style to the TQM implementation level using both the application score and the consensus score, and when correlating it to the individual category scores, the sample size was only seven.

In addition, the data were not diverse enough. All of the respondents were in the second or third level of TQM implementation for the chi-square tests of independence for both the application score and the consensus score. For the tests of the CEO's leadership style versus the individual category scores, not all levels for each category score were represented, either. In the correlation of CEO leadership style and the number of years the company has been implementing TQM, none of the companies have been involved in TQM for 9 to 12 years, and only one company has been involved in it for 13 to 16 years. Also, for all of the chi-square tests of independence, none of the CEOs had a directing leadership style. For a proper chi-square analysis, the expected frequency in at least 80 percent of the cells would be at least five. Since the sample sizes were so small and since

the data were not diverse, most of the expected frequencies were equal to zero. Thus, the chi-square tests were statistically unreliable.

However, despite the small sample size, the data did present reason to believe that there was no relationship between only one CEO leadership style and each level of TQM implementation. When comparing the CEO's leadership style to the level of TQM implementation using both the application score and the consensus score, at least two different leadership styles were found among both Level II and Level III companies. In addition, the leadership styles appeared to be evenly distributed in each level. Thus, no one leadership style seemed to predominate in either TQM level. This distribution of the data supported the conclusion that there was no statistical relationship between one CEO leadership style and each level of TQM implementation.

On the other hand, the z-test using the CEO data suggested that the coaching leadership style was more predominant and may be the preferred leadership style for CEOs to use during TQM implementation. However, for those tests to be statistically valid, both the sample size times the expected probability, np_o, and the sample size times the quantity of one minus the expected probability, $n(1 - p_o)$, would have to have been greater than or equal to five. For both conditions to be true, the sample size would have to have been at least 20. Since the sample size was only seven, the first condition was not true, and thus, the results were not statistically reliable.

Further, because Levels I and IV were not represented, it was not possible to make inferences about all levels. Even so, however, there was no a priori reason to believe that coaching would not have been the leadership style of choice for Level I, also. On the other hand, a Level IV company might not have had a coaching leader. Since the goal of

world-class quality companies is to give the employees authority and responsibility for quality tasks, the leader would have to have either a participating (low task-orientation, high relationship-orientation) or a delegating (low task-orientation, low relationship-orientation) style.

The "ideal" profile of a Level IV leader developed by "The Conference Board, Inc." was supported by the z-tests using the data from all the respondents. According to the results from the z-tests, the coaching style was predominant in Level II companies, the coaching and the participating styles were predominant in Level III companies, and the participating style was predominant in Level IV companies. Assuming a priori that Level I companies would have had coaching leaders, the z-tests suggested that in the first two level of TQM implementation, the coaching style would be preferred. In Level III, leaders might be switching from the coaching style to the participating style. Finally, in Level IV, the participating style would be preferred.

Even though the z-tests for all the respondents appeared to be statistically valid, there were flaws in the analyses. The respondents did not indicate which manager was being evaluated. Therefore, the possibility existed that two or more respondents in a particular company were evaluating one manager, and thus, those data points would have been combined into one data point. In the z-tests performed, however, all the respondents were represented as individual data points. Thus, the number of data points for the z-tests were most likely inflated, and thus unreliable.

7. CONCLUSION

7.1. FINAL RESULTS

The results of this research were as follows. There was no statistically significant relationship between the CEO's leadership style and the level of TQM implementation using the application score. There was no statistically significant relationship between the CEO's leadership style and the level of TQM implementation using the consensus score. There was no statistically significant relationship between the CEO's leadership style and the individual category scores (Senior Executive Leadership, Information and Analysis, Strategic Quality Planning, Human Resource Development and Management, Management of Process Quality, Quality and Operational Results, and Customer Focus and Satisfaction). There was no statistically significant relationship between the CEO's leadership style and the number of years the company has been implementing TQM. There was no statistically significant relationship between the CEO's leadership style and the number of employees in the company.

The z-tests using the CEO data suggested that coaching was the predominant CEO leadership style used during TQM implementation, while the directing style was not predominant. The z-tests using all the data suggested that both coaching and participating were the predominant styles used during TQM implementation. Specifically, coaching was predominant in Level II, coaching and participating were predominant in Level III, and participating was predominant in Level IV. The directing style was not predominant during TQM implementation.

7.2. FUTURE RESEARCH

Even though the results of this research were unreliable, this paper tried to determine if a relationship between TQM implementation and leadership style exists. In order to determine if a statistical relationship exists between leadership style and the level of TQM implementation, more data need to be found in the future. Data could possibly be obtained from other states whose quality awards are also based on the Malcolm Baldrige National Quality Award (MBNQA) or from companies who have applied for the MBNQA itself. At the current time, however, the National Institute of Standards and Technology (NIST), the managers of the MBNQA, will not release confidential information concerning the applicants' scores.

However, as this research suggests, there may be no relationship between the CEO's leadership style and the company's level of TQM implementation. This possibility also warrants further research in the future. One possible reason for the lack of a statistical relationship may be similar to the discovery of the importance of interpersonal factors in the workplace by Elton Mayo and his associates in the 1920s (Forsyth, 1990). Mayo and his associates varied several physical features of the work environment at the Hawthorne Plant of the Western Electric Company while measuring the workers' output. For example, Mayo moved a group of workers to a separate room in order to monitor their performance. Next, he introduced factors that were expected to hurt job performance, such as reduced lighting and fewer rest periods, and he introduced factors that were expected to improve job performance, such as better lighting and more rest periods. Surprisingly, in every case, worker output increased. Mayo recognized that the physical features that he had manipulated were not as important as the social factors

present in the work group. Apparently, the workers felt that the company was taking a special interest in them, and so they responded by working harder. This change in behavior of a group as a result of observation is known as the Hawthorne effect. This discovery by Mayo emphasized the importance of considering interpersonal factors in the workplace. In the TQM environment, the company unites as a team to improve quality. The improvements in quality may be attributed more to the benefits of the new interpersonal relationships between the workers than to the leadership style of the CEO. Team building has been shown to help maximize organizational effectiveness (Forsyth, 1990) and is an important factor in TQM (Waldman, 1993). Thus, the degree of importance of team building versus leadership style may warrant future research. Another study which investigated the relationship between Herzberg's two-factor theory of job satisfaction and quality improvement implementation supports this possibility (Utley, Westbrook, and Turner, 1997). The study concluded that more emphasis on motivator factors, such as accomplishment, recognition, responsibility, and teamwork, contributes positively to quality management implementation.

Another possible explanation for the lack of a relationship may be related to the level of TQM implementation the company is at before a full-fledged TQM program is started. Some companies may start the journey toward world-class quality from scratch, while other companies may already have some aspects important to a TQM program already established. Consider two companies. One company has a coaching style leader, but is at Level I. Another company also has a coaching style leader, but is at Level II. As each company progresses through their quality program, the leadership styles of their leaders may actually change, for example, from coaching to participating to delegating as

the company changes TQM levels. However, since each company started their journey at different levels, then different leadership styles may be found in each TQM level of implementation. Thus, there may be a pattern of leadership style change as a company approaches world-class quality, but a particular leadership style may not be associated with a particular level of TQM implementation. This possibility may also warrant future research.

