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JOB AND ORGANIZATIONAL DETERMINANTS OF

EMPLOYEES' PRACTICES OF TOTAL QUALITY MANAGEMENT

IN THE PUBLIC SECTOR

by

Ying-Jung Yeh

A dissertation submitted in partial fulfillment

of the requirements for the degree of

Doctor of Philosophy

(Industrial Engineering)

at the

UNIVERSITY OF WISCONSIN – MADISON

2000

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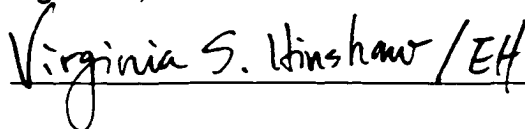
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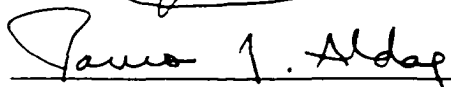
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ABSTRACT

Little research focuses on the relationship of work environment and the implementation of quality management. The purpose of this study was to investigate the effects of job and organizational factors on employees' practices of Total Quality Management (TQM). Based upon the previous literature (e.g. Schneider, et al., 1996; Shea and Howell, 1998), job and organizational determinants, which were suggested to influence the success of TQM implementation, were identified. A study model was developed to show the hypothetical relationships among job and organizational determinants and employees' TQM practices, and tested with the empirical data collected from the city government of Madison, Wisconsin. 848 useable questionnaires from a mailing of 2231 were returned in fall, 1997.

Factor analyses yielded seven factors, which described the characteristics of work environment and employees' psychological outcomes: project involvement, training received, job enrichment, standardization, centralization, self-efficacy, and involvement. These seven factors were investigated by path analysis. The three work environment factors that most strongly predicted employees' practices of TQM were standardization, job enrichment, and self-efficacy. Individuals' project involvement and received training had no direct effects on the practices of quality management, but had indirect positive effects through the impact of self-efficacy. Employees' job and organizational involvement had no direct effects on TQM practices except on the practice of customer focus and satisfaction. The impact of employees' involvement mediated the influence of standardization, job enrichment, and centralization on customer focus and satisfaction.

This study bridges the gap between organizational science and quality management. The findings also provide management implications for improving the implementation of quality management through the redesign of job and organization. A public sector was studied in this dissertation. Different influences of work environment may be found in different sectors. Further research in different sectors is suggested to investigate the generalization of the study model.

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Finally, I would like to dedicate this dissertation to my parents. This dissertation cannot be done without their supports and constant love, their wisdom in directing me a road in my life, and their examples in living a good life.

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CHAPTER 1: INTRODUCTION

Total Quality Management (TQM) has been a popular management practice since the 1980s. It has been recognized to be able to strengthen a company's competitiveness through the increase of productivity, production efficiency, delivery of better services and customer satisfaction, as well as improvement of labor-management relationship. In academia, while most of the research on TQM focused on the effects of quality improvements, Hackman and Wageman (1995) found, only 4 % out of 99 academic papers between 1989 and 1993 focused on TQM interventions, i.e. whether TQM is actually in place. Instead of repeating the investigation on the outcome or impact of TQM, this study focuses on the determinants of a successful TQM implementation.

According to Schneider, et al. (1996), four dimensions should be considered in creating a sustainable TQM culture: the nature of work, the nature of hierarchy, the nature of interpersonal relationships, and the focus of support and rewards. The job and organizational determinants will be identified and their effects will be investigated. By the examination of the effects of operable work environment variables, I hope to build into TQM program the variables which will increase employees' TQM practices, and thereafter lead to positive organizational outcomes as suggested by previous literature.

In this dissertation, I first present a review of literature. In the literature review chapter, a brief historical development of TQM will be addressed in Section 2.1, followed by a discussion from an academic point of view, namely, how TQM is regarded in the arena of management science. It has been argued that TQM lacks a single operational definition. It is not my attempt

to solve this problem, instead, I choose to define TQM through investigating its contents, i.e., TQM's key features. For this purpose, the components of TQM from the Malcolm Baldrige National Quality Award, and empirical studies which identified the key constructs of TQM through TQM assessment surveys are discussed in Section 2.3. As a result, a TQM framework is developed in Section 3.1. In the TQM framework, there are four components: cultural aspect, organizational commitment to TQM, employee empowerment, and employees' TQM practices. Although 'organizational commitment to TQM' is recognized as the key driver for a successful TQM implementation, "employees" are believed to be the ones who actually carry out the TQM practices. Therefore, the factors to increase employees' TQM practices, or to encourage them to engage in more quality improvement activities, become the main interest of this study.

TQM is regarded as a system where the interaction with the work environment occurs as soon as it is introduced in the organization. The four dimensions Schneider et al. (1996) proposed are used as a framework for more reviews of the literature in Section 2.4. Based upon the literature, I classified the work environment variables in three aspects: individual, job, and organizational aspects. These characteristics are suspected to have influence on employees' TQM practices and are discussed in Section 3.2. They are also used to develop the research model shown in Section 3.3.

A comprehensive organizational survey was conducted in fall 1997 at the City of Madison. A total of 2231 questionnaires were sent out to every full time employee working in the city government. 848 questionnaires were returned yielding a 38% response rate. This study uses the data collected from city employees to test the research model. The data are analyzed with univariate analysis, which includes descriptive statistics and correlation analysis, and

multivariate analysis, which includes factor analysis and path analysis. The results are discussed and presented in Chapter 5. Factors extracted from factor analysis replace the variables in path analyses to simplify the path models and make the results easier to interpret. Direct effect and indirect effects are computed in path analysis by using standardized regression coefficients. Total effects of work environment characteristics are compared and discussed in Chapter 6.

The purpose of this study is not only to bridge the gap between organizational science and TQM, but also to provide implications for practitioners to implement a sustainable TQM program in their organizations.

CHAPTER 2: LITERATURE REVIEW

2.1 HISTORICAL REVIEW OF QUALITY MANAGEMENT

The origins of quality management can be traced as early as the 1920s when statistical methodology as applied to manufacturing industry for the purpose of product inspection and evaluation of process capability (Steeple, 1993; Juran, 1995). Statistical Quality Control (SQC) was first initiated by the Bell System in 1926, and was regarded as the first wave of quality control. However, it did not receive much attention nation-wide. During World War II, the War Production Board in order to help contractors improve the quality of their goods as well as their productivity offered training courses in statistical techniques, that were developed by Bell System in 1926 (Juran, 1995).

The second wave of quality control took place during the post war era. At that time, the SQC techniques drew special attention from management interested in reducing cost, increasing productivity and other economical considerations. The quality control department in a company emerged as an independent unit. In addition to conventional product inspection before shipment, reliability engineering was developed to reduce the product failure by investigating the production procedure. Many of the statistical techniques were widely used in this type of quality control. Since then, quality engineering has received a great deal of assistance from statisticians in developing advanced statistical methodology. Some examples like Seven Tools use the basic level of statistics. Intermediate statistical level incorporates theory of sampling surveys, inspection, statistical estimates and tests. The design of experiments, multivariate analysis and methods of operation research involve higher levels of statistics (Ishikawa, 1985). With the

advancement of the computing technology, Bayesian estimation for forecasting and computer simulation are also used in quality engineering, especially in manufacturing industry. Statistical process control is still one of the major components in quality management nowadays and is incorporated with other management practices.

The use of statistical techniques is consistent with the concept proposed by quality experts such as Deming, Juran, Ishikawa and many others that management should make the decision based on *fact*. It is suggested that scientific analyses provide a quantitative and systematic way to investigate the occurrence of problems and identify areas for improvement. A revolutionary movement in management occurred in the 1980s when America faced the strong challenges from Japanese companies. This is also what Juran called the third wave of quality control. At this time, statistics-focused quality management seemed not enough to solve the problems the American companies were facing. It was the thorough, systematic and customer-focused management practice on a broader level, requiring the whole organization's commitment in quality, that was considered the major contribution to the competitive advantage of Japanese companies.

In 1950s American quality experts, W. E. Deming and J. M. Juran, advanced the quality management system in Japan. With the success of Japanese examples, Total Quality Management was adopted widely in many U.S. companies in the 1980s: Deming's 14 principles, Juran's Trilogy and quality planning, Crosby's 14 steps for Zero Defects program, Ishikawa's company-wide quality control. Detailed quality training packages were also developed by consultants and practitioners incorporating the concepts proposed by these quality gurus. Japanese quality experts have made efforts in campaign on quality and recognition at a national

level since as early as the 1950s[1]. Many believe this is one of the reasons that Japanese have succeeded in and benefited from quality management. In 1987, a national quality award – the Malcolm Baldrige Award was established to reward companies who are committed to quality management practices. This award has attracted companies' competition nation-wide. It has also been adopted at the state level. By late 1994, over two-thirds of the 50 states had created a similar award. More and more industries are participating in this program (Juran, 1993). For example, the health care industry, education, manufacturing, service and small business have established criteria specific in their domains for evaluation and competition within Malcolm Baldrige National Quality Award.

America's awareness of quality management was stimulated by Japanese success in the marketplace by the means of high quality and customer-focused strategy. However, Japanese attributed the quality movement to American experts, W. E. Deming, and J. M. Juran's influence (Ishikawa, 1985). After years of exchanging experiences and knowledge, the work of these well-known quality experts (e.g., Deming, Juran, Ishikawa, etc.) has provided important resources and guidelines for developing companies' TQM practices and strategies. In the following sections, the key features in Deming's, Juran's, and Ishikawa's quality management will be reviewed.

2.1.1 CONTRIBUTORS TO THE QUALITY MANAGEMENTS

Deming, W.E.

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[1] In 1951, the Deming Prize was established for individual contributions in the field of quality control; the Deming Application Prize was also established in the same year to recognize companies for outstanding implementation of quality control. (Refer to Juran's "A History of Managing for Quality", 1995)

Deming's 14 points for quality management is arguably the most well-known and most-mentioned quality principles. In the 14 points, Deming proposed that quality improvement should be a continuous effort a company should dedicate itself to for maintaining its competitiveness in the marketplace. He had been taking Western management to a new era by his advocacy of quality management. Deming's contribution is far beyond traditional adoption of statistical process control in quality management. In addition to the quality process, which is the main course in many quality workbooks, he emphasized management should take on a strong leadership to create a learning and trustful environment where employees are empowered to take the responsibilities for the overall performance, to participate in the decision making and to take the ownership for the quality improvement system (Deming, 1986; Anderson et al, 1994). The evidence can be found in a series of research on TQM's impact on the employees' quality of working life. Another attribute of Deming's work is the idea that quality management is not only a set of practices but also a philosophy which should be spread throughout the whole organization from top management to shop floor workers. His quality management concepts are believed to have particular influence on improving the work force, customer and supplier relationship, and inter-department communication.

Juran, J. M.

Juran emphasized building quality in the product design and production process to meet customers' needs. His famous Trilogy is illustrated by the following statement: "managing for quality is done by use of the same three managerial processes of planning, control and improvement (Juran, 1992: 14)". Juran's Trilogy now refers to Quality Planning, Quality Control

and Quality Improvement. "Meeting customer's needs" is the most important feature in his work. This can be found in his definition of quality: *Quality is customer satisfaction* (Juran and Gryna, 1993: 3). His quality management is then built around the "customer". He argued that the "customer" should not be narrowly regarded as the end user, but "anyone who is impacted by the product or process (Juran and Gryna, 1993: 3)". That is the well-known terminology in quality: "external customer" and "internal customer".

Juran and Gryna (1993) proposed that "to become superior in quality, we need to: (1) develop technologies to create products and processes which meet customer needs and (2) stimulate a culture that continually views quality as a primary goal (Juran and Gryna, 1993: 177)". Here they defined quality culture as "the pattern of human habits, beliefs, and behavior concerning quality." Juran and Gryna suggested a quality culture can be created by increasing and maintaining the awareness of quality, providing evidence of management leadership, providing a work environment for self-development and empowerment through self-control and job design, encouraging participation at all levels in quality practice, and establishing recognition and reward systems.

Ishikawa, K.

Kaoru Ishikawa was not only one of the activists in promoting quality systems in Japan as early as the 50s, but also received international recognition on the contribution to quality management. He proposed the concept of "total quality control" (TQC), which builds upon quality control as being commonly adopted at that time. TQC refers to a company-wide quality control, which requires participation of all employees, all divisions and integrated quality control

system (e.g., integration of cost control, price control, quantity control, and control of delivery, etc.) (Ishikawa, 1985). Ishikawa suggested quality control be regarded as a "thought revolution" in management. As he stated:

> "... by applying QC properly, the irrational behavior of industry and society could be corrected. ...the application of QC could accomplish revitalization of industry and effect a thought revolution in management (Ishikawa, 1985: 104)".

In applying TQC, companies can transform themselves into quality-focused and customer-oriented companies. A TQC company not only thinks of the end users as its customers, but also emphasizes the next process customer. Application of statistical methods and cross-functional management are brought into the decision-making process. Moreover, Ishikawa suggested a full participatory management. In other words, "respect for humanity" should be a management philosophy:

> "When the management decides on company-wide quality control, it must standardize all processes and procedures and then boldly delegate authority to subordinates. The fundamental principle of successful management is to allow subordinates to make full use of their ability (Ishikawa, 1985: 112)".

It is not surprising to see the overlaps among these three gurus' work, since Japan's quality management was stimulated by Deming and Juran's lectures in 50s, and its successful outcomes came back to America and elicited a "TQM movement" in the industry. In short, from the review above, we can conclude that quality management is a customer-valued, employee-focused management where decisions are made based on the use of statistical methods, and cross-functional communication. Its success requires the participation and commitment from top

management to frontline employees. The underlying concepts of TQM identified through empirical research will be illustrated in a later section. Two questions should be answered first before going further discussion: is TQM different from other management science that is worth building theories around? When we talk about TQM, are we talking about the same thing?

2.2 TQM as a Management Science

Although TQM has increased its popularity since 1980s, there are few theoretical and empirical studies on a theory of TQM. In the academic arena, most of the existing studies have been of the impacts of TQM, such as organizational performance, employee participation, quality of working life, or efficiency and effectiveness of the production. Only in 1994, when a special issue on TQM was published in the *Academy of Management Review*, did we see a thorough collection of research on this topic in an academic management journal. As one of AMR editors, Richard Klimoski, mentioned in the preface, it was time to include this quality and customer-focused management in management theory. It was the editors' wish to produce a breakthrough, and/or become a benchmark for the field. This special issue includes several articles on the definition of quality (e.g. Reeves and Bednar, 1994; Sitkin et al., 1994), development of TQM theory (e.g. Anderson et al, 1994; Waldman, 1994), comparison with the existing management literature (e.g. Dean and Bowen, 1994; Spencer, 1994), and implication of TQM implementation from cognitive perspectives (e.g. Reger and et al., 1994). None of these authors conducted empirical study to support their theoretical arguments. However, their work indeed has elicited interest in the field of TQM research.

Practitioners and scholars have argued that many of the concepts in TQM are not new in organizational science, such as adopting scientific data collection methods to improve productivity and efficiency, interacting with environment (meeting customer needs), employee involvement, and organizational learning. These kind of concepts and management practices can be traced as early as Taylor's Scientific Management to Lawler's employee involvement or the emphasis of employee's quality of working life. However, Spencer (1994) concluded that TQM

is a more comprehensive program after comparing TQM with three existing organization models: mechanistic, organismic, and cultural model. The mechanistic model views "organization as a tool or a machine designed to create profits for its owner (p. 448)". In the organismic model, the organization is examined as a learning organism which is able to interact with the environment. Through the coordination among the units, organization fights for survival and searches means for its growth. In this respect, it is consistent with TQM's continuous learning and improvement principles. However, these two models only reflect TQM's technical and procedural components. Spencer (1994) suggested that the cultural model accounts for the spiritual aspects of TQM.

Culture is defined as shared beliefs, values and norms (Wiener, 1988; Gordon, 1991; Schein, 1990) and can be communicated through myths, symbols, and rites (Trice and Beyer, 1991). From this perspective, TQM is beyond a set of principles. Quality experts claim TQM should be adopted as a new philosophy of management in the organization (Deming, 1986). Ultimately, an organization should develop a quality culture (Juran, 1993; Waldman, 1994; Black, 1996). Indeed, TQM in many ways is a "shared vision, value and belief" to commit organization's members' effort in achieving corporate mission. A TQM culture may require a commitment from top management to place quality as an organization priority, to create a trustful environment to encourage employees' participation and cross-functional team communication. Results from scientific methods such as statistical analysis and dot plots, and quality design tools such as flow charts, decision tree, and fish bone diagram serve as a common language to facilitate team discussion and further to identify problems and develop solutions. A comparison of TQM with the three models shows that TQM is a more comprehensive

management science than any one of the three. However, is it a unique domain that is worth of building a theory on TQM in the organization science?

Hackman and Wageman (1995) argued that, before going further to conduct theoretical, conceptual and empirical studies, TQM should pass two tests: convergent validity and discriminant validity. First, TQM has to pass convergent validity: in current practices, do the TQM programs share a common set of assumptions and prescriptions as the founders proposed (p. 318)? This is a very important research issue since it involves how people define TQM and whether they are studying the same construct. Although Hackman and Wageman found that nowadays TQM as an organization philosophy has been emphasized more than its scientific methods and statistical origins, some basic ideas from the founders can easily be observed in many practices. Another analysis conducted by Anderson et al. (1994) appears to reflect the same conclusion.

Anderson et al. (1994) argued that the 14-points prescribed in Deming's principles for management is not enough to be claimed as a theory. However, their study shows that quality experts from academy and industry share beliefs on the underlying concepts in Deming's TQM. Using Delphi method, a panel of quality experts including practitioners and researchers identified thirty-seven concepts and grouped them into 7 categories. They were further used in establishing a conceptual model of TQM in the same study. The details will be addressed in the next section. Based on these reviews, it can be concluded that TQM does have a clear set of assumptions and prescriptions in the current practices, which quality experts agree upon and can be traced to the original ideas the founders proposed. In this respect, TQM does show convergent validity (Hackman and Wageman, 1994).

According to Hackman and Wageman (1995), TQM also has to pass discriminant validity. Discriminant validity involves examining whether TQM is distinguishable from other organizational development programs. They found that TQM is clearly different, both conceptually and operationally from some programs, such as participative management and quality of working life (QWL) movement. The philosophy of participative management may be similar to TQM; however, it does not have a set of operational principles and tools to follow. Nor does it have clear common concepts that scholars and practitioners can identify. The focus of quality of working life is on the cooperation of labor and management, and it emphasizes more on the psychological outcomes of employees than customer focus or organization productivity as suggested by TQM (Hackman & Wageman, 1994). Lawler (1994), the author of *High Involvement Management* (1986), indicated that the commonality can be found in TQM and employee involvement program; however, they are different in many areas: the emphasis of outcome (quality focus vs. organizational effectiveness), their view of reward system (group recognition vs. individual financial rewards), job design (tendency for accepting existing design vs. creating enriched jobs) etc.. In short, TQM combines both concrete operational techniques and philosophical prescriptions. Therefore, we can infer that TQM passes discriminant validity with the support of these arguments (Hackman and Wageman, 1995). After the examinations of these two validity tests, we can now proceed to the conceptual and empirical academic research on the domains of TQM with more confidence.

In summary, TQM is a more comprehensive organizational improvement program than Scientific Management, participatory management and quality of working life. It combines mechanistic, organismic and cultural aspects (Spencer, 1994; Shea, 1996). Hackman and

Wageman's conclusions (1995) and the study by Anderson et al. (1994) support that researchers

and practitioners share a set of assumptions about what TQM is.

The following section will discuss the identification of TQM constructs from practices

(from the criteria of the national quality award) and empirical results in details. Furthermore,

based on the reviews of literature, the key features of TQM and a conceptual model of TQM

program will be determined for the purpose of this study.

2.3   KEY COMPONENTS OF TQM

2.3.1   INTRODUCTION

Considerable amount of research has been done on the impact of TQM. Despite the complex causes of an organization's performance, TQM has been associated with many successful cases. Motorola and Xerox have acknowledged TQM for improving their competitive positions (Hunt, 1992; Reed et al, 1996). Evidence shows quality improvement system can increase productivity and process efficiency by reducing the scrap rates and defect percentage, or controlling the product reliability (Reed. et al., 1996; Taguchi and Clausing, 1990; Flynn et al., 1994). Increasing company's competitive position is also a contribution of TQM, which emphasizes the interactions with customers (Reed, et al.. 1996), i.e. customer value as suggested by Juran (1986). Some researchers also found TQM program can improve employee's quality of working life (Lawler et al., 1992). As addressed by Flynn, et al (1994), quality performance was perceived as *outputs*, which can be achieved or sustained by the *inputs*, i.e. TQM intervention. or quality management practices.

Compared with the variety of measurement of the performance/output of TQM, there are relatively few scales to evaluate how well TQM is adopted in the organization. In other words. how can we contribute companies' successes to TQM intervention if there is no evidence showing TQM is actually in place? According to Hackman and Wageman (1995), they found:

"... of 99 papers about the effects of TQM published in academic and practitioner

journals between 1989 and 1993, only 4 percent assessed the degree to which TQM

interventions actually were in place. And even when "manipulation checks" were

performed, they often involved inferences based on qualitative accounts of the evolution of a TQM program rather than on direct measurements of behavior (e.g. Fisher, 1992)" (Hackman and Wageman, 1995: 321).

The research focus has been shifted from "outputs" to "inputs" recently. For example, Saraph et al. (1989) explained why they chose to focus on management practices: "... the decision makers of an organization focus on better management of [critical] factors, improvements will occur in quality performance and ultimately result in improved financial performance for the organization (p. 810)". They suggested that if a company follows through the critical factors of TQM program, the improvement and financial performance would actually take place over time.

It is not an easy task to evaluate "management practices of quality" as long as the question "what should be evaluated?" remains. In short, what should these "inputs" be? To answer the question, several researchers have conducted empirical studies to identify the key constructs, or what some researchers call "critical factors" of TQM. It has been known that there is no single consensus definition of TQM (Gehani, 1993; Reed et al., 1994; Lawler, 1994), however, the "key constructs" identified from these studies may provide the answer of what TQM practices are in the eyes of practitioners, researchers and board members of quality award. In Section 2.3.1, criteria used in Malcolm Baldrige National Quality Award (MBNQA) will be presented first to illustrate what criteria the award has used for evaluation. It will be followed by the discussion of several empirical studies in the development of assessment for TQM practices, in which critical factors were identified and empirically tested. The Malcolm Baldrige National Award's seven

criteria will be used as a framework and compared with the empirical studies to examine the commonality of the key constructs. Section 2.3.2 highlights two existing models of TQM systems: (1) MBNQA, and (2) quality management system by Anderson et al. (1994). These show the relationships of among the key constructs. Based upon the review, a conceptual model of a TQM system is presented and guides the development of the research model in the next chapter.

2.3.2   THE COMPONENTS OF TQM IN PRACTICE AND EMPIRICAL STUDIES

Currently several national awards serve the purpose of assessing management practice of TQM. For instance, Malcolm Baldrige National Quality Award in U.S., European Quality Award, Deming Prize in Japan or ISO certification developed criteria to evaluate the execution of TQM. The principles for managing quality proposed by quality experts have been integrated into these criteria. Taking Malcolm Baldrige Award as an example, this evaluation program systematically and comprehensively assesses how quality is practiced. The elements of MBNQA look into the organization from the leadership attitude to customer satisfaction, from process to quality outcomes, and from the use of statistical tools to the training of employees. These seven criteria are:

1. Leadership

2. Information and Analysis

3. Strategic Quality Planning

4. Human Resource Development and Utilization

5. Management of Process Quality

6. Quality and Operational Results

7. Customer Focus and Satisfaction

The MBNQA has been considered a reliable evaluation and diagnostic tool (Steeple, 1993; Wisner. J. D., & Eakins, S. G. 1994; Black et al., 1996). The quality requirements for excellence are embodied in these criteria (Steeples, 1993). The Award criteria provide practitioners a framework for developing quality strategies. Meanwhile, organization researchers also adopt this framework for either developing theories or validating their models (e.g. Black et al.. 1996; Sainfort et al.. 1996).

In spite of having Malcolm Baldrige Award criteria for evaluating TQM practices in the organization, these thorough yet complex assessments unfortunately are not efficient enough to examine organizations' TQM practices on a regular basis. For example, the Malcolm Baldrige National Award is given annually. For the examination of TQM practices. companies have to submit the application for the award. Application report and site visit reviews will be conducted. The time and effort for documentation are considerable. Due to the purpose of efficiency, a standardized self-assessment is preferred to enable an organization to set a baseline and their improvement objective. This is also a spirit of TQM: using scientific method to "plan. do. check and act" its quality effort and ensure the continuous improvement.

Saraph et al. (1989) developed one of the first instruments for measuring TQM practices in the organization. On the basis of a review of literature and theoretical work, the authors identified eight critical factors (areas) as a profile of organization-wide quality management. A questionnaire was developed based on these factors using 5-point interval rating scale. It was

then administered to 162 managers at the division level from manufacturing or service industries. Validity and reliability tests were conducted later. In the final version of the questionnaire, some questions were eliminated, but still contained 8 factors as originally identified. These 8 factors are: role of divisional top management and quality policy, role of the quality department, training, product/service design, supplier quality management, process management/operating procedures, quality data and reporting, employee relations. As suggested by the authors, "[these] measures could be used by decision makers in an organization to assess the status of quality management in order to direct improvements in the quality area (p.810)".

According to my interpretation of the factors with the considerations in the questions designed for each factor, I found Top management commitment is the similar measure as MBNQA's Leadership criterion. SPC usage and internal quality information usage can be used to evaluate the Information and Analysis in MBNQA. Employee empowerment, Employee involvement, and Employee training are in accordance with Human Resource Development and Management in MBNQA. Supplier quality management and design quality management seem to reflect on MBNQA's Management of Process Quality. Benchmarking, product quality and Supplier performance are also the requirements of Quality and Operational Results in MBNQA. Customer focus can be a quantitative measure for Customer Focus and Satisfaction (See Table 2-1 for the comparisons).

It is worth noting that this classification based upon MBNQA may not receive the agreement from original authors since it involves the subjective interpretation for each factor and may cause different results by different people. However, the comparisons are the attempt to

search for the commonality and difference between the subjective MBNQA criteria and empirical findings.

The weakness of this assessment is the data were collected from high-level manager, president or quality manager. The bias was very likely to occur from their perspectives since they might be more involved in establishing the quality program. Their familiarities, the sense of ownership may lead to higher recognition of quality management program than it is perceived and operated by the floor shop workers (Flynn et al., 1994). Another critique is on the construct validity testing. They checked the correlation within each factor derived from the literature review, and also checked the factor loading within each construct. They did not pull all the questions together and run the conventional confirmatory factor analysis. The analysis may lead to different result.

In order to rectify the weakness of Saraph et al's (1989) study, Flynn et al., (1994) had derived 7 dimensions with 14 sub-factors from the actual use of practices by practitioners in Japan and U.S. and from empirical literature. This later was reduced to 11 sub-factors with the same 7 dimensions after the validation from the survey data (See Table 2-1 for the 11 sub-scale from the final version). The survey was administered at the plant level with separate instruments for operators, plant manager, quality manager, and general manager, which is the strength of this study. However, the generalizability of this study is limited because the survey was designed for manufacturing industry and at the plant level. It is worth noting that this classification based upon MBNQA may not receive the same agreement from original authors since it involves the subjective interpretation for each factor and may cause different results from different people.

However, the comparison is made in order to search the commonality and difference between the subjective MBNQA criteria and empirical findings.

In the comparison with MBNQA's seven criteria, the commonality is found in four areas: Leadership, Human Resource Development and Management, Management of Process Quality, Customer Focus and Satisfaction. The only exception is the evaluation of teamwork structure. Teamwork is considered as a means to facilitate better quality process. Malcolm Baldrige Award criteria emphasize the management of process quality and the communication among inter-functional team members, however, it does not consider "teamwork" as a "must-be" means to meet this requirement.