The z-tests suggested the most likely possibility. The z-tests suggested a pattern of leadership style change may occur during TQM implementation. In an increasingly competitive, international market, quality (and, thus, TQM) is an important factor in the success or failure of an organization. Since successful TQM is partly dependent on the leadership style(s) of the leaders, it is important to understand what this pattern of leadership style may be.

The coaching leadership style, which is high in both task- and relationship-oriented behaviors, may be preferred in the early levels of TQM when the workers are learning the concepts and tools of TQM. After everyone is more comfortable applying the concepts and tools in Level III, the leaders may prefer to "back-off" from the high task-orientated activities, such as setting all of the goals and deciding how the work should be done. In other words, a change from the coaching style to a participating leadership style may occur in Level III. Finally, the participating style may be preferred in Level IV. The participative style allows the leaders to delegate more responsibilities to the subordinates, while still remaining supportive of the subordinates' actions. If TQM is to succeed, it is important for managers to delegate authority and responsibility to their workers and to support organization members in their pursuit of quality. This theory of leadership style

change would also account for the lack of correlation between leadership styles and TQM levels since two leadership styles are predominant in one TQM level. To further research this theory, as well as the other possibilities mentioned above, more data are needed.

It is important for American businesses to understand and implement TQM if they are to remain competitive in a global marketplace. The findings of this research advocate the use of situational leadership during TQM implementation. Since leadership is a driving force in TQM implementation, managers must understand when to change leadership styles and which leadership styles to use. If managers use the coaching style in the early phases of TQM and then switch to the participative style after the organizational members are more comfortable with implementing TQM philosophies and tools, the job of leading the organization through TQM implementation will be easier. In the end, the organization will be able to excel in the pursuit of better quality, and thus, the organization will remain competitive on both a national and an international scale.

APPENDIX A

Scoring Guidelines for 1994 Missouri Quality Award

SCORE	APPROACH/DEPLOYMENT	RESULTS
0%	• no systematic approach evident; anecdotal information	• no results or poor results in areas reported
10% to 30%	• beginning of a systematic approach to the primary purposed of the Item • early stages of a transition from reacting to problems to preventing problems • major gaps exist in deployment that would inhibit progress in achieving the primary purposes of the Item	• early stages of developing trends; some improvements and/or early good performance levels in a few areas • results not reported for many to most areas of importance to the applicant's key operating requirements
40% to 60%	• a sound, systematic approach, responsive to the primary purposes of the Item • a fact-based improvement process in place in key areas; more emphasis is placed on improvement than on reaction to problems • no major gaps in deployment, though some areas or work units may be in very early stages of deployment	• improvement trends and/or good performance levels reported for many to most areas of importance to the applicant's key operating requirements • no pattern of adverse trends and/or poor performance levels in areas of importance to the applicant's key operating requirements • some trends and/or current performance levels--evaluated against relevant comparisons and/or benchmarks - show areas of strength and/or good to very good relative performance levels
70% to 90%	• a sound, systematic approach, responsive to the overall purposes of the Item • a fact-based improvement process is a key management tool; clear evidence of refinement and improved integration as a result of improvement cycles and analysis • approach is well-deployed, with no major gaps; deployment may vary in some areas of work units	• current performance is good to excellent in most areas of importance to the applicant's key operating requirements • most improvement trends and/or performance levels are sustained • many to most trends and/or current performance levels - evaluated against relevant comparisons and/or benchmarks - show areas of leadership and very good relative performance levels
100%	• a sound, systematic approach, fully responsive to all the requirements of the Item • a very strong, fact-based improvement process is a key management tool; strong refinement and integration - backed by excellent analysis • approach is fully deployed without any significant gaps in any areas or work units	• current performance is excellent in most areas of importance to the applicant's key operating requirements • excellent improvement trends and/or sustained excellent performance levels in most areas • strong evidence of industry and benchmark leadership demonstrated in many areas

APPENDIX B

The Leader Behavior Description Questionnaire (Randolph & Blackburn Version)

Directions: The following items may be used to describe the behavior of your leader or supervisor. Each item describes a specific kind of behavior, but does not ask you to judge whether the behavior is desirable or undesirable. This is not a test of ability. It simply asks you to describe, as accurately as you can, the behavior of your supervisor or leader. Think about how frequently your leader engages in the behavior described by each item. Put a check in the appropriate column that describes whether he/she: (A) *always*, (B) *often*, (C) *occasionally*, (D) *seldom*, or (E) *never* acts as described by each item.

	A	B	C	D	E		A	B	C	D	E
1. I make my attitudes clear to the group.						2. I do personal favors for subordinates.					
3. I try out my new ideas with my group.						4. I do little things to make it pleasant to be a member of the group.					
5. I rule with an iron hand.						6. I am easy to understand.					
7. I speak in a manner not to be questioned.						8. I find time to listen to subordinates.					
9. I criticize poor work.						10. I mix with subordinates rather than keeping to myself.					
11. I assign subordinates to particular tasks.						12. I look out for the personal welfare of individuals in my group.					
13. I schedule the work.						14. I explain my actions to subordinates.					
15. I maintain definite standards of performance.						16. I consult subordinates before action.					
17. I emphasize the meeting of deadlines.						18. I back up subordinates in their action.					
19. I encourage the use of uniform procedures.						20. I treat all subordinates as equals.					
21. I make sure that my part in the organization is understood.						22. I am willing to make changes.					
23. I ask that subordinates follow standard rules and regulations.						24. I am friendly and approachable.					
25. I let subordinates know what is expected of them.						26. I make subordinates feel at ease when talking with them.					
27. I see to it that subordinates are working up to capacity.						28. I put suggestions made by my group into action.					
29. I see to it that the work of subordinates is coordinated						30. I get group approval in important matters before acting.					
Total						Total					

APPENDIX C

Scoring the Leader Behavior Description Questionnaire (LBDQ)

SCORING THE LBDQ

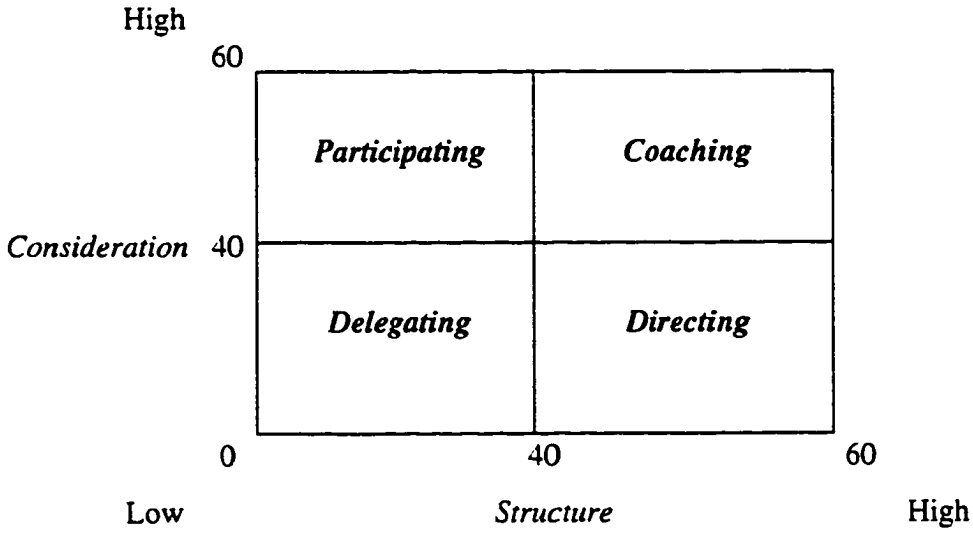
Directions: Total the checks in each column of the LBDQ and enter in the square below each column. The columns on the left hand represent initiating Structure values. The right hand columns represent Consideration values. Record the column totals by the weighting factors indicated. Add these for a grand total representing the initiating Structure value and the Consideration value.

Structure			***Consideration***		
Always	x 4 =	_____	Always	x 4 =	_____
Often	x 3 =	_____	Often	x 3 =	_____
Occasionally	x 2 =	_____	Occasionally	x 2 =	_____
Seldom	x 1 =	_____	Seldom	x 1 =	_____
Never	x 0 =	_____	Never	x 0 =	_____
	Total	_____		Total	_____

ASSESSING LEADERSHIP STYLE

Directions: In order to assess the leadership style, examine the scores above and find the appropriate leadership style in the table below.

Structure Score	***Consideration*** Score	Leadership Style
40 or above	below 40	Directing
40 or above	40 or above	Coaching
below 40	40 or above	Participating
below 40	below 40	Delegating



APPENDIX D

The Revised Leader Behavior Description Questionnaire (LBDQ)

Directions: The following items may be used to describe the behavior of your leader or supervisor. Each item describes a specific kind of behavior, but does not ask you to judge whether the behavior is desirable or undesirable. This is not a test of ability. It simply asks you to describe, as accurately as you can, the behavior of your supervisor or leader. Think about how frequently your leader engages in the behavior described by each item. Put a check in the appropriate column that describes whether he/she: (A) *always*, (B) *often*, (C) *occasionally*, (D) *seldom*, or (E) *never* acts as described by each item.

	A	B	C	D	E		A	B	C	D	E
1. He/she makes his/her attitudes clear to the group.						2. He/she does personal favors for subordinates.					
3. He/she tries out his/her new ideas with the group.						4. He/she does little things to make it pleasant to be a member of the group.					
5. He/she rules with an iron hand.						6. He/she is easy to understand.					
7. He/she speaks in a manner not to be questioned.						8. He/she finds time to listen to subordinates.					
9. He/she criticizes poor work.						10. He/she mixes with subordinates rather than keeping to him/herself.					
11. He/she assigns subordinates to particular tasks.						12. He/she looks out for the personal welfare of individuals in the group.					
13. He/she schedules the work.						14. He/she explains his/her actions to subordinates.					
15. He/she maintains definite standards of performance.						16. He/she consults subordinates before action.					
17. He/she emphasizes the meeting of deadlines.						18. He/she backs up subordinates in their action.					
19. He/she encourages the use of uniform procedures.						20. He/she treats all subordinates as equals.					
21. He/she makes sure that his/her part in the organization is understood.						22. He/she is willing to make changes.					
23. He/she asks that subordinates follow standard rules and regulations.						24. He/she is friendly and approachable.					
25. He/she lets subordinates know what is expected of them.						26. He/she makes subordinates feel at ease when talking with them.					
27. He/she sees to it that subordinates are working up to capacity.						28. He/she puts suggestions made by the group into action.					
29. He/she sees to it that the work of subordinates is coordinated						30. He/she gets group approval in important matters before acting.					
Total						Total					

APPENDIX E

Missouri Quality Award Applicant Information with CEO Data

Company	CEO Leadership Style: Structure	CEO Leadership Style: Consideration	CEO Leadership Style: Style	# in sample	Overall Score: Application	Overall Score: Consensus
A	45.0	51.0	Coaching	1*	322.20	351
B	45.0	55.0	Coaching	1*	415.30	442
C**	49.0	55.0	Coaching	1*	349.17	347
D	31.0	32.0	Delegating	2	311.70	312
E	43.0	54.0	Coaching	2	483.20	455
F	32.0	26.3	Delegating	3	N/A	545
G	35.0	51.0	Participating	1	423.80	N/A
H	38.0	34.3	Delegating	3	430.40	400

Company	Individual Category Score***: Senior Executive Leadership	Information and Analysis	Strategic Quality Planning	Human Resource Development and Management	Management of Process Quality	Quality and Operational Results	Customer Focus and Satisfaction
A	43.40%	25.41%	42.16%	31.61%	34.91%	24.45%	34.65%
B	41.94%	47.59%	59.75%	33.83%	38.75%	40.00%	41.80%
C**	42.04%	30.08%	44.45%	32.78%	33.57%	29.48%	36.93%
D	41.88%	16.51%	18.64%	42.32%	45.09%	30.40%	21.20%
E	64.72%	59.51%	54.25%	78.00%	43.75%	42.93%	37.23%
F	N/A	N/A	N/A	N/A	N/A	N/A	N/A
G	55.83%	37.08%	41.71%	47.55%	47.68%	40.00%	35.80%
H	52.71%	50.92%	42.38%	42.06%	47.41%	33.52%	44.95%

Company	Years Implementing TQM	Number of Employees
A	6	350
B	4	1156
C**	4	550
D	6	1011
E	8	600
F	6	241
G	16	1500
H	6	3000

* self-evaluation
** from 1994 Application: all others are from 1995 Applications
*** converted to a % since 1994 and 1995 Applications weight the individual category scores differently