Through a review of the prescriptive, conceptual and empirical literature on quality management and with advanced scale validation techniques used in social sciences, Ahire, Golhar, and Waller (1996) identified 12 constructs (see Table 2-1) of integrated quality management strategies. Survey with a 7-point Likert scale was administered to 371 manufacturing plants. This study used plants as the unit of analysis. Combining exploratory factor analysis (EFA) approach and confirmatory factor analysis (CFA) approach, the researchers were not only able to identify the constructs within quality management, but also to investigate the relationships among constructs. The result showed Top Management Commitment is highly correlated with each of the quality improvement strategies. Moreover, due to the high correlations of Employee Empowerment, Employee Training, and Employee Involvement strategies with all other strategies and among themselves, a second-order construct is suggested. According to Ahire, et al (1996), the second-order construct may exist and can be named as "Quality Oriented Human Resource Management". The limitation falls in the scope of the

generalizability. The survey generated by the study is manufacturing-focused. Considerations

should be paid when it applies to other industries. The authors suggested the three surveys,

Saraph et al., 1989, Flynn et al., 1994 and Ahire et al., 1996 complement one another in many

aspects. As Ahire et al. (1996) stated "Together, they should provide a very strong composite set

of constructs and associated scales for further theory development."

The Malcolm Baldrige National Quality Award is considered a reliable assessment on

quality management practices, which also serves as a framework or guideline for evaluating or

developing quality strategies of companies. As a result, Sainfort et al. (1995), and Black et al.

(1996), adopted the 7 categories in MBNQA as the bases for their scale developments. With an

overall response rate of 58%, 424 surveys were received from 4 agencies in a mid-west city

government. Using a 5-point Likert scale, 5 factors were generated in Sainfort et al's (1996)

study with the validation of confirmatory factor analysis (see Table 2-1 for the factors). The

difference of this survey from others is it targets on service industry and specifically the public

sector.

Instead of using a Likert type scale, Black and Porter (1996) asked respondents to rate

each of 39 items on the relative magnitude of importance to the reference item "assessment and

improvement of quality systems and documentation" on a scale of 0-100. The questionnaires

were answered by employees who had experience in quality management. Factor analysis was

conducted and yielded 10 factors. Although a survey-type of evaluation is not created from the

study, the authors successfully identified the critical factors of TQM, which can be used as a set

of criteria for organization's self-assessment on TQM practices. The benefits of using Sainfort et

al. (1996), and Black and Porter's (1996) constructs of TQM are they directly assess areas in accordance with Baldrige guidelines.

The constructs in each assessment are presented in Table 2-1. The comparisons of these assessments are shown in Table 2-2. It is not my interest to make the detailed comparisons on these assessments. However, there are several benefits of addressing these assessments in this study. First, there are not only some overlaps among these assessments found based on the review. By checking closely on the questions and the corresponding constructs, the links can also be found with the framework of the Malcolm Baldrige Award (see Table 2-1). The exception is the evaluation of teamwork structure in Black et al., (1996) and Flynn et al., (1994) assessments. Teamwork is considered as a means to facilitate better quality process. Malcolm Baldrige Award criteria emphasize the management of process quality and the communication among inter-functional team, however, it does not consider "teamwork" as a "must-be" means to meet this requirement.

It is not surprising to find the links since these assessments and Malcolm Baldrige share the bases on quality literatures, principles proposed by quality gurus as mentioned earlier, and practitioner's knowledge and experiences. Nevertheless, what is encouraging is that these constructs were tested with empirical data and still show the commonality. This also confirms the Hackman and Wageman's (1994) convergent validity, in the sense that current TQM practices do share a common set of assumptions and prescriptions. This also makes the definitions of TQM or the components of TQM more distinct.

Second, these studies not only provide organizations a framework of quality management, but also useable scales for benchmarking their TQM practices. Moreover, the assessments make

further empirical testing on TQM related assumptions possible. For example, the relationships among constructs, or relationships of organizational factors with TQM constructs can be investigated. With more research evolving on TQM, it is going to help establishing theories on quality management and provide practitioners insights of how TQM works in the organization.

2.3.3   RELATIONSHIPS AMONG TQM COMPONENTS

In this section, two models that describe the relationships of the key components of TQM will be presented. These are Anderson et al's Quality Management Model, and Malcolm Baldrige Award criteria framework.

Anderson, et al. (1994) chose a very different approach in deriving the key concepts of Deming's quality management. Using Delphi method, a panel of quality experts from both academia and industry participated in a study to identify concepts underlying Deming's quality management known as "14 points quality principles". The seven factors identified in this study are: visionary leadership, internal and external cooperation, learning, process management, continuous improvement, employee fulfillment, and customer satisfaction. Unlike the previous discussed studies, the constructs in Anderson et al. (1994) study are not empirically tested but were illustrated as a conceptual model (See Figure 2-1), which described the relationships among the TQM constructs. Anderson et al. suggested the quality management model in their study be seen as a theory of organizational improvement. As they suggested, top managers' commitment to quality is a driver to establish a desired organizational system which fosters cooperation and learning. A collaborative and learning organization is a mechanism for the implementation of quality process practices, such as the use of information and data analysis in process control, cost

evaluation, benchmarking, and other methodological and behavioral practices. A desirable quality process management will contribute to quality outcomes, i.e. continuous improvement and employee fulfillment. Ultimately it is believed to lead to the satisfaction of the customer.

The Malcolm Baldrige National Quality Award system also represents a dynamic process of organizational improvement. The relationships among these criteria are shown in Figure 2-2. As described by NIST in the seven categories of the criteria, "Leadership" is a *driver* that leads the company to establish systems including four categories in MBNQA, which are "Information and Analysis", "Strategic Quality Planning", "Human Resource Utilization", and "Quality Assurance". "Quality Results" is *measures of process* to evaluate the functions of the systems. It also provides feedback to the *driver* and *systems*. The *goal* is "Customer Satisfaction".

In both of the examples mentioned above, top management commitment is considered the first critical factor that may determine whether the quality program will be successfully implemented in the company or not. It is suggested the influence of leader's attitude and support toward quality implementation is shown in the allocation of the training resources, the creation of recognition system, the facilitation of inter-department collaboration and the direction the company is leading to. Besides national recognition in quality as mentioned earlier, Japanese's early adoption of quality management and their success from it is also due to the support from the top management (Deming 1986, Juran, 1995). The other constructs all interact with each other. TQM's systematic approach is well accepted by scholars and practitioners who believe that what causes the problem of the end result is the system or the process.

In the discussion of the key components and the operation of a TQM system, these two examples provide us a nice understanding about how each critical factor of TQM relates with

one another. However, there is not much found in the academic journals regarding the interaction TQM has with the organizational environment. Gharajedaghi & Ackoff stated: "like living organisms, organizational systems are dependent on their environments for resources, and they can adjust the behavior of their parts to maintain the properties of the whole within acceptable limits" (Spencer, 1994: 455). The metaphor that refers to an organization as an organism (Burn and Stalker, 1961) is regarded as the foundation stone of general systems theory (Kast and Rosenzweig, 1972). In general systems theory, the concern is on the internal adaptations to environmental forces with the feedback and the tendency of maintaining a steady state. When TQM is implemented, the organization may naturally resist this external material until the homeostasis is reached. This explains why the existing organizational factors should be considered when a system is introduced to the organization. The existing organizational factors, which are also referred to as "organizational antecedents" in Shea and Howell's (1998) study may serve as resources that help the integration of TQM. Or on the other hand they may create resistance instead.

In the next section, more literature will be reviewed in order to search for the influential elements for a successful TQM implementation in the work environment. A research model, which shows the relationships between organizational factors and TQM system, will be presented in the next chapter when the research questions and hypotheses are discussed.

2.4   CONSIDERATIONS IN CREATING A TQM CULTURE

As illustrated in the previous sections, TQM concepts, principles, techniques, and steps for implementations are widely discussed in many TQM literature and management handbooks. Many researchers and TQM practitioners believe TQM implementation involves fundamental organizational changes and integration of organizational factors (Reger, et al., 1994; Grant, et al., 1994; Hoffherr, Moran and Nadler, 1994; Schneider et al., 1996), although these changes or factors haven't been systematically verified in published research articles. The interaction between work environment and TQM implementation seems inevitable according to several scholars. For example, organizational theorists holding the system perspectives suggest organization be elaborated as an organism where it is conceived as struggling for survival within a changing environment (Smircich, 1983). Moreover, it is able to adjust and continually redefine individual tasks through interacting with others (Burns and Stalker, 1961). TQM system can be viewed as a system within a big organizational system, Hoffherr, Moran and Nadler who suggested "each system is part of at least one hierarchy of systems" (1994). The interaction and influence between the two systems (TQM and organizational environment) also occur once TQM is introduced to the organization. Thus, the factors existing in the organizational environment may become influential on the success of TQM implementation. In this section the influential factors will be identified from the perspective of cultural change.

The perspective of cultural change in examining the influence of the existing work environment has been chosen, because many researchers and practitioners believe implementation of TQM is a type of an organizational change program which involves cultural change for quality (Juran and Gryna, 1993; Spencer, 1994; Schneider and Brief, 1996). For

example, Schneider, Brief and Guzzo (1996), Juran and Gryna (1993), and Shea and Howell (1998) have identified major dimensions to be considered in creating a quality culture. Shea and Howell's (1998) study focuses on the behavioral aspects of employees' TQM practices from social cognitive perspectives.

Schneider, Brief and Guzzo (1996) suggested only through creating an organizational culture or climate, can the organizational changes be sustained over time. After reviewing TQM literature, they concluded TQM related organizational changes were actually an attempt to create a climate and culture for quality. They proposed four major dimensions to be considered in creating a sustainable TQM culture: the nature of work, the nature of the hierarchy, the nature of interpersonal relationships, and the focus of support and rewards. These four climate dimensions proposed by Schneider et al. (1996) are used as a framework to review literature in each area. The purpose of the review is to show what has been discussed in the previous literature about the roles of the work environment in the implementation of TQM. The work of Juran & Gryna (1993), and Shea and Howell (1998) will also be incorporated into the discussion.

2.4.1   THE NATURE OF WORK

2.4.1.1 Job Characteristics in the Design of Job

Although Schneider et al. (1996) did not describe specifically how the job should be designed in the discussion of creating a TQM culture, they believed the nature of work should be examined. As Lawler et al. (1992) pointed out, both TQM and employee involvement programs emphasized employee empowerment. However, unlike an employee involvement program which consists of more details in changing job designs from work motivation perspectives, TQM

has been famous for its focus on the process design which enhances the effectiveness of cross departmental communication, customer feedback channels or suppliers relationships. TQM does not address much on the issue of job design (Lawler et al., 1992; Lawler, 1994).

The issues of job design can be traced back as early as the 1910s when F. Taylor published one of the earliest and best known books in management science: *Scientific Management* (Taylor, 1911). However, *Scientific Management's* decomposition of the task once dominated in the management practice has been criticized for its neglect of human needs. In *Scientific Management*, the role of management is to control and monitor the system. Workers were treated as a part of a machine. Each employee is responsible for a small part of the task. The repetitiveness of a simple task improves the efficiency and productivity, however, the job itself becomes meaningless, and workers are reported to experience boredom and lack of control of the job (Hackman and Oldham, 1980).

Extrinsic reward seems not enough to explain worker's psychological needs. Thus, organizational psychologists introduced employees' internal work motivation to the management science (Maslow, 1943; McGregor, 1957; Herzberg, 1976; Hackman and Oldham, 1980). In their work redesign theory (1980), Hackman and Oldham (1980) adopted job characteristics and motivation theories from the behavioral approach, and sociotechnical systems theory from the system's perspective[2]. One of their basic ideas for the design of work "is to build into jobs [the]

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[2] Besides the emphasis of person-job relationship, in the work design theory, Hackman and Oldham also borrowed the concepts from sociotechnical system to illustrate the group relationships and organization-environment in establishing effective work system. I believe social environment in a work setting also contribute to the creation of a TQM culture. The social aspects will be discussed in the next section. More review will be done to support this assumption.

attributes that create conditions for high work motivation, satisfaction, and performance (p. 59)". Unlike Taylor's mechanistic point of view, which oversimplifies the task and neglects the needs of workers, Hackman and Oldham (1980) consider the psychological states of a person in reacting to the job. Three psychological states were identified in this regard: (1) meaningfulness of the work, (2) responsibility for outcomes of the work and (3) knowledge of the actual results of the work activities. These three psychological states can lead to internal work motivation. In order to achieve the three positive experiences of psychological states, Hackman and Oldham (1980) argued that job should be designed with the following core characteristics:

- *Skill variety, task identity and task significance* to foster employees' experienced meaningfulness of the work;

- *Autonomy* to enhance the experienced responsibility for outcomes of the work;

- *Feedback from job* to increase the knowledge of the actual results of the work activities.

Hackman & Lawler (1971) and Hackman & Oldham (1980) argued that "high motivation and satisfaction will result only when people feel they are doing meaningful work, have responsibility for the work, and get feedback about their performance" (p. 88, Lawler, 1986).

In addition to the five characteristics mentioned above, Lawler (1986) also suggested participation in decision making can have significant impact on motivation since people have the needs for control, competence, achievement, self-fulfillment and personal growth. Participation is also considered a major element to reduce the resistance to organizational change and improve organizational effectiveness. Caplan (1975) defined *participation* as "the amount of influence the person has on shared decisions which affect him (p.45)".

According to Moos (1986), job involvement is defined as "the extent to which employees are concerned about and committed to their job". Many studies showed that employees who perceived high job involvement had favorable job related psychological states, such as job satisfaction, higher work motivation, and high job involvement(Brady, Kinnaird and Friedrich, 1980).

2.4.1.2 Motivation, Job Satisfaction and Organizational Commitment as Mediating Factors

After reviewing the work of Hackman & Oldham (1976) and Williams & Bunker (1993), and Waldman (1994) concluded that the impacts of job characteristics and their associated psychological states are more related to attitudinal outcomes of internal work motivation than to work performance. High work motivation may lead individuals not only to meet their in-role requirements, but also to perform extra-role behaviors. Waldman (1994) proposed: "Internal work motivation derived from enriched work will lead to extra-role performance behavior, including engaging in teamwork and continuous improvement activities" (p. 523).