APPENDIX F

Statistics for All Respondents

Company	TQM Level for Applic.	Application Score	Tqm Level for Consen.	Consensus Score	Management Level	Number o Respondents	Leadership Style Directing	Coaching	Participating	Delegating
A	II	322.2	II	351	Senio	1	0	1	0	0
					Middle	0	0	0	0	0
					Lower	0	0	0	0	0
					Non-mgt	0	0	0	0	0
					Unknown	0	0	0	0	0
					Total	1	0	1	0	0
					% of Total		0.00%	100.00%	0.00%	0.00%
B	II	349.17	II	347	Senio	1	0	1	0	0
					Middle	0	0	0	0	0
					Lower	0	0	0	0	0
					Non-mgt	0	0	0	0	0
					Unknown	0	0	0	0	0
					Total	1	0	1	0	0
					% of Total		0.00%	100.00%	0.00%	0.00%
C	II	311.7	II	312	Senio	4	0	1	1	2
					Middle	3	0	1	2	0
					Lower	4	1	1	1	1
					Non-mgt	2	1	1	0	0
					Unknown	2	0	1	0	1
					Total	15	2	5	4	4
					% of Total		13.33%	33.33%	26.67%	26.67%
D	II	415.3	II	442	Senio	1	0	1	0	0
					Middle	0	0	0	0	0
					Lower	0	0	0	0	0
					Non-mgt	0	0	0	0	0
					Unknown	0	0	0	0	0
					Total	1	0	1	0	0
					% of Total		0.00%	100.00%	0.00%	0.00%
E	II	415.3	II	455	Senio	9	0	5	3	1
					Middle	14	1	2	5	6
					Lower	8	1	4	2	1
					Non-mgt	3	0	0	3	0
					Unknown	18	0	13	4	1
					Total	52	2	24	17	9
					% of Total		3.85%	46.15%	32.69%	17.31%
F	II	430.4	II	400	Senio	3	0	2	0	1
					Middle	19	3	4	9	3
					Lower	5	0	0	3	2
					Non-mgt	0	0	0	0	0
					Unknown	0	0	0	0	0
					Total	27	3	6	12	6
					% of Total		11.11%	22.22%	44.44%	22.22%

Company	TQM Level for Applic.	Application Score	Tqm Level for Consen.	Consensus Score	Management Level	Number o Respondents	Leadership Style Directing	Coaching	Participating	Delegating
G	II	423.8	N/A	N/A	Senio	1	0	0	1	0
					Middle	0	0	0	0	0
					Lower	0	0	0	0	0
					Non-mgt	0	0	0	0	0
					Unknown	0	0	0	0	0
					Total	1	0	0	1	0
					% of Total		0.00%	0.00%	100.00%	0.00%
H	N/A	N/A	II	545	Senio	3	0	0	0	3
					Middle	4	1	0	2	1
					Lower	1	0	0	0	1
					Non-mgt	6	1	3	1	1
					Unknown	0	0	0	0	0
					Total	14	2	3	3	6
					% of Total		14.29%	21.43%	21.43%	42.86%
I	II	341.6	II	199	Senio	3	0	3	0	0
					Middle	1	0	0	1	0
					Lower	2	0	2	0	0
					Non-mgt	1	0	1	0	0
					Unknown	0	0	0	0	0
					Total	7	0	6	1	0
					% of Total		0.00%	85.71%	14.29%	0.00%
J	II	502.72	IV	570	Senio	0	0	0	0	0
					Middle	7	0	2	3	2
					Lower	8	1	1	5	1
					Non-mgt	3	1	1	1	0
					Unknown	1	0	0	1	0
					Total	19	2	4	10	3
					% of Total		10.53%	21.05%	52.63%	15.79%
K	II	407.5	II	415	Senio	0	0	0	0	0
					Middle	2	0	0	1	1
					Lower	2	0	1	0	1
					Non-mgt	0	0	0	0	0
					Unknown	0	0	0	0	0
					Total	4	0	1	1	2
					% of Total		0.00%	25.00%	25.00%	50.00%
L	II	555.1	II	550	Senio	0	0	0	0	0
					Middle	1	0	1	0	0
					Lower	0	0	0	0	0
					Non-mgt	18	0	5	10	3
					Unknown	0	0	0	0	0
					Total	19	0	6	10	3
					% of Total		0.00%	31.58%	52.63%	15.79%

Company	TQM Level for Applic.	Application Score	Tqm Level for Consen.	Consensus Score	Management Level	Number o Respondents	Leadership Style Directing	Coaching	Participating	Delegating
M	N/A	N/A	IV	565	Senio	0	0	0	0	0
					Middle	1	0	0	1	0
					Lower	0	0	0	0	0
					Non-mgt	0	0	0	0	0
					Unknown	0	0	0	0	0
					Total	1	0	0	1	0
					% of Total		0.00%	0.00%	100.00%	0.00%
N	II	259.22	II	262	Senio	0	0	0	0	0
					Middle	0	0	0	0	0
					Lower	1	0	0	0	1
					Non-mgt	0	0	0	0	0
					Unknown	0	0	0	0	0
					Total	1	0	0	0	1
					% of Total		0.00%	0.00%	0.00%	100.00%
O	II	267.9	II	268	Senio	0	0	0	0	0
					Middle	0	0	0	0	0
					Lower	0	0	0	0	0
					Non-mgt	1	0	1	0	0
					Unknown	0	0	0	0	0
					Total	1	0	1	0	0
					% of Total		0.00%	100.00%	0.00%	0.00%
P	II	373.44	II	505	Senio	0	0	0	0	0
					Middle	0	0	0	0	0
					Lower	0	0	0	0	0
					Non-mgt	0	0	0	0	0
					Unknown	1	0	1	0	0
					Total	1	0	1	0	0
					% of Total		0.00%	100.00%	0.00%	0.00%
All					Senio	26	0	14	5	7
					Middle	52	5	10	24	13
					Lower	31	3	9	11	8
					Non-mgt	34	3	12	15	4
					Unknown	22	0	15	5	2
					Total	165	11	60	60	34
					% of Total		6.67%	36.36%	36.36%	20.61%

Note: Company IDs do not correspond with Company IDs in Appendix E.

APPENDIX G

Analysis of Data Using Chi-Square Tests of Independence

CEO Leadership Style vs. TQM Implementation Level Using the Application Score

OBSERVED FREQUENCIES

	TQM Implementation Level				
Leadership Style	I (0-187)	II (188-375)	III (376-563)	IV (564-1000)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	2.00	2.00	0.00	4.00
Participating	0.00	0.00	1.00	0.00	1.00
Delegating	0.00	1.00	1.00	0.00	2.00
Total	0.00	3.00	4.00	0.00	7.00

EXPECTED FREQUENCIES

	TQM Implementation Level				
Leadership Style	I (0-187)	II (188-375)	III (376-563)	IV (564-1000)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	1.71	2.29	0.00	4.00
Participating	0.00	0.43	0.57	0.00	1.00
Delegating	0.00	0.86	1.14	0.00	2.00
Total	0.00	3.00	4.00	0.00	7.00

(O-E)^2/E

				Total	
0.00	0.00	0.00	0.00	0.00	
0.00	0.05	0.04	0.00	0.08	
0.00	0.43	0.32	0.00	0.75	
0.00	0.02	0.02	0.00	0.04	
				0.88	$= X^2$

H: CEO leadership style and TQM level are independent.
A: TQM level is dependent on CEO leadership style.

N = 7, 4 X 4 table.
Level of significance = 0.10, df = 9
Reject null hypothesis if $X^2 >= 14.684$

Accept null hypothesis: CEO leadership style and TQM level are independent.