Previous literature also shows that work motivation, job satisfaction, and organizational commitment are associated with extra-role performance behavior, organizational citizenship behaviors (OCB) (Smith, Organ & Near, 1983; Organ, 1988; Wright etc. 1993; Dyne & LePine 1998; Morrison, 1994; Schappe, 1998; Walsh & Tseng, 1998) or active effort (Walsh and Tseng, 1998). These studies believe that "extra-role performance behavior", OCB and "active effort" share the similar concepts. Here this type of behaviors is defined as the behaviors which may not be specified clearly in advance in employee's role descriptions or in the formal reward system, but they are a set of behaviors employees spontaneously engage in, such as team cooperation, quality improvement, which can improve the external image of the organization and help

achieving organizational goals. These types of behaviors imply employees take the ownership of the organization. Whether TQM practices should be viewed as in-role requirements or extra-role behaviors may depend upon the management's decision and organization's mission. This varies with how employees define their responsibilities (Morrison, 1994). What is worth noting is that these types of behaviors (extra-role behaviors, OCB or active effort) can be found in many TQM practices (Waldman, 1994). Moreover, with higher job satisfaction and affective commitment, employees tend to define their job responsibilities more broadly (Morrison, 1994). Thus, motivation, job satisfaction and organizational commitment may increase employees' TQM practices.

Previous studies suggested motivation, job satisfaction, or job commitment play a role as a mechanism that links between job characteristics and desired organizational behavior. These findings explain why Schneider et al. (1996) proposed to examine whether the nature of job is interesting and challenging, or boring and meaningless in the pursuit of a TQM culture.

2.4.2 THE NATURE OF THE HIERARCHY

The second organizational climate dimension to be considered according to Schneider et al., (1996) is the nature of the hierarchy. According to the authors, whether organization structure is centralized (e.g. management control) vs. flattened (e.g. employee participation in decision making) or team vs. individualistic competitive approach in operating the task should be considered in managing the organizational change. They suggested the lower level employees should be empowered since "they may have the best understanding of customer requirements and

changes needed to meet them". When creating an organizational culture or climate for quality a flattened organizational structure is preferred.

The nature of hierarchy can be addressed from the perspectives of organizational structure studies. Shea and Howell (1998)[3] suggested that an organizational structure, "which reflects a particular blend of mechanistic and organic characteristics" may lead employees to engage in more TQM practices. The mechanistic and organic management systems are the concept from Burns and Stalker's (1961) work as attempts to characterize the two extremes of an organization's adaptability to the technical or commercial change. Shea and Howell (1998) used a taxonomy of organizational structures developed by Pugh (1981), Pugh (1969a), and Pugh et al (1969b) to describe the characteristics of Burns and Stalkers' mechanistic and organic management systems. The five types of organizational structures were defined as:

Specialization: the degree of division into specialized roles.

Standardization: the degree of standard rules and procedures.

Formalization: the degree of written instructions and procedures.

Centralization: the degree of decision-making authority at the top.

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[3] Mechanistic and organic structures have been discussed in a TQM context in both Spencer's (1994) and Shea and Howell's studies. Unlike Shea and Howell who argued the mix of both characteristics are the organizational antecedents for a successful TQM implementation, Spencer's stated TQM has both mechanistic and organic characteristics. Confusion may occur when both studies are introduced to the readers. It should make clear that Shea & Howell's study emphasized that these characteristics are the variables existing in the organization before TQM implementation. If they are consistent with TQM philosophy, these characteristics from mechanistic and organic structures may increase employees' self-efficacy and lead to more quality related behaviors. Spencer's argument on the other hand indicates TQM consists of some characteristics from both mechanistic and organic structures. When it is implemented, the degree of these characteristics may also be altered. In other words, the changes accompanied by TQM implementation feed back to the existing structures.

Configuration: long versus short chains of command and role structures, and percentage

of "supportive" personnel.

(Pugh, 1981: 143)

Shea and Howell (1998) suggested that mechanistic organization has the characteristics of

"high centralization as reflected in their formal, hierarchical structure of control, authority and

communication; high specialization as indicated by the preponderance of specialists carrying out

highly differentiated tasks; ... high standardization through the precise definition and stipulation

of technical methods attached to each functional role or task..." (p.3)".

The organic organizations represent the contrast of mechanistic management systems. Shea

and Howell (1998) concluded that organic structures has low centralization, specialization,

formalization and standardization, while Burns and Stalker (1961) regarded it as a better

structure to adapt to a turbulent/changing environment. Its characteristics of low centralization

reflect on "a lateral rather than a vertical direction of communication between people of different

rank... resembling consultation rather than command (Burns and Stalker, 1961: 207)". The

organic structure is also characterized as low specialization because the definition of individual

tasks is an ongoing adjustment with the feedback from the interaction with others in a changing

environment. Moreover, organic structure has low formalization and standardization for its less

clear definitions on technical elements or role responsibility.

From the review of the organizational structures and perspectives from social cognitive

theory, Shea and Howell (1998) proposed that the optimal organizational structures for

implementing TQM should combine both mechanistic and organic characteristics: high degree of

standardization and formalization from the attributes of mechanistic organizations, as well as low

degree of centralization and specialization from the attributes of organic organizations. They

argued that high standardization and formalization are more likely to increase employees' TQM

consistent behaviors through the mechanism of self-efficacy, because formal and standardized

routines contribute to "progressive mastery and hence the effective implementation of the TQM

philosophy". They claimed:

> Standardization and formalization are reflected in the use of standard tools and
>
> techniques for process improvement and control and ensure that the organization
>
> achieves the levels of efficiency...

(Shea & Howell, 1998:3)

This argument can also be supported by the evidence shown in Malcolm Baldrige criteria

or ISO 9000 handbook. Both suggested a well-defined and workable process/instruction for

deployment of long-term and short-term plans to achieve quality. Some require a clear set of

methodologies or behavioral practices to be used to direct and control daily work activities

(Brown. 1992; Anderson, et al., 1994)). We may consider high standardization and

formalization as a means for process management, which is in tune with TQM philosophy.

Although the work instruction is given, it does not necessarily mean that the flexibility of

how to conduct a job is taken from the employees. Shea and Howell (1998) also proposed low

centralization and specialization are preferred for the implementation of TQM. In other words.

low centralization suggests a low management control, high employee autonomy, which

encourage employees self-inspection, and participation in decision making and giving them the

power to solve the problem, rather than the inspection as the end process as suggested by the

conventional quality engineering. According to the definition given by Hugh (1981), low

specialization means less specialized roles for a division implying that boundaries are less rigid among divisions. A cross-functional cooperation as suggested by TQM may be easier to take place in an organization where the boundary of each division is less restrictive.

The concept of employees' self-control is also supported by Juran and Gryna (1993). According to their ideas, one of the elements for creating a TQM culture is through employee empowerment which may occur when the organization gives employees self-control. According to Juran and Gryna (1993) self-control can be achieved by providing employees three essential elements: autonomy, feedback, and sufficient skills in conducting the tasks. Without all three of the elements, TQM practices are still regarded as remaining at management level. These three elements can be provided by the redesign of the job which will be discussed in the next section. However, the concept Juran and Gryna (1993) tried to convey is that in order to engage employees at all levels in TQM practices, management should share the power with employees. A more flattened organizational structure is preferred in supporting such quality commitments.

2.4.3   THE NATURE OF INTERPERSONAL RELATIONSHIPS

According to Schneider et al. (1996), a preferred organizational climate for a sustainable TQM implementation is an environment of mutual sharing and trust. This is also consistent with Deming's idea of driving out fear and creating a trustful environment for employees to take the responsibilities for the tasks (Deming, 1985). According to Deming (1985), "no one can put in his best performance unless he feels secure"(Deming, 1985:59). Management may play a role in building up trust with the employees. Several studies show the support from supervisors and colleagues can increase employees' job satisfaction, and commitment to the organization and

less burnout (Rosenthal, et al., 1983; O'Neill, et al., 1985; Moos & Moos, 1983; Brandy, et al., 1980; Fawzy, et al., 1983). As discussed previously, these psychological outcomes may lead to more organization favored behaviors.

2.4.4 THE FOCUS OF SUPPORT AND REWARDS

The focus of support and rewards refer to whether the organization has made its mission clear to the employees. In other words, the employees should be informed what the organization values. The value on quality can be communicated through a charismatic leadership on quality or by creating recognition or reward systems. According to Juran and Gryna (1993), "evidence of upper management leadership", and "recognition and rewards system for quality" are two of the major elements for creating a TQM culture. The TQM literature stresses the importance of a strong leadership commitment in the success of TQM implementation. In the previous section of literature review, the key constructs of TQM used in national quality award, or identified by the empirical literature, all indicated the support from top management plays a key role in sustaining a TQM program. A well-established recognition or rewards system for quality is regarded a nice way to publicly acknowledge TQM is the focus and value of the organization. It also provides the incentives for employees' TQM practices.

Table 2-1: Key constructs of TQM practices (continued to the next page)

Malcolm Baldrige	Sainfort et al., 1995	Black et al., 1996[4]	Saraph et al., 1989	Flynn et al., 1994	Ahire et al., 1996
1. Leadership	1.Leadership/manageme nt support of QI	3. Communication of improvement information 5. External interface management 6. Strategic quality management	1. Top management leadership 2. Role of quality department	1.1. Quality leadership	1. Top management commitment
2. Information and analysis	2. Information and use analysis/use of data	3. as shown above 4. Customer satisfaction orientation 6. as shown above 9. Quality improvement measurement systems	7. Quality data and reporting		6. SPC usage 7. Internal quality information usage
3. Strategic quality planning	1. (same as shown above)	6. as shown above 8. Operational quality planning 10. Corporate quality culture			

[4] The comparison with Malcolm Baldrige in this column was from Black and Porter's (1996) study.

Table 2-1: Key constructs of TQM practices

Malcolm Baldrige	Sainfort et al., 1995	Black et al., 1996	Saraph et al., 1989	Flynn et al., 1994	Ahire et al., 1996
4. Human resource development and management	3. Human Resources	1. People and customer management 3. as shown above 6. as shown above	8. Employee relations 3. Training	1.2. Quality improvement rewards 5.1. Selection for teamwork potential	8. Employee empowerment 9. Employee involvement 10. Employee training
5. Management of Process Quality	4. Processes and quality results	2. Supplier partnerships 5. External interface management 6. as shown above 9. as shown above	4. Product/service design 5. Supplier quality management 6. Process management	2.1. Process control 2.2. Feedback 3. Cleanliness and organization 4.1. New product quality 4.2. Interfunctional design process 6. Supplier relationship	3. Supplier quality management 4. Design quality management
6. Quality and Operational results	4. (same as shown above)				5. Benchmarking 11. Product quality 12. Supplier performance
7. Customer focus and satisfaction	5. Customer focus and satisfaction	1. as shown above 5. as shown above		7. Customer interaction	2. Customer focus
		7. Teamwork		5.2 Teamwork	

Table 2-2: Scale development in these studies (continued to the next page)

Assessment	Sainfort et al., 1996	Black et al., 1996	Saraph et al., 1989	Flynn et al., 1994	Ahire et al., 1996
Development of the constructs	Based on Malcolm Baldrige criteria	Based on Malcolm Baldrige framework	Based on the review of literature and theoretical work from Deming, Juran, Crosby and Ishikawa	Based on the practitioner and empirical literature on practices in actual use.	Thorough review of the prescriptive, conceptual, practitioner and empirical literature on QM
Scale development	424 employees from 4 agencies in a city government	204 members in 61 organization who had experiences in TQM system.	162 managers	42 manufacturing plants	Using a survey of 371 manufacturing firms
Scope of the scale	division/organization level	organization level	division/organization level	plant level/shop floor operations	plant level
Number of constructs[5]	5 factors	10 factors	8 factors	7 dimensions which consist 11 subscales.	12 constructs
Number of Items[6]	30 items	39 items	66 items	48 items	60 items
Scale	5 point Likert type scale	Relative weighting to a reference item "assessment and improvement of quality systems and documentation".	5 point Likert type scale	5 point Likert type scale	7 point Likert type scale

[5] The number represents the final numbers of constructs after the scale validation.

[6] The number represents the final items after the scale validation.

Table 2-2: Scale development in these studies (continued to the next page)

Assessment	Sainfort et al., 1996	Black et al., 1996	Saraph et al., 1989	Flynn et al., 1994	Ahire et al., 1996
Assessment focus	service industry, public sector, employee perspectives	Not specified	Manufacturing and service industry	manufacturing-specific	manufacturing-focused
Strength	• items reflects QI areas in service industry • an organization-wide assessment, can be used in different divisions • from employee's perceptions.		• assessment can be used on varied levels.	• collecting data from multiple responds including functional managers, shop floor workers; separate instrument (sub-scales) for different groups.	• thorough perspectives on construct development • more current and comprehensive scale validation techniques to yield more reliable and valid scale".
Weakness		• It helps to identify critical factors, but is not ready for evaluating practices.	• Based on the literature, no practitioners' insights.		
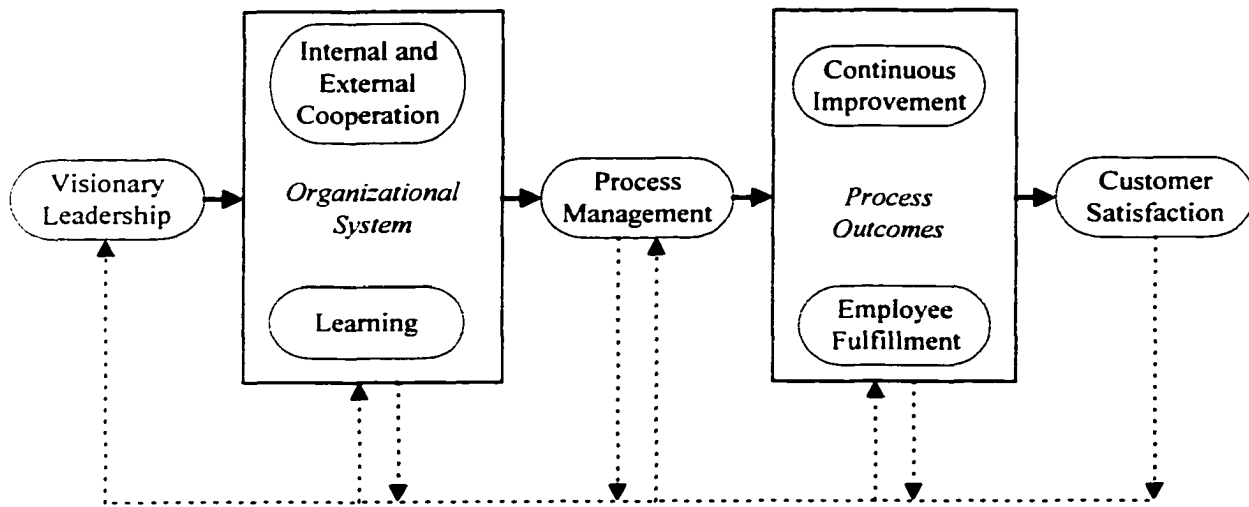
Figure 2-1: Anderson, Rungtusanatham, and Schroeder's Quality Management Model (1994).
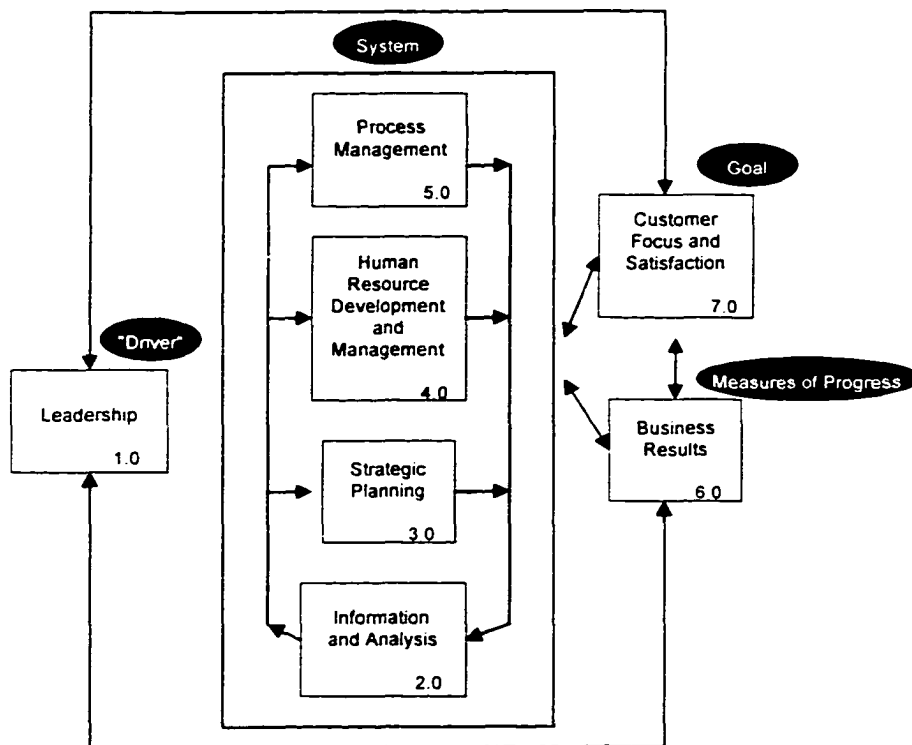
Figure 2-2: Malcolm Baldrige Award criteria framework (NIST, 1995).

CHAPTER 3: RESEARCH MODEL

The purpose of this study is to investigate the effects of the existing organizational factors on TQM institutionalization focusing on employees' TQM practices. Institutionalization is defined as the extent to which TQM is integrated into ongoing activities of the organization, or the degree to which TQM is "the way we do things around here" (Sainfort et al., 1996). A research model was proposed to describe the hypothetical relationships among organizational factors and employees' TQM practices, and was tested later on. There are three major elements in the research model: 'employees' TQM practices' of a TQM system as dependent variables, work environment characteristics as independent variables, employee empowerment as mediating factors.

TQM practices can be divided into two aspects: <u>employees'</u> TQM practices, and <u>organizational commitments</u> for TQM. 'Employees' TQM practices' refers to the behavioral aspects of the TQM institutionalization, which is the focus of the study. Second, 'organizational commitments for TQM' refers to top management commitment, as well as recognition and reward system for TQM. The latter (i.e., management practices) are considered as predictors for the former (employees' TQM practices). The term *'work environment characteristics'* will be used throughout this paper to represent the influential elements of the work environment on the employees' TQM practices. These elements are identified and addressed in Section 3.2.

There are two reasons that I choose to focus on "TQM practices" within the TQM system, i.e. the behavioral aspects rather than the system as a whole in this study. First, it is believed that

a successful implementation requires all employees' willingness to engage in organizational improvement activities, however this element is often forgotten in research and the examination of TQM intervention (Waldman, 1994; Shea & Howell, 1998; Moon & Swaffin-Smith, 1998; Korunka et al., 1998). It is time to pay attention to the behavioral aspects at employee. Secondly, organizational commitment in TQM is regarded as a <u>driver</u> for successful TQM institutionalization, rather than the goal itself. Thus, organizational commitments for TQM and behavioral aspects should be considered two different constructs. The distinction was made here to emphasize the fact that TQM institutionalization refers to <u>employees' TQM practices</u> in this study.

Based upon the review of TQM literature, I first present my definitions of a TQM system in Section 3.1. The key constructs of TQM are discussed. In Section 3.2, work environment characteristics are identified and research hypotheses are proposed. A detailed conceptual framework of the study is presented at the end of this chapter.

3.1 KEY CONSTRUCTS OF TQM IN THIS STUDY

In this section, the underlying constructs of TQM and their relationships are demonstrated based upon the review of literature in the previous chapter. The first construct, "the cultural aspect" refers to creating a TQM culture in the organization. A culture is believed to sustain the organizational changes caused by TQM implementation, and an ultimate goal of organizational intervention, such as TQM program. The second construct, "organizational commitment in TQM", refers to the top management's commitment in quality improvement activities as well as recognition/reward systems in quality performance established in human resources policies. This construct captures the attitudinal as well as system aspects at the *management or organization* level. The third construct, employee empowerment and the fourth construct – employees' TQM practices - draw the attention on the *employee* level. The former represents the psychological aspect, and the latter focus on the behavioral aspects of TQM practices. More details of a TQM system is given in the following section. A TQM framework (Figure 3-1) will be presented at the end of this section.

3.1.1 TQM AS AN ORGANIZATIONAL CULTURE

Quality management is popularly accepted as a management science along with the category of Taylor's Scientific Management, participative management, and others. Its contribution is not only providing practitioners a set of practices, but also bringing a

revolutionary thought in management (Ishikawa, 1985). Beyond its behavioral components, TQM is suggested to be a philosophy, an ideology and moreover, a culture an organization should cultivate (Crosby, 1979; Deming, 1986; Juran and Gryna, 1993; Spencer, 1994; Waldman. 1994; Black, 1996; Schneider et al., 1996).

As emphasized in the literature review, scholars of cultural studies define organizational culture as shared beliefs, values and norms (Weiner, 1988; Gordon, 1991; Schein, 1992) that can be communicated through myths, symbols, and rites (Trice and Beyer, 1991). Schneider et al. further concluded that TQM is a type of organizational change program. The essence of TQM is actually to create a culture for quality. Moreover, only through creating a culture for quality. can the organizational changes be sustained. In addition, Juran and Gryna (1993) proposed the creation of a TQM culture as the ultimate goal of quality management. According to Juran and Gryna (1993), TQM culture refers to "the pattern of human habits, beliefs, and behaviors concerning quality" (Juran and Gryna, 1993: 158).

All of these discussions suggest TQM be seen as a culture because a successful TQM implementation should include organization members' beliefs in quality, and the behavioral aspects of using quality techniques. People familiar with TQM techniques share a common language. For example. they can communicate their ideas by presenting a cause-and-effect diagram. I suspect a TQM culture is developed when there is a high degree of TQM institutionalization. However, cultural studies in organizational science are always disputable for their lack of operationalized and consensus definitions. I am not making attempts to tackle this

issue in this study, however, the culture element cannot be neglected in any discussion of TQM. It can be regarded as the ultimate goal of TQM implementation (Juran and Gryna, 1993).

3.1.2   ORGANIZATIONAL COMMITMENT IN TQM

3.1.2.a Top Management commitment.

From the historical review, practical and academic literature, one can see that top management commitment in quality is never missed in any one of the expert's work, research framework, award criteria, and empirical evidence as a key feature of quality management. It is regarded as a driver, or a critical contributor for establishing a quality system and sustaining a quality culture. It is strongly suggested to be associated with a successful quality implementation. From a culture change perspective, Weiner (1988) also suggested leadership is a key element in changing an organization's value system.

3.1.2.b Human Resource Policy

The human resource policy I emphasize here is its reward and recognition system to acknowledge the superior individual and team's commitment to quality performance. In addition to that, whether the employees have the abilities to carry on quality requirements may depend on the training programs human resources department provides. Human resources policies on quality management, i.e. the rewards and recognition system, and training program have the potential to increase the awareness of quality, motivate, and empower employees in TQM practices. Moreover, well-established human resources

policies show the company's commitment in increasing quality performance. I regard top management commitment and human resources policies as two key drivers in encouraging employees to apply TQM practices in their daily work and establishing quality culture in the organization. Top management commitment is placed prior to human resources policies since the former is believed to have the power on the resources allocation and whether to put quality as a priority for the company.

3.1.3 EMPLOYEE EMPOWERMENT AS A MECHANISM

According to Juran and Gryna (1993), one thing that distinguishes TQM from Taylor's Scientific Management is its emphasis on the "humanity aspect in management". Deming, Juran, and Ishikawa all stress the respect for humanity. They advocate empowerment of employees by creating a trustful environment and driving out fear, giving employees power and competency to control the job, encouraging frontline workers to participate in decision making. Ishikawa suggested that "the term humanity implies autonomy and spontaneity" (Ishikawa, 1985: 112). Juran and Gryna proposed that creating a quality culture be done through employee's self-development and empowerment by the means of self-control and job design. As they stated:

> "People must be provided with knowledge of what they are supposed to do, feedback on their performance, and the means of regulating their work in the event that they are failing to meet the goals. The lack of one or more of these three elements means that quality problems are management-controllable. (Generally, at least 80 percent of quality problems are management-controllable.) Placing workers in a state of self-control is a prerequisite to using behavioral approaches to motivate employees. (Juran and Gryna, 1993: 169)".

A similar statement can be seen in Deming's point to"remove barriers that rob people of pride of workmanship" (Deming, 1986: 77). These all suggest management create meaningful jobs for the employees, give employees the controls of the task, increase employees' responsibilities through participation. Employee empowerment is not only a key element of quality management, but also is believed by these quality gurus to enhance employees' commitment in quality improvement.

Some researchers considered employee empowerment as part of human resources policies (Ahire et al., 1996). Although human resources department may design the jobs that empower the employees, I choose to separate employee empowerment from HR policies. HR policies in my model is part of organizational commitment to quality (recognition and rewards system, providing necessary training), but employee empowerment is an intangible psychological aspect in the individuals. Moreover, as discussed before, within a TQM culture, top management commitment and human resources policies are key drivers that encourage employees' TQM practices. Employee empowerment is now the third stimulator that is believed to be able to increase employees' commitment in quality and shape a quality culture. Organizational support for quality (top management commitment and human resource policies) can be seen as an external enhancement, while employee empowerment can be regarded as an individual internal motivator, a mechanism by which to increase employees' quality commitment.

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3.1.4 EMPLOYEES' TQM PRACTICES

In this study, employees' TQM practices include three elements: their use of information and data analysis in conducting their job, their efforts on quality process and results, and employees' focus on customers.

3.1.4.a Use of Information and Data Analysis

One should not neglect that the origin of quality management is the application of statistical techniques. One of the key features in TQM is the use of information and data collected through scientific method, i.e., statistical application or QI techniques in making decision. Some commonly used QI techniques include Pareto diagram, scatter plots, control charts as basic statistical tools, affinity diagram, tree diagram, and cause-and-effect diagram. house of quality for management planning, brainstorming, nominal group process for group facilitation, focus group, and survey for customer research. The advantage of use of information and data analysis is not only for performance evaluation, but also for setting quality objectives and benchmarking. Whether employees adopt such QI techniques and do their jobs based upon the information and data become an indicator of TQM institutionalization.

3.1.4.b Process and Quality Results

Deming suggested (1986): "Quality comes not from inspection, but from improvement of the production process (p. 29)". Here I emphasize the employees should systematically ensure that quality is built within the process. Procedure or documentation may help to

maintain the consistency. Appropriate assessments may be developed to monitor the reliability of the system. Process management also includes the quality of cross-functional communication, supplier relationship, and next-process customers' needs, as well as the pursuit of continuous improvement. Moreover, it is necessary to examine whether employees put the system into practice.

Besides the process control, a system should be established by the organization and be carried out by the employees to evaluate the quality results. The quality results should include the scope (who and what to be evaluated), the measurement (how and how often), and the use of the results (how to incorporate with management planning).

3.1.4.c Customer Focus and Satisfaction

The last and probably the most influential concept of TQM is its focus on customers. Some researchers regard customer satisfaction as the end result of quality management, however, in this study I refer it as part of employees' TQM practices. It includes behaviors such as including customers' needs in the process of work. Moreover, it is to examine whether the employees put their customers' satisfaction as priority, whether the organization has developed strategies and plans to identify and meet customers' needs, or whether the employees' collect feedback from the customers to improve the organization's services.

3.1.5   A TQM Framework

Figure 3-1 shows a TQM model where the relationships among TQM constructs are also presented. In this model, employees' TQM practices are selected as the outcome variables (i.e. dependent variables) of the study. They are suspected to be influenced by organizational commitment in TQM, or work environment characteristics through the mechanism of employee empowerment. Culture element is essential, but more intangible, subtler and less visible dimensions. It is also considered the ultimate goal of TQM implementation, cultural element is excluded in this study, since the study's focus is on the implementation stage: how TQM works, interacts with the work environment once it is implemented.