CEO Leadership Style vs. TQM Implementation Level Using the Consensus Score

OBSERVED FREQUENCIES

	TQM Implementation Level				
Leadership Style	I (0-187)	II (188-375)	III (376-563)	IV (564-1000)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	2.00	2.00	0.00	4.00
Participating	0.00	0.00	0.00	0.00	0.00
Delegating	0.00	1.00	2.00	0.00	3.00
Total	0.00	3.00	4.00	0.00	7.00

EXPECTED FREQUENCIES

	TQM Implementation Level				
Leadership Style	I (0-187)	II (188-375)	III (376-563)	IV (564-1000)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	1.71	2.29	0.00	4.00
Participating	0.00	0.00	0.00	0.00	0.00
Delegating	0.00	1.29	1.71	0.00	3.00
Total	0.00	3.00	4.00	0.00	7.00

(O-E)^2/E

				Total	
0.00	0.00	0.00	0.00	0.00	
0.00	0.05	0.04	0.00	0.08	
0.00	0.00	0.00	0.00	0.00	
0.00	0.06	0.05	0.00	0.11	
				0.19	***= X^2***

H: CEO leadership style and TQM level are independent.
A: TQM level is dependent on CEO leadership style.

N = 7. 4 X 4 table.
Level of significance = 0.10. df = 9
Reject null hypothesis if $X^2 >= 14.684$

Accept null hypothesis: CEO leadership style and TQM level are independent.

CEO Leadership Style vs. Leadership Category Score

OBSERVED FREQUENCIES

	Percentile Rank of Leadership Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III (37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	0.00	3.00	1.00	4.00
Participating	0.00	0.00	1.00	0.00	1.00
Delegating	0.00	0.00	2.00	0.00	2.00
Total	0.00	0.00	6.00	1.00	7.00

EXPECTED FREQUENCIES

	Percentile Rank of Leadership Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III 37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	0.00	3.43	0.57	4.00
Participating	0.00	0.00	0.86	0.14	1.00
Delegating	0.00	0.00	1.71	0.29	2.00
Total	0.00	0.00	6.00	1.00	7.00

(O-E)^2/E

				Total	
0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.05	0.32	0.38	
0.00	0.00	0.02	0.14	0.17	
0.00	0.00	0.05	0.29	0.33	
				0.88	**= X^2**

H: CEO leadership style and Leadership score are independent.
A: Leadership score is dependent on CEO leadership style.

N = 7, 4 X 4 table.
Level of significance = 0.10, df = 9
Reject null hypothesis if X^2 >= 14.684

Accept null hypothesis: CEO leadership style and Leadership score are independent.

CEO Leadership Style vs. Information and Analysis Category Score

OBSERVED FREQUENCIES

	Percentile Rank of Information and Analysis Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III (37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	2.00	1.00	1.00	4.00
Participating	0.00	1.00	0.00	0.00	1.00
Delegating	1.00	0.00	1.00	0.00	2.00
Total	1.00	3.00	2.00	1.00	7.00

EXPECTED FREQUENCIES

	Percentile Rank of Information and Analysis Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III (37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.57	1.71	1.14	0.57	4.00
Participating	0.14	0.43	0.29	0.14	1.00
Delegating	0.29	0.86	0.57	0.29	2.00
Total	1.00	3.00	2.00	1.00	7.00

(O-E)^2/E

				Total	
0.00	0.00	0.00	0.00	0.00	
0.57	0.05	0.02	0.32	0.96	
0.14	0.76	0.29	0.14	1.33	
1.79	0.86	0.32	0.29	3.25	
				5.54	= X^2

H: CEO leadership style and Information and Analysis score are independent.
A: Information and Analysis score is dependent on CEO leadership style.

N = 7. 4 X 4 table.
Level of significance = 0.10. df = 9
Reject null hypothesis if X^2 >= 14.684

Accept null hypothesis: CEO leadership style and Information and Analysis score are independent.

CEO Leadership Style vs. Strategic Quality Planning Category Score

OBSERVED FREQUENCIES

	Percentile Rank of Strategic Quality Planning Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III (37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	0.00	3.00	1.00	4.00
Participating	0.00	0.00	1.00	0.00	1.00
Delegating	1.00	0.00	1.00	0.00	2.00
Total	1.00	0.00	5.00	1.00	7.00

EXPECTED FREQUENCIES

	Percentile Rank of Strategic Quality Planning Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III (37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.57	0.00	2.86	0.57	4.00
Participating	0.14	0.00	0.71	0.14	1.00
Delegating	0.29	0.00	1.43	0.29	2.00
Total	1.00	0.00	5.00	1.00	7.00

(O-E)^2/E

				Total	
0.00	0.00	0.00	0.00	0.00	
0.57	0.00	0.01	0.32	0.90	
0.14	0.00	0.11	0.14	0.40	
1.79	0.00	0.13	0.29	2.20	
				3.50	**= X^2**

H: CEO leadership style and Strategic Quality Planning score are independent.
A: Strategic Quality Planning score is dependent on CEO leadership style.

N = 7, 4 X 4 table.
Level of significance = 0.10, df = 9
Reject null hypothesis if $X^2 >= 14.684$

Accept null hypothesis: CEO leadership style and Strategic Quality Planning score are independent.

CEO Leadership Style vs. Human Resource Development and Management Category Score

OBSERVED FREQUENCIES

	Percentile Rank of Human Resource Development and Management Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III (37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	0.00	3.00	1.00	4.00
Participating	0.00	0.00	1.00	0.00	1.00
Delegating	0.00	0.00	2.00	0.00	2.00
Total	0.00	0.00	6.00	1.00	7.00

EXPECTED FREQUENCIES

	Percentile Rank of Human Resource Development and Management Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III (37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	0.00	3.43	0.57	4.00
Participating	0.00	0.00	0.86	0.14	1.00
Delegating	0.00	0.00	1.71	0.29	2.00
Total	0.00	0.00	6.00	1.00	7.00

(O-E)^2/E

				Total	
0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.05	0.32	0.38	
0.00	0.00	0.02	0.14	0.17	
0.00	0.00	0.05	0.29	0.33	
				0.88	= X^2

H: CEO leadership style and Human Resource Development and Management score are independent.
A: Human Resource Development and Management score is dependent on CEO leadership style.

N = 7, 4 X 4 table.
Level of significance = 0.10, df = 9
Reject null hypothesis if $X^2 >= 14.684$

Accept null hypothesis: CEO leadership style and Human Resource Development and Management score are independent.