TQM Framework

TQM Culture

Organizational Commitment in Quality

Top Management
Commitment ➔ HR Policy

TQM Practices

- Use of Information and Data Analysis

Employee
Empowerment ➔

- Process and Quality Results

- Customer Focus and Satisfaction
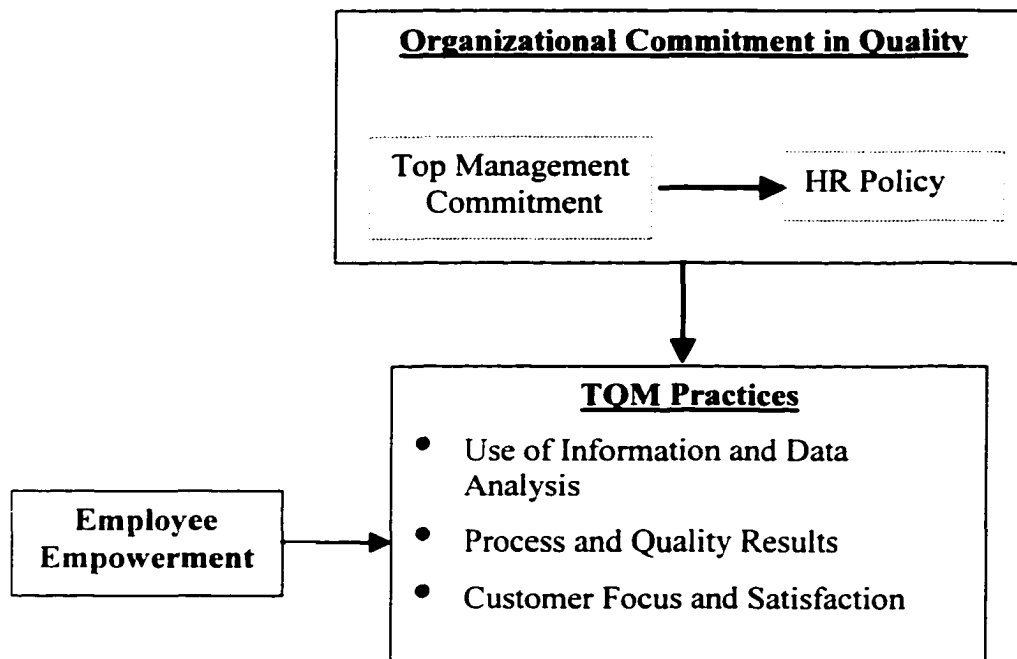
Figure 3-1: TQM Framework in this Study.

In summary, the focus of the study is on how to increase employees' TQM practices, when work environment is considered. Employees' TQM practices contains three elements identified from the above discussion: the use of information and data in dealing with daily work, process and quality results, and the focus on customer. A TQM system is dynamic instead of being static. It interacts with the environment, i.e. the organization. As suggested by Sainfort et al., 1996, organizational culture and structure have impact on TQM institutionalization, however, a TQM culture may also influence the way organization members think, behave, and value and may also change the organizational structure and job elements. The interaction and influence between work environment and TQM culture are bi-directional. However, in this study, I am interested in investigating the work environment serving as antecedents for successful TQM implementation. The following section will discuss in details what elements of the work environment are suspected to increase employees' TQM practices. The literature review from Chapter 2 is used to support these statements.

3.2 ORGANIZATIONAL FACTORS IN THE WORK ENVIRONMENT AND RESEARCH HYPOTHESES

The TQM framework discussed in Section 3.1 presents my perception of how a TQM system operates. However, this study focuses not only on the TQM system itself, but also on how it interacts with the work environment. Here I introduce a study framework, which will serve as the foundation of this study. Figure 3-2 shows work environment has a direct effect on employees' TQM practices and an indirect effect via its impact on employee empowerment. Employee empowerment is a mediating factor, but also has a direct effect on employees' TQM practices. Employees' TQM practices also feed back to the work environment, which may lead to change in organizational culture, although the change of culture is not the main concern of this study.

Conceptual Framework I
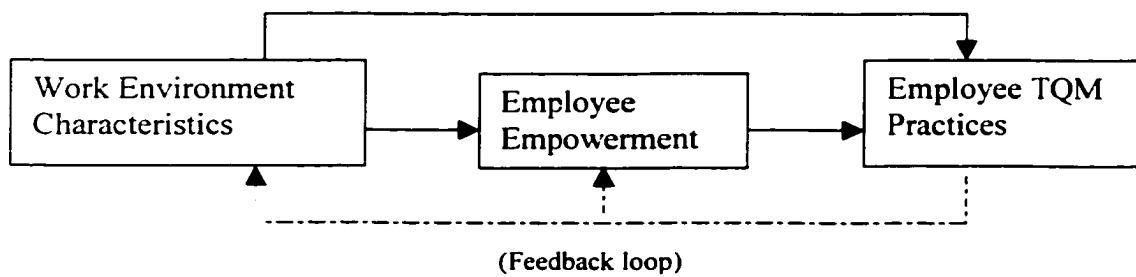
(Feedback loop)

Figure 3-2: Conceptual Framework I.

Note: Feedback loop is included in the conceptual model, however, it will not be tested in this study.

In this section, the components of employee empowerment are first identified and discussed. It is suspected to have direct effect on employees' TQM practices. Hypotheses are posited to illustrate the hypothetical relationships between employee empowerment and employees' TQM practices. It follows the discussion of work environment. Based upon the review of literature in Section 2.4, I present the impact of the work environment on TQM practices from three aspects: individual characteristics, job characteristics, and organizational characteristics, as shown in Figure 3-3. Note that Figure 3-3 is an expansion of Figure 3-2, with more details of the work environment. Characteristics at each aspect, which are considered to influence TQM practices, are identified and discussed. Table 3-1 shows the definition of each factor as well as the justification for this selection. It should be noted here that the classification is to serve simply as a framework to describe the characteristics of the work environment. Underlying constructs of these factors across different aspects may exist and can be used to test the research models if the empirical results suggest their existence.

Conceptual Framework II
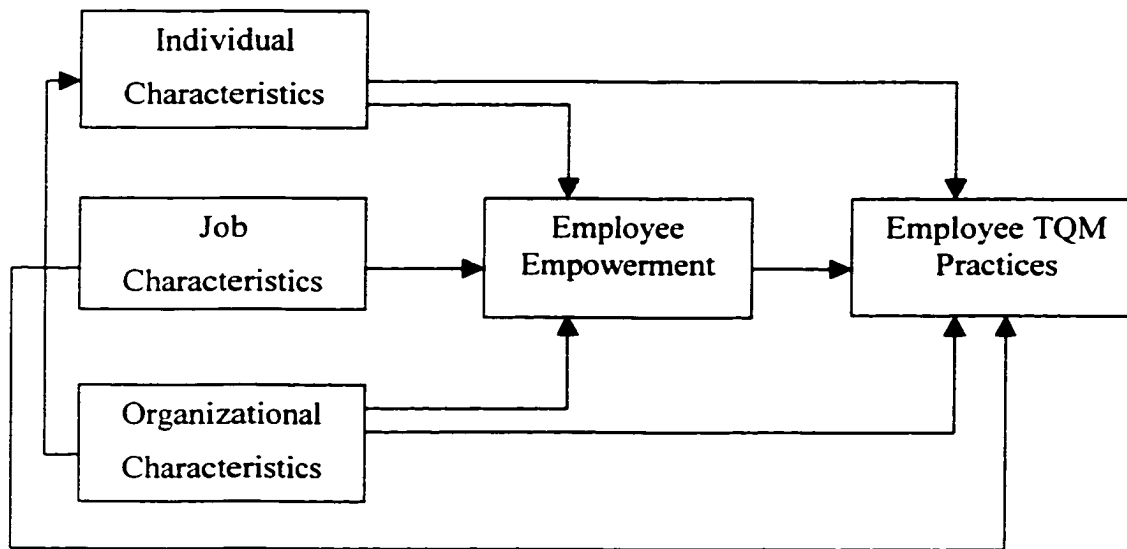
Figure 3-3: Conceptual Framework II.

Note: Conceptual framework II is the expansion of Conceptual Framework I shown in Figure 3-2.

3.2.1 Mediating Factors – Employee Empowerment

As discussed in Section 2.4.1 and Section 3.1.3, many researchers suggest internal work motivation, job satisfaction, job involvement and organizational commitment as the mechanisms which lead employees to engage in efforts toward organizational improvement (Waldman, 1994; Morrison, 1994; Walsh and Tseng, 1998). Shea and Howell (1998) further proposed "self-efficacy" as a cognitive process which impacts on behavioral aspects of TQM. Moreover, "self-efficacy" can be enhanced through organizational variables such as organizational structure, job design, vicarious learning and modeling (by the participation in TQM projects), as well as training. With the support of the literature, I propose two mediating factors as the elements of employee empowerment: self-efficacy and psychological outcome. Self-efficacy in this study refers to the degree of employees' beliefs in their capability to carry out TQM practices, especially with the TQM skills provided by the organization. Psychological outcome here refers to the psychological states as a result of work environment. They can be positive outcomes, such as job involvement, satisfaction, motivation, and organizational involvement, or negative ones, such as job related stresses. Via these two mediating factors, work environment characteristics have indirect impacts on employees' TQM practices. Specifically, self-efficacy is suspected to be related with individual characteristics, since self-efficacy and individual characteristics in this study focus on the skill level and TQM-related experience. Moreover, psychological outcome is related with job and organizational characteristics, since enriched job characteristics and organizational characteristics are suggested by the literature to be able to lead to a positive psychological outcome.

H1a: Self-efficacy is positively associated with employees' TQM practices.

H1b: Individual characteristics – project involvement/participation and training are positively associated with Self-Efficacy.

H2a: Psychological outcome – involvement is positively associated with employees' TQM practices.

H2b: Enriched job characteristics and organizational characteristics are positively associated with psychological outcome – involvement.

3.2.2 INDIVIDUAL CHARACTERISTICS

According to the literature, one of the means to empower employees is through training since it gives them the skills to conduct tasks in the way TQM suggests (Deming, 1985; Juran and Gryna, 1993). However, the issue of training or quality project involvement has been considered so critical that researchers often take it for granted, which leads to little systematic research in this area. It is the interest of this study to relate the role of the personal TQM experiences and skills received from training to his/her TQM activities.

It is widely believed that learning and practice can enhance the individual's capability to carry out a task (Shea & Howell, 1998). Moreover, it empowers employees to increase their confidence in themselves. This study proposes that the individual's experiences associated with TQM projects/training impacts on the employee's behavioral aspect of TQM practices, and indirectly impacts via employee empowerment. As a result, at the individual aspect, two major

elements are included in this study: first, <u>employees' quality project/activity involvement</u>, and second, <u>the training received</u>. While the former implies the "active" participation in quality improvement projects, the latter represents the "passive" reception of what the organization can provide. Many believe the "active" participation can increase employees' ownership of organizational development programs, thus it is suspected to be more influential in the implementation of TQM than the "passive" aspect of training. The concomitant effects of the two along with other organizational factors should be investigated.

A research question is raised to investigate whether previous quality **project experiences** may influence TQM practices. The assumption is that the more projects they have been involved in, the more likely it is that they will engage in TQM practices because they take ownership of the project and feel pride in being chosen to participate.

H3a: The more projects employees have been involved in, the more likely they will engage in TQM practices.

H3b: The number of project involvement/participation is positively associated with TQM practices through its impact on self-efficacy.

In order to investigate the influence of quality improvement **training**, several factors should be taken into account: days of training, number of skills/techniques taught in the training session ("extent" of training). In general, such training is believed to be able to increase employees' TQM practices. However, in addition to the quantity of training, the effectiveness should also be considered. It is obvious that if employees judge the training to be bad or

ineffective, the increase in days or types of training may only discourage employees' willingness

to adopt TQM principles at work. In other words, the combined effects of quantity of training

and effectiveness should not be ignored.

H4a: The quantity of training (days of training, and types and numbers of skills received) and effectiveness of training are positively associated with employees' TQM practices.

H4b: The quantity of training is positively associated with TQM practices through its impact on self-efficacy.

3.2.3   JOB CHARACTERISTICS

According to the previous studies, job satisfaction may lead to more active efforts such as

continuous improvement or teamwork (please refer to literature review section). As a result, I

propose, at job aspect, enriched job characteristics are positively associated with employees'

TQM practices not only because of their consistency with TQM principles, but, more

importantly, also through the mechanism of employee empowerment. Based upon the review of

the literature, feedback, autonomy, participation, and task clarity are selected for the conceptual

framework because they are believed to be consistent with quality principles as suggested by

quality experts. Moreover, these variables along with skill variety are also considered to be able

to empower employees and lead to a positive psychological outcome, such as high level of job

involvement, job satisfaction and motivation. A general hypothesis is:

H5a: Enriched job characteristics (i.e. skill variety, feedback, autonomy, participation, task clarity, lack of role ambiguity, and lack of role conflicts) are positively associated with

employees' TQM practices. The more enriched job characteristics found in the job, the more likely the employees will engage in TQM practices.

H5b: <u>Enriched job characteristics are associated with TQM practices through the impact of employee empowerment – involvement.</u>

To be more specific, I suspect each of the variables: skill variety, feedback, autonomy, job involvement, participation, opportunity for advancement and task clarity, has a direct positive effect on employees' TQM practices and indirect effect via the impact on employee empowerment, here refers to as the psychological outcome (e.g. job involvement and job satisfaction). Low role ambiguity and role conflict are believed to be associated with positive psychological outcome as well as employees' increased level of TQM practices.

3.2.4   ORGANIZATIONAL CHARACTERISTICS

According to the literature, the discussion of the organizational aspect associated with TQM practices can be divided into three components: organizational structure, social environment, and organizational commitment to quality. First of all, as discussed previously, a flattened organizational structure with less rigid boundaries among divisions is generally preferred in creating a quality culture. A low centralization organization yields more power to employees leading them to have more control of their jobs and responsibilities for their tasks, which is also consistent with TQM principles. Less centralization also increases the flexibility to adapt to a changing environment.

H6a: Low centralization is associated with more employees' TQM practices.

H6b: Low centralization is associated with more TQM practices by employees through the impact of employee empowerment – involvement.

Secondly, Shea and Howell (1998) suggested standardized and formalized organizational structures may increase employees' TQM practices. Standard rules, procedures and written documentation lead to employees' skill mastery. These are also consistent with TQM principles. For example, well-documented work instructions are highly valued in ISO9000 certification and the Malcolm Baldrige Award.

However, high standardization and formalization may seem to "force" employees to follow the rules and take control away from them, so that it seems to imply low employee autonomy at first glance. Its impact on employee empowerment is unknown, therefore, I propose to investigate the effect of standardization/formalization on employee empowerment.

H7a: Standardization and formalization are associated with employees' TQM practices.

H7b: Standardization/formalization is associated with employee empowerment. Via the mechanism of employee empowerment – involvement, standardization/formalization indirectly impacts on employees' TQM practices.

In addition, an interaction effect between standardization/formalization and centralization may exist. A decentralized organization which increases employees' autonomy may compensate for the rigidity of the rules or instructions. For example, setting rules or instructions for employees to follow but allowing them the flexibility to conduct their jobs may be the best

structures that lead to good performance, effectiveness or employees' willingness to engage in quality improvement activities. More importantly, how the rules or instructions are developed may play an important role in employee empowerment as well as other organizational behaviors (e.g. OCB, extra efforts etc.). If the rules or instructions are created with the participation of employees, I believe by doing so employees not only feel empowered and take the ownership of their decisions, but also are more willing to engaged in TQM practices because of the clarity of their job responsibility. A balance between centralization and standardization/formalization may provide the best organizational structure which supports employees' TQM practices. Due to the scope of the study, the interaction effect is not investigated, however, such an effect is strongly recommended to be included in the future study.

In addition to the organizational structure, the social environment of the organization is to be investigated in this study. A supportive work environment is suspected to be able to increase employees' positive organizational behaviors through the mechanism of employee empowerment, in this case, job satisfaction, job involvement or other psychological outcome. In a TQM context, a supportive social environment is likely to encourage employees' TQM practices. This is also consistent with TQM principles, as it suggests: one of the main principles of TQM is to expel fear of the organization and provide a trustful environment to encourage employees to take responsibility for their jobs, and learn from their mistakes.

H8a: A supportive environment is positively associated with employees' TQM practices.

H8b: A supportive environment is positively associated with employees' TQM practices via the impact of employee empowerment.

Another aspect of organizational characteristics: organizational commitment to quality improvement has been recognized as a key factor for successful TQM implementation. There are two components to consider: top management support for quality, and a human resource policy for a reward and recognition system for quality. Top management support may also influence the establishment of such a recognition system, quality improvement project implementation, or training given to employees, since top management is able to allocate resources. As a result, in addition to the direct effect on employees' TQM practices, I propose organizational commitment (both top management support as well as human resource policy) has an indirect effect on employees' TQM practices via the number of project/activities, and training given to employees. Project involvement/participation and training as discussed in the individual characteristics in Section 3.2.1, therefore, are not only independent variables, but also mediating factors between organizational commitment in quality improvement and employees' TQM practices.

H9a: Top management support and human resource policy may increase employees' TQM practices. Moreover, top management support is positively associated with a recognition and reward system.

H9b: Top management support and human resource policy have indirect effects on employees' TQM practices through the effects of project involvement/participation, and training, as well as self-efficacy.

3.3 RESEARCH MODEL

Figure 3-4 is an extension of Figure 3-3, which adds the elements identified in Section 3-2. Note that this figure did not show some specific path between some "elements". The relationships are shown only in the broader classification. Here I would like to address the specific paths, which are not shown in the figure.

First of all, although the figure shows the individual aspect had impact on employee empowerment, I consider the individual aspect, as defined in this study, only goes through "self-efficacy" of employee empowerment but not through psychological outcome to have an indirect impact on employees' TQM practices. Job characteristics and organizational characteristics all go through psychological outcome to have indirect impact on employees' TQM practices. I admit that job and organizational aspects may also go through self-efficacy, however, the self-efficacy as defined in this study is tied strongly to skills, techniques and training which if given, may be able to enhance employees' capabilities to execute the desired behaviors. Self-efficacy reflects employees' perceptions of their capabilities. In other words, a direct question could be phrased thus: do you think you have quality improvement skills to achieve quality improvement objectives? In some other cases, job characteristics may be able to increase self-efficacy. For example, skill variety, feedback and autonomy may allow employees to gain controls over the jobs which lead to increased confidence in their capability in general. However, this path is not the main concern of this study.

Secondly, since individual characteristics here refer to individual's experience in project involvement/participation, and training, I propose only the "organizational commitment in

quality improvement" of the organizational characteristics has direct impact on individual characteristics. As mentioned earlier, top management's commitments and human resource policy can determine the allocation of the resources. The number of projects proposed, implemented and the number of training sessions given by the organization is strongly tied to organizational supports for QI efforts. Because of the definition of the individual characteristics in this study, the path starting from organizational structure and supportive environment to individual characteristics can be ignored. The detailed path models are given later in the next chapter.

As discussed previously, work environment characteristics were classified into three aspects: individual characteristics, job characteristics and organizational characteristics. However, it should be noted here that this classification is for the convenience in identifying influential elements from the work environment. In fact, all variables within these three aspects can all be regarded as organizational characteristics, since they are variables found in the work environment. They can also be referred to as individual characteristics since they are all individuals' perceptions of the work environment. Taking variables at the individual level for example, TQM project activities or training are provided by the organization, although I perceive them as factors that are associated with the individual's capability for quality improvement in this study. It is my interest to investigate the influence of the projects/training in which individuals participated, and the influence of characteristics of the work environment on employees' TQM practices. Underlying constructs may exist in these characteristics, especially between job and organizational characteristics. For example, autonomy in job characteristics may be highly

correlated with centralization of organizational structure. Role ambiguity and role conflicts are considered to be job characteristics in previous studies, however, they may also reflect the standardization/formalization of the organization. Therefore, if empirical evidence suggests the explainable constructs, the conceptual framework should be modified and analyses should be done with the underlying constructs.

It should be noted here that the feedback loop shown in Figure 3-2 is removed in Figure 3-3 and Figure 3-4, since it is not tested in the current study. In the conceptual framework, all variables in Figure 3-4 are perceived as organizational antecedents which may increase employees' TQM practices. However, we should not ignore the fact that employees' TQM practices may in turn influence the work environment characteristics and moreover, change the organizational culture.

Conceptual Framework III

Individual Aspect

➤ Project
   Involvement

➤ Training Received

Job Aspect

➤ Skill Variety
➤ Feedback
➤ Autonomy
➤ Participation
➤ Opportunity for
   Advancement

Employee Empowerment

➤ Self-Efficacy
➤ Psychological
   outcome

Employees' TQM Practices

➤ Use of Information
   and Data
➤ Process and
   Quality Results
➤ Customer Focus
   and Satisfaction

Organizational Aspect

➤ Organizational
   Structures
➤ Supportive
   Environment
➤ Organizational
   Commitment in
   Quality Improvement

Figure 3-4: Conceptual framework III.

Table 3-1 Research variables, definition and justification - work environment characteristics.

DIMENSION	FACTORS	DEFINITION	JUSTIFICATION
Individual Characteristics	Project Involvement	The activities related to quality improvement projects the employees have been involved in.	Employees' participation in quality projects or activities may increase employees' knowledge, experience, sense of ownership, and responsibility for quality management.
	Training	The training employees have received through formal training sessions or quality improvement projects.	
Job Characteristics	Skill Variety	The degree to which a job requires employees to perform a wide range of operations in their work and/or the degree to which employees must use a variety of equipment and procedures in their work (Sims et al., 1976).	These variables are chosen because they are believed: (1) to be able to increase work motivation, job satisfaction or positive psychological outcome which will lead to more active efforts, extra-role behaviors, and organizational citizenship behaviors including team corporation, and continuous improvement activities (Hackman & Oldham, 1980; Lawler, 1986; Organ, 1988; Wright et al., 1993; Morrison, 1994; Dyne & Lepine, 1998; Schappe, 1998; Walsh & Tseng, 1998; Juran & Gryna, 1993; Waldman, 1994; Lawler, 1994; Schneider et al., 1996; Shea & Howell, 1998); and (2) to be consistent to TQM principles (Shea & Howell, 1998).
	Feedback	The degree to which employees receive information as they are working which reveals how well they are performing on the job (Sims et al., 1976).	
	Autonomy	The extent to which employees have a major say in scheduling their work, selecting the equipment they will use, and deciding on procedures to be followed (Sims et al., 1976).	
	Participation	The amount of influence the person has on shared decisions which affect him/her (Caplan et al., 1975).	
	Opportunity for Advancement	The extent to which opportunities for promotions, advancement or recognition are perceived.	

Table 3-1 Research variables, definition and justification - work environment characteristics (continued).

DIMENSION	VARIABLE	DEFINITION	JUSTIFICATION
Organizational Characteristics	Centralization	The degree of decision-making authority at the top (Pugh, 1969; Pugh, 1981).	These variables are chosen to represent the organizational structure. Shea and Howell (1998) suggested low centralization and specialization, and high standardization and formalization can increase employees TQM practices. Juran and Gryna (1993) suggested less management control can help creating a TQM culture.
	Standardization	The degree of standard rules and procedures (Pugh, 1969; Pugh, 1981).	
	Formalization	The degree of written instructions and procedures (Pugh, 1969; Pugh, 1981).	
	Social Environment	The extent to which people around the employee at work provide support by being good listeners or by being persons he/she can rely on when help is needed (Caplan, 1975; Insel & Moos, 1974)	A supportive environment is what Deming(1985) suggested "driving out fear" which may increase employees' sense of responsibility for the tasks.
	Organizational Commitments in quality improvement	The extent to which top management shows the support for quality implementation and whether the organization has a reward and recognition system to support the quality policy.	Top management commitment, and recognition and reward systems are believed to be the key drivers behind creating a quality culture and TQM implementation.

Table 3-2: Research variables, definitions and justification – mediating factors

DIMENSION	VARIABLE	DEFINITION	JUSTIFICATION
EMPLOYEES EMPOWERMENT	Self-Efficacy/Outcome Expectancy	Self-Efficacy refers to one's belief in the capabilities to achieve a certain level of performance. Outcome expectancies refer to one's beliefs about whether behaviors will produce favourable or unfavourable outcomes (Shea & Howell, 1998).	The increased self-efficacy and positive outcome expectancy may help the employees to engage in more TQM practices (Shea & Howell, 1998).
	Psychological outcome	According to Hackman & Oldham, 1980, psychological outcomes is the outcomes of psychological states when people experience meaningfulness of the work, responsibility for outcome of the work, have knowledge of the actual results of the activities. Psychological outcomes can be internal motivation, job satisfaction, job involvement.	Increased job motivation, involvement and satisfaction may lead to more active efforts, OCBs, and extra efforts by employees (Hackman & Oldham, 1980; Lawler, 1986; Organ, 1988; Wright et al., 1993; Morrison, 1994; Dyne & Lepine, 1998; Schappe, 1998; Walsh & Tseng, 1998; Juran & Gryna, 1993; Waldman, 1994; Lawler, 1994; Schneider et al., 1996; Shea & Howell, 1998)

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Table 3-3: Research variables, definitions and justification - employees' TQM practices

DIMENSION	VARIABLE	DEFINITION	JUSTIFICATION
TQM institutionalization	Employees' TQM practices	The extent to which employees use the data and information, improve the process to deliver services and systematically monitor the quality of their jobs as well as make the customers' needs and satisfaction as the priority.	Based upon the framework of Malcolm Baldrige National Quality Awards, and empirical studies, use of information and data analysis, process management, quality results, customer focus and satisfaction are considered to be the major components in TQM system (Anderson et al., 1994; Saraph et al., 1989; Flynn et al., 1994; Ahire et al., 1996; Black et al., 1996; Sainfort et al., 1996). This study considers them as the behavioral aspects of the employees, which is distinguished from organizational commitment in quality improvement.

CHAPTER 4: MEASUREMENT AND METHODOLOGY

4.1 INTRODUCTION

In this study the city of Madison, Wisconsin was the research site. This study was part of a large project directed by Professor Sainfort with a grant from the National Science Foundations' **Transformations to Quality Organizations** program. The primary data collection method in this project consisted of the development and administration of an employee survey. The purpose of this survey was to obtain quantitative data that could be used to test the relationships between various constructs of organizational culture, structure, quality of working life, and TQM implementation from the perspective of employees. Two waves of the survey were administered. The first wave was conducted in the fall 1995. Based upon the data collected from the first wave, the survey was revised and sent out for a second time in the fall 1997. This particular study uses the second wave data to investigate how the work environment influences employees' TQM practices.

For the second round survey, questionnaires were sent via internal/campus mail to each full time City employee and were returned directly to the researchers at the University of Wisconsin-Madison via internal/campus mail. Pre-labeled envelopes were provided and confidentiality was ensured. A total of 2,231 questionnaires were mailed out and a total of 848 were returned and deemed useable for subsequent analysis. Thus the overall response rate for this study was 38%. Respondents were asked to indicate their department/division as well as their unit/sub-division, when applicable. This allowed the examination of the

response rates across "Agencies" (i.e., divisions, departments, and/or combinations of

divisions/departments as defined by the city) (see Table 4-1 for the response rates across

agencies).