CEO Leadership Style vs. Management of Process Quality Category Score

OBSERVED FREQUENCIES

	Percentile Rank of Management of Process Quality Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III (37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	2.00	2.00	0.00	4.00
Participating	0.00	0.00	1.00	0.00	1.00
Delegating	0.00	0.00	2.00	0.00	2.00
Total	0.00	2.00	5.00	0.00	7.00

EXPECTED FREQUENCIES

	Percentile Rank of Management of Process Quality Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III (37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	1.14	2.86	0.00	4.00
Participating	0.00	0.29	0.71	0.00	1.00
Delegating	0.00	0.57	1.43	0.00	2.00
Total	0.00	2.00	5.00	0.00	7.00

(O-E)^2/E

				Total	
0.00	0.00	0.00	0.00	0.00	
0.00	0.64	0.26	0.00	0.90	
0.00	0.29	0.11	0.00	0.40	
0.00	0.57	0.23	0.00	0.80	
				2.10	**= X^2**

H: CEO leadership style and Management of Process Quality score are independent.
A: Management of Process Quality score is dependent on CEO leadership style.

N = 7, 4 X 4 table.
Level of significance = 0.10, df = 9
Reject null hypothesis if $X^2 >= 14.684$

Accept null hypothesis: CEO leadership style and Management of Process Quality score are independent.

CEO Leadership Style vs. Quality and Operational Results Category Score

OBSERVED FREQUENCIES

	Percentile Rank of Quality and Operational Results Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III (37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	2.00	2.00	0.00	4.00
Participating	0.00	0.00	1.00	0.00	1.00
Delegating	0.00	2.00	0.00	0.00	2.00
Total	0.00	4.00	3.00	0.00	7.00

EXPECTED FREQUENCIES

	Percentile Rank of Quality and Operational Results Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III (37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	2.29	1.71	0.00	4.00
Participating	0.00	0.57	0.43	0.00	1.00
Delegating	0.00	1.14	0.86	0.00	2.00
Total	0.00	4.00	3.00	0.00	7.00

(O-E)^2/E

				Total	
0.00	0.00	0.00	0.00	0.00	
0.00	0.04	0.05	0.00	0.08	
0.00	0.57	0.76	0.00	1.33	
0.00	0.64	0.86	0.00	1.50	
				2.92	= X^2

H: CEO leadership style and Quality and Operational Results score are independent.
A: Quality and Operational Results score is dependent on CEO leadership style.

N = 7. 4 X 4 table.
Level of significance = 0.10. df = 9
Reject null hypothesis if X^2 >= 14.684

Accept null hypothesis: CEO leadership style and Quality and Operational Results score are independent.

CEO Leadership Style vs. Customer Focus and Satisfaction Category Score

OBSERVED FREQUENCIES

	Percentile Rank of Customer Focus and Satisfaction Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III (37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	3.00	1.00	0.00	4.00
Participating	0.00	1.00	0.00	0.00	1.00
Delegating	0.00	1.00	1.00	0.00	2.00
Total	0.00	5.00	2.00	0.00	7.00

EXPECTED FREQUENCIES

	Percentile Rank of Customer Focus and Satisfaction Score				
Leadership Style	I (0-18.7%)	II (18.8%-37.5%)	III (37.6%-56.3%)	IV (56.4%-100%)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	0.00	2.86	1.14	0.00	4.00
Participating	0.00	0.71	0.29	0.00	1.00
Delegating	0.00	1.43	0.57	0.00	2.00
Total	0.00	5.00	2.00	0.00	7.00

(O-E)^2/E

				Total	
0.00	0.00	0.00	0.00	0.00	
0.00	0.01	0.02	0.00	0.03	
0.00	0.11	0.29	0.00	0.40	
0.00	0.13	0.32	0.00	0.45	
				0.88	**= X^2**

H: CEO leadership style and Customer Focus and Satisfaction score are independent.
A: Customer Focus and Satisfaction score is dependent on CEO leadership style.

N = 7, 4 X 4 table.
Level of significance = 0.10, df = 9
Reject null hypothesis if X^2 >= 14.684

Accept null hypothesis: CEO leadership style and Customer Focus and Satisfaction score are independent.

CEO Leadership Style vs. Years Implementing TQM

OBSERVED FREQUENCIES

	Years Implementing TQM				
Leadership Style	I (0-4)	II (5-8)	III (9-12)	IV (13-16)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	2.00	2.00	0.00	0.00	4.00
Participating	0.00	0.00	0.00	1.00	1.00
Delegating	0.00	3.00	0.00	0.00	3.00
Total	2.00	5.00	0.00	1.00	8.00

EXPECTED FREQUENCIES

	Years Implementing TQM				
Leadership Style	I (0-4)	II (5-8)	III (9-12)	IV (13-16)	Total
Directing	0.00	0.00	0.00	0.00	0.00
Coaching	1.00	2.50	0.00	0.50	4.00
Participating	0.25	0.63	0.00	0.13	1.00
Delegating	0.75	1.88	0.00	0.38	3.00
Total	2.00	5.00	0.00	1.00	8.00

(O-E)^2/E

				Total	
0.00	0.00	0.00	0.00	0.00	
1.00	0.10	0.00	0.50	1.60	
0.25	0.63	0.00	6.13	7.00	
0.75	0.68	0.00	0.38	1.80	
				10.	**= *X^2***

H: CEO leadership style and years implementing TQM are independent
A: Years implementing TQM is dependent on CEO leadership style.

N = 8, 4 X 4 table.
Level of significance = 0.10, df = 9
Reject null hypothesis if *X^2* >= 14.684

Accept null hypothesis: CEO leadership style and years implementing TQM are independent.

CEO Leadership Style vs. Number of Employees

OBSERVED FREQUENCIES

	Number of Employees			
Leadership Style	I (0-500)	II (501-1000	III (1001-3000)	Total
Directing	0.00	0.00	0.00	0.00
Coaching	1.00	2.00	1.00	4.00
Participating	0.00	0.00	1.00	1.00
Delegating	1.00	0.00	2.00	3.00
Total	2.00	2.00	4.00	8.00

EXPECTED FREQUENCIES

	Number of Employees			
Leadership Style	I (0-500)	II (501-1000	III (1001-3000)	Total
Directing	0.00	0.00	0.00	0.00
Coaching	1.00	1.00	2.00	4.00
Participating	0.25	0.25	0.50	1.00
Delegating	0.75	0.75	1.50	3.00
Total	2.00	2.00	4.00	8.00

(O-E)^2/E

			Total	
0.00	0.00	0.00	0.00	
0.00	1.00	0.50	1.50	
0.25	0.25	0.50	1.00	
0.08	0.75	0.17	1.00	
			3.50	= *X*^2

H: CEO leadership style and number of employees are independent.
A: Number of employees is dependent on CEO leadership style.

N = 8, 4 X 3 table.
Level of significance = 0.10, df = 6
Reject null hypothesis if *X*^2 >= 10.645

Accept null hypothesis: CEO leadership style and number of employees are independent.