Agency/Department/Division	Respondents	Total	Rate
Fire	**99**	**284**	**34.9%**
Police	**113**	**440**	**25.7%**
Library	**54**	**117**	**46.2%**
Public Health	**60**	**87**	**69.0%**
Public Works and Transportation	**284**	**980**	**29.0%**
Madison Metro	69	373	18.5%
Traffic Engineering	29	52	55.8%
Parking Utility	28	46	60.9%
Parks	62	138	44.9%
City Engineer	28	81	34.6%
Streets	37	172	21.5%
Water Utility	28	115	24.3%
Other	3	-	
Public Facilities	**22**	**44**	**50.0%**
Monona Terrace*	0	15	0.0%
Civic Center	16	23	69.6%
Senior Center	6	6	100.0%
Planning & Development	**92**	**145**	**63.4%**
Housing Operations	21	43	48.8%
Planning	8	16	50.0%
Inspection	28	52	53.8%
Community and Economic Development	12	13	92.3%
Administrative/CDBG/Community Services	15	21	71.4%
Other	8	-	
Administration	**108**	**209**	**51.7%**
Affirmative Action	3	7	42.9%
Equal Opportunities Commission	1	9	11.1%
Attorney	12	25	48.0%
Motor Equipment	13	39	33.3%
Human Resources	11	23	47.8%
Revenue	26	34	76.5%
City Comptroller	22	35	62.9%
Information Services (with City Channel)	20	37	54.1%
Others	**7**	**15**	**46.7%**
Mayoral Assistants	5	9	55.6%
Council	1	2	50.0%
Municipal Court	1	4	25.0%
Unknown	**9**	**-**	
Total	**848**	**2231**	**38%**

* The 0% response rate for Monona Terrace is due to the creation of this division days prior the start of data collection.

Table 4-1: Response rate across agencies.

4.2   MEASUREMENT

4.2.1   INDEPENDENT VARIABLES

Twenty-two variables were chosen from the questionnaire of the second

administration (See Appendix A for the questionnaire, used in the second round survey) to

serve as independent variables, which were used to measure the organizational factors as

identified in the previous chapter. Based upon the conceptual framework, the independent

variables were divided into three groups: individual characteristics, job characteristics, and

organizational characteristics. The names, number of items and sources of these variables

are presented in Table 4-2 – 4-4. While most of them were from published instruments,

some were developed for the purpose of the overall project and tested in the first wave.

Five variables for individual characteristics were selected to measure individuals'

capacity for quality improvement tasks: number of projects involved in, and participation

in activities, measuring employees' experiences of project involvement; days of training,

extent/types of training received, overall rating of training, measuring the degree of

training or skills received. These five measurements were developed for the purpose of

this project.

Based on the literature, five variables from job characteristics were selected: skill

variety, feedback, autonomy, participation, and opportunity for advancement (all of them

were selected from existing instruments). The first three were originally from *Job*

Characteristics Inventory by Sims et al. (1976). Participation and opportunity for

advancement were from *University of Michigan Institute for Social Research* by Caplan et

al. (1975). They are Likert-type scales ranging from 1 to 5. The previous studies showed the high reliability and good validity of these scales.

At the organizational level, centralization was measured using management control from *Work Environment Scale* (Insel & Moos, 1974). Task clarity, role ambiguity, role conflict as well as understanding of city's vision, mission and goals were selected to measure the degree of standardization and formalization characteristics of the organizational structure. Although these variables measure how employees *perceive* the organizational structure and may not reflect the *actual* organizational structure, employees' psychological perceptions are believed to be able to influence how they perform the task in addition to the "actual situation". It may be disputable to consider task clarity, role ambiguity and role conflict as organizational characteristics rather than job characteristics, because they often have been considered as job characteristics in the literature. However, I believe they represent the standardization and formalization characteristics to a large degree, especially according to Pugh's definitions (1981). To solve the problem of classification, factor analysis was performed to identify the underlying constructs prior to path analysis. The results supported the classification: task clarity, role ambiguity, role conflict, and understanding of city's visions, missions and goals share the same construct. See Chapter 5 – Results for details.

Social environment was measured using supervisor support, and peer cohesion from Work Environment Scale (Insel & Moos, 1974), and support from others at work from the study of Caplan et al. (1975). Although *TQM institutionalization scale* have two variables

that measure the degree of organizational commitment in quality improvement: top

management support for TQM, and human resource policy, I decided not to use these two

measures. That is because these two measurements intended to measure TQM

institutionalization, which were considered as outcome variables along with three

employees' TQM practices. I believe the organizational commitment in quality

improvement is the construct considered to be differentiable from employees' TQM

practices, however, because of potential confounding due to the design of these

measurements, I decided to exclude this factor from the study, and leave the investigation

of its effect for the future study.

4.2.2   MEDIATING FACTORS:

Two elements of employee empowerment were considered as mediating factors:

self-efficacy & outcome expectancy, and psychological outcomes. Self-efficacy &

outcome expectancy, as defined in Chapter 3, were measured using three variables: skills

acquired, familiarity with QI, and perceived effects of QI. These three variables were also

new scales developed for this project. They were all Likert-type scales ranging from 1 to

5. Psychological outcomes were measured using two variables: job involvement, and

organizational involvement. Job involvement was from *Work Environment Scale* (Insel &

Moos, 1974), which consisted of four true/false items. Organizational involvement was

from Cook and Wall (1980), which consisted of three items. It was also a Likert-type scale

ranging from 1 to 7. Table 4-5 shows the variables chosen for mediating factors.

4.2.3 DEPENDENT VARIABLES:

Three variables were chosen to measure the dependent variable in this study: employees' TQM practices: use of information and data, processes and quality results management, and customer focus and satisfaction (See Table 4-6). The three variables were from TQM institutionalization scale (Sainfort et al., 1996), developed for this project. They were all five-point Likert-type scales. The limitation of using these three measurements is that these variables measured the TQM practices at the *agency* level. Participants were asked to rate the degree of TQM practices at the agency rather than of their own. However, in the first round data, we found there is a moderate correlation between employees' rating on their own TQM practices and how they perceived their agency's TQM practices (correlation coefficient=.578). Such a finding justifies the use of these variables, however, some cautions should be used in interpreting the results because of the limitation of the measurements.

It should be noted here that all these variables are measures of employees' perceptions of their work environment as well as TQM institutionalization. As stated by Aldag and Brief (1979), "employees often react to their perceptions of the job's content, which do not necessarily coincide with the actual content of the job", this provides the support to some degree for choosing employees' perceptions to test the model proposed by this study.

4.3 METHODOLOGY – DATA ANALYSIS

Sample demographics were first investigated, followed by the analyses of variables. The strategies of analyzing the data included univariate analysis and multivariate analysis. **Univariate analysis** consisted of the descriptive statistics and correlation analysis at variable levels. The results of the descriptive statistics gave me an overview of how the variables distributed, and whether any particular patterns occurred. I also checked the normality of each variable by histogram and Q-Q plots. Correlation showed the linear relationship between variables and also provided the results for hypothesis testing at variable level. Further multivariate analyses were performed for the remaining set of variables.

In the **multivariate analysis**, factor analysis and path analysis were performed. Variables were factor analyzed in order to identify the underlying constructs. By doing so, it can help confirm and clarify the selection of measurement for my theoretical models and reduce the numbers of variables in path analyses.

There are several methods of extracting factors, for example, principal components analysis with or without iteration, Rao's canonical factoring, alpha factoring, image factoring, maximum likelihood, unweighted Least-Squares factor analysis (Johnson, D., 1998; Kim & Mueller, 1978a, b). According to Johnson (1998), which of these methods is best is not known. Principal components analysis may be the most popular of these. Kim & Mueller suggested using maximum likelihood methods, least-squares method or the default option in the statistical program. In SPSS, it is the principal components analysis.

After considering both Johnson, and Kim & Mueller's suggestions, I decided to use principal components analysis (PCA) as the extracting method in the factor analysis.

There are several criteria for deciding the number of factors to be extracted. I considered Kaiser's rule (eigenvalue greater than 1), the cumulative percentage of total variation, scree plots, and most importantly, the ease of interpretation of parsimony in determining the number of factors.

Factor scores were computed by the averages of standardized values of variables loaded highly (greater than .50) on the same factors. Factors then replaced the variables in the path analysis. The detailed discussion of factor analysis are presented in Section 5.3.1.

Path analyses were performed using the method proposed by Asher (1983). Direct and indirect effects were computed using the regression coefficients. Since regression analysis was used as the method of path analysis, the assumptions of regression equations were examined. The key assumptions of the regression model and methods of the examination are listed below:

- Linearity: the expected value of the dependent variable is a linear function of the independent variable. It can be examined by X-Y scatter plots.

- Constant variance. It can be examined by plotting the residuals against independent variables or against predicted values.

- Normality: the errors are normally distributed. This can be examined by normality plots (Q-Q plots) of residuals.

- Independence of ε_i: the observations are sampled independently. This can be examined by Durbin Watson statistics. The value close to 2 suggests independence of error.

Path models were built for each of the TQM practices: <u>use of data & information</u>, <u>processes & quality results</u>, and <u>customer focus & satisfaction</u>. In addition, the average of three TQM practices was computed to represent overall employees' TQM practices. A path model was also built for this variable. The purpose of this dissertation is to identify how the work environment influences employees' TQM practices. Therefore, the effects of work environment factors were examined closely. As a rule of thumb, coefficients greater than .10 were considered "substantive significant" (Amick & Celentano (1991).

Detailed methodology and analyses were presented in Chapter 5 in addition to the results.

Table 4-2: Measurements for Individual Characteristics

Factors	Measurement	# of Items	Questions at the 2nd Round Survey	Sources
Project Involvement	Number of Project Involved	1	C15	New Scale
	Participation in Activities	8	C7-C14	New Scale
Training	Days of Training	1	C17	New Scale
	Extent of Training Received	10	C18-C27	New Scale
	Overall Rating of Training	1	C29	New Scale

Table 4-3: Measurements for Job Characteristics

Factors	Measurement	# of Items	Questions at the 2nd survey	Sources
Job Characteristics	Skill Variety	5	A9, A12, A10, A15, A17	Job Characteristics Inventory (Sims et al., 1976)
	Feedback	5	A8, A11, A18, A20, A22	Sims et al., 1976
	Autonomy	6	A10b, A13, A14, A16, A19, A21	Sims et al., 1976
	Participation	3	A23, A24, A25	University of Michigan Institute for Social Research (Caplan et al., 1975)
	Opportunity for Advancement	3	A66, A67, A68	Caplan et al., 1975

Table 4-4: Measurements for Organizational Characteristics

Organizational Factors	Measurement	# of Items	Questions at 2nd survey	Sources
Centralization	Management Control	4	B8, B17, B26, B35	Work Environment Scale (Insel & Moos, 1974)
Standardization and Formalization	Task Clarity	4	B7, B16, B25, B34	Insel & Moos, 1974
	Role Ambiguity	4	A30, A31, A32, A33	University of Michigan Institute for social Research (Caplan et al., 1975)
	Role Conflict	4	A63, A64, A65	Caplan et al., 1975
	Understand the Vision, Mission and Goals	2	A34, A35	Employee Survey (City of Madison, 1996)
Social Environment	Supervisor Support	4	B3, B12, B21, B30	Insel & Moos, 1974
	Peer Cohesion	4	B2, B11, B20, B29	Insel & Moos, 1974
	Support from Others at Work	4	A59, A60, A61, A62	Caplan et al., 1975

Table 4-5: Measurements for Mediating Factors

Organizational Factors	Measurement	# of Items	Questions at 2nd survey	Sources
Self-Efficacy	Skills Acquired	7	C31-C37	New Scale
	Familiarity with QI	6	C1-C6	New Scale
	Perceived Effects of QI	5	C38-C42	New Scale
Psychological Outcomes	Job Involvement	4	B1, B10, B19, B28	Work Environment Scale (Insel & Moos, 1974)
	Organizational Involvement	3	E10, E12, E14	Organizational Commitment Questionnaire (Cook & Wall, 1980)

Table 4-6: Measurements for Dependent Variables – Employees' TQM Practices

Factors	Measurement	# of Items	Questions at the 2nd survey	Sources
Employees' TQM practices	Use of data and information	3	D13-D15	TQM Institutionalization Scale (Sainfort et al., 1996)
	Process and Quality Results	8	D21-D28	Sainfort et al., 1996
	Customer Focus	7	D29-D35	Sainfort et al., 1996

CHAPTER 5: RESULTS

In this chapter, I present the results of analyzing the data and testing the hypotheses. The results are presented and interpreted in the following sections: sample demographics, which presents the demographic information for those who returned the surveys; univariate analysis, which includes descriptive statistics and correlation analysis; multivariate analysis, which includes factor analysis and path analysis. Some discussion is included to explain how the results were used for the later part of analyses. However, the overall and detailed discussion is presented in the next chapter.

5.1 DEMOGRAPHICS INFORMATION OF THE SAMPLE

Demographic information was examined by overall sample, by agency and by job category. Overall, 41.9% of the participants were female; average age was 43.46 (SD = 9.06); 8.7% were non-white; 73.1% of the participants had had at least some college degree; 64.7% were married; 72.2% were union members; 88% of the participants had worked with the city for at least 3 years; 71.4% of the participants had worked for at least 3 years on the current job position (please refer to the first column of Table 5-1). The information shows this is a stable, mature, educated, and highly unionized sample.

Employees were asked to fill in the agencies/department/division and units of their current

employment. The answers were further grouped into eight agencies/department/division and

units if appropriate according to the organizational chart provided by the city.

Job titles were also an open-ended question. For the convenience of comparison and

further analyses, we created a standardized category after the surveys were returned. In order to

do so, we first listed all job titles given by the participants for each agency. We then provided

the list and six job titles: clerk, field worker, manager, supervisor, professionals, and technicians

to the department chairs and asked them to choose from one of the six job titles for each original

job titles given by the participants. After receiving these re-coded job titles from the department

chairs, we closely checked their answers and gave our final judgement based on the knowledge

we had about these categories.

Table 5-1, 5-2 shows the demographic and tenure information across the agencies, and job

titles respectively. The percentage is the proportion of the demographics (the first column)

within each agency (on the first row). Among the eight agencies, Fire had the largest percentage

of males (79.4%), followed by public work and transportation (74.6%), while library and public

health had the largest percentage of females (88.7% and 74.6% respectively). The majority of

participants from the Fire, Police and Public Work and Transportation departments were field

workers (62.9%, 67.6% and 52.7% respectively). The largest percentages of participants from

Library and Public Health were professionals (46.3% and 41.1% respectively). Library, and

Administration had a higher percentage of clerks than any other agency (44.4% and 35%). $\chi^2 =$

354.96, p<.001 suggests the proportion of job titles varies across the agencies. This also implies

that the nature or characteristics of the work differs among the agencies. Agencies like Library, and Administration might have more clerical type tasks. Employees from these agencies may spend more time in the office than those field workers from Police, Public Works and Transportation