APPENDIX H

Analysis of Data Using Z-Tests for Significance of a Proportion

Hypothesis Testing of CEO Application Score Data Using Z-Test for Significance of a Proportion

$$z = \frac{p^{*} - p_{o}}{s_{p^{*}}}$$

$$s_{p^{*}} = \sqrt{\frac{p_{o}(1-p_{o})}{n}}$$

	Leadership Style	No. of Observations (n*)	p* = n*/n	z	p-val: H1	p-val: H2
	Directing	0	0.0000	-1.53	0.9367	0.0633
n = 7	Coaching	4	0.5714	1.96	0.0248	0.9752
p_o = 0.25	Participating	1	0.1429	-0.65	0.7437	0.2563
s_{p^*} = 0.1637	Delegating	2	0.2857	0.22	0.4136	0.5864

H1: $p = p_o$
A: $p > p_o$

Reject null hypothesis H if $z >= z_c$
Level of significance (c) = .05
z_c = 1.64

Results:
Reject null hypothesis for Coaching leadership style.
Thus, Coaching leadership style is more predominant than expected.

H2: $p = p_o$
A: $p < p_o$

Reject null hypothesis H if $z <= -z_c$
Level of significance (c) = .10
z_c = 1.28

Results:
Reject null hypothesis for Directing leadership style.
Thus, Directing leadership style is less predominant than expected.

Hypothesis Testing of CEO Consensus Score Data Using Z-Test for Significance of a Proportion

$$z = \frac{p^* - p_o}{s_{p^*}}$$

$$s_{p^*} = \sqrt{\frac{p_o(1-p_o)}{n}}$$

	Leadership Style	No. of Observations (n*)	p* = n*/n	z	p-val: H1	p-val: H2
	Directing	0	0.0000	-1.53	0.9367	0.0633
n = 7	Coaching	4	0.5714	1.96	0.0248	0.9752
p_o = 0.25	Participating	0	0.0000	-1.53	0.9367	0.0633
s_{p^*} = 0.1637	Delegating	3	0.4286	1.09	0.1376	0.8624

H1: p = p_o

A: p > p_o

Reject null hypothesis H if $z >= z_c$

Level of significance (c) = .05

z_c = 1.64

Results:

Reject null hypothesis for Coaching leadership style.

Thus, Coaching leadership style is more predominant than expected.

H2: p = p_o

A: p < p_o

Reject null hypothesis H if $z <= -z_c$

Level of significance (c) = .10

z_c = 1.28

Results:

Reject null hypothesis for Directing leadership style.

Thus, Directing leadership style is less predominant than expected.

Reject null hypothesis for Participating leadership style.

Thus, Participating leadership style is less predominant than expected.

Hypothesis Testing of Data from All Respondents Using Z-Test for Significance of a Proportion

$$z = \frac{p^{*} - p_{o}}{s_{p}}$$

$$s_{p} = \sqrt{\frac{p_{o}(1-p_{o})}{n}}$$

	Leadership Style	No. of Observations (n^{*})	$p^{*} = n^{*}/n$	z	p-val: H1	p-val: H2
	Directing	11	0.0667	-5.44	1.0000	0.0000
$n = 165$	Coaching	60	0.3636	3.37	0.0004	0.9996
$p_{o} = 0.25$	Participating	60	0.3636	3.37	0.0004	0.9996
$s_{p} = 0.0337$	Delegating	34	0.2061	-1.30	0.9038	0.0962

H1: $p = p_{o}$
A: $p > p_{o}$

Reject null hypothesis H if $z >= z_{c}$
Level of significance (c) = .05
$z_{c} = 1.64$

Results:
Reject null hypothesis for Coaching leadership style.
Thus, Coaching leadership style is more predominant than expected.

Reject null hypothesis for Participating leadership style.
Thus, Participating leadership style is more predominant than expected.

H2: $p = p_{o}$
A: $p < p_{o}$

Reject null hypothesis H if $z <= -z_{c}$
Level of significance (c) = .05
$z_{c} = 1.64$

Results:
Reject null hypothesis for Directing leadership style.
Thus, Directing leadership style is less predominant than expected.

H: $p = p_{o}$
A: $p < p_{o}$

Reject null hypothesis H if $z <= -z_{c}$
Confidence level (c) = .10
$z_{c} = 1.28$

Results:
Reject null hypothesis for Directing leadership style.
Thus, Directing leadership style is less predominant than expected.

Reject null hypothesis for Delegating leadership style.
Thus, Delegating leadership style is less predominant than expected.

Note: Used consensus score to determine TQM level for all data points except for one which only had an application score.

Hypothesis Testing of Data from All Level II Respondents Using Z-Test for Significance of a Proportion

$$z = \frac{p^{*} - p_{o}}{s_{p^{*}}}$$

$$s_{p^{*}} = \sqrt{\frac{p_{o}(1-p_{o})}{n}}$$

	Leadership Style	No. of Observations (n*)	p* = n*/n	z	p-val: H1	p-val: H2
	Directing	2	0.0769	-2.04	0.9792	0.0208
n = 26	Coaching	14	0.5385	3.40	0.0003	0.9997
p_o = 0.25	Participating	5	0.1923	-0.68	0.7515	0.2485
$s_{p^{*}}$ = 0.0849	Delegating	5	0.1923	-0.68	0.7515	0.2485

H1: $p = p_o$
A: $p > p_o$

Reject null hypothesis H if $z >= z_c$
Level of significance (c) = .05
z_c = 1.64

Results:
Reject null hypothesis for Coaching leadership style.
Thus, Coaching leadership style is more predominant than expected.

H2: $p = p_o$
A: $p < p_o$

Reject null hypothesis H if $z <= -z_c$
Level of significance (c) = .05
z_c = 1.64

Results:
Reject null hypothesis for Directing leadership style.
Thus, Directing leadership style is less predominant than expected.

Note: Used consensus score to determine TQM level for all data points

Hypothesis Testing of Data from All Level III Respondents Using Z-Test for Significance of a Proportion

$$z = \frac{\hat{p} - p_0}{s_{\hat{p}}}$$

$$s_{\hat{p}} = \sqrt{\frac{p_0(1-p_0)}{n}}$$

	Leadership Style	No. of Observations (n^*)	$p^* = n^*/n$	z	p-val: H1	p-val: H2
	Directing	7	0.0588	-4.82	1.0000	0.0000
n = 119	Coaching	42	0.3529	2.59	0.0048	0.9952
p_0 = 0.25	Participating	44	0.3697	3.02	0.0013	0.9987
$s_{\hat{p}_0}$ = 0.0397	Delegating	26	0.2185	-0.79	0.7864	0.2136

H1: $p = p_0$
A: $p > p_0$

Reject null hypothesis H if $z >= z_c$
Level of significance (c) = .05
z_c = 1.64

Results:
Reject null hypothesis for Coaching leadership style.
Thus, Coaching leadership style is more predominant than expected.

Reject null hypothesis for Participating leadership style.
Thus, Participating leadership style is more predominant than expected.

H2: $p = p_0$
A: $p < p_0$

Reject null hypothesis H if $z <= -z_c$
Level of significance (c) = .05
z_c = 1.64

Results:
Reject null hypothesis for Directing leadership style.
Thus, Directing leadership style is less predominant than expected.

Note: Used consensus score to determine TQM level for all data points except for one which only had an application score.

Hypothesis Testing of Data from All Level IV Respondents Using Z-Test for Significance of a Proportion

$$z = \frac{p^* - p_o}{s_{p^*}}$$

$$s_{p^*} = \sqrt{\frac{p_o(1-p_o)}{n}}$$

	Leadership Style	No. of Observations (n*)	p* = n*/n	z	p-val: H1	p-val: H2
	Directing	2	0.1000	-1.55	0.9393	0.0607
n = 20	Coaching	4	0.2000	-0.52	0.6972	0.3028
p_o = 0.25	Participating	11	0.5500	3.10	0.0010	0.9990
s_{p^*} = 0.0968	Delegating	3	0.1500	-1.03	0.8492	0.1508

H1: $p = p_o$
A: $p > p_o$

Reject null hypothesis H if $z >= z_c$
Level of significance (c) = .05
z_c = 1.64

Results:
Reject null hypothesis for Participating leadership style.
Thus, Participating leadership style is more predominant than expected.

H2: $p = p_o$
A: $p < p_o$

Reject null hypothesis H if $z <= -z_c$
Level of significance (c) = .10
z_c = 1.28

Results:
Reject null hypothesis for Directing leadership style.
Thus, Directing leadership style is less predominant than expected.

Note: Used consensus score to determine TQM level for all data points.

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VITA

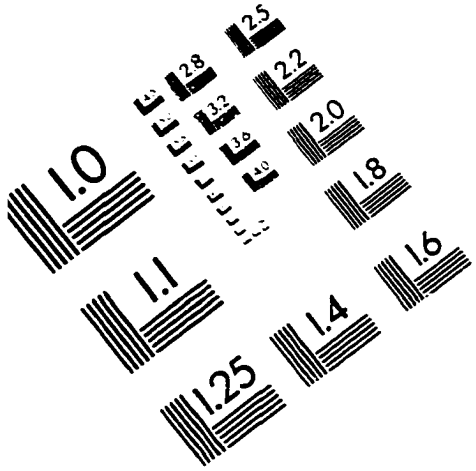
Rhonda Diane Brown was born on December 4, 1968 in St. Louis, Missouri. She completed her primary and secondary education in various public schools in St. Louis, Missouri and in Valdosta, Georgia. She received a Bachelor of Science degree in Engineering Management from the University of Missouri--Rolla in Rolla, Missouri and graduated *cum laude* in May 1992.

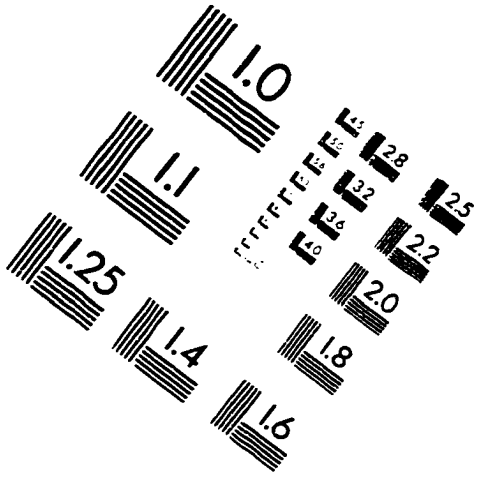
She continued graduate studies at the University of Missouri--Rolla and received a Master of Science degree in Engineering Management in May 1994. She began her doctoral studies in June 1994. In April 1995, she married and changed her name to Rhonda Diane Turvey.

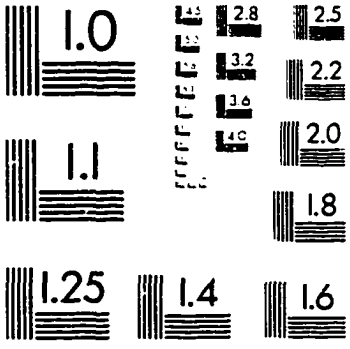
During her studies at the University of Missouri--Rolla, she was active in several student organizations, including the Independents of UMR, Student Council, and the student-run, radio station KMNR. She chaired several committees for the Independents of UMR and held the office of Treasurer. At KMNR, she held the offices of Business Manager and Station Manager. While in graduate school, she had several teaching assistantships in which she taught both Total Quality Management and Statistical Process Control. She has also been a member of the American Society of Quality since February 1994.

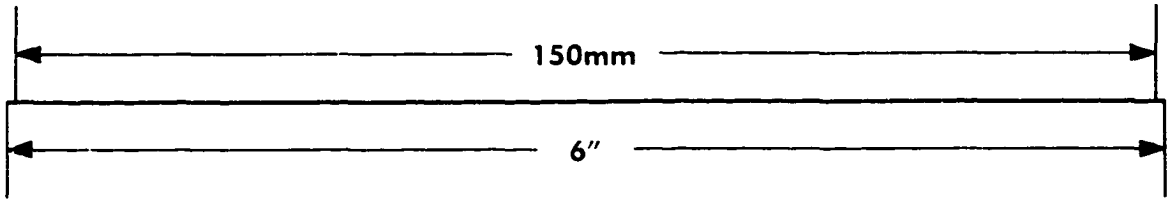
In January 1996, she became the proud mother of a beautiful baby girl. In January 1998, she began working as a Quality Assurance Engineer for Kiemschield Manufacturing Company in Columbia, Missouri.

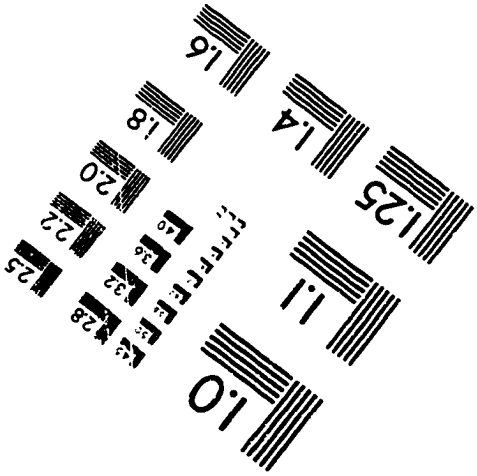
IMAGE EVALUATION TEST TARGET (QA-3)

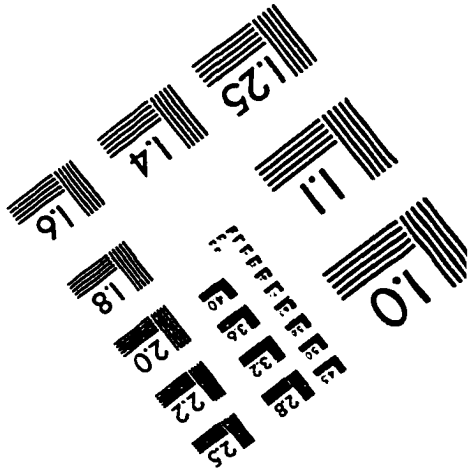












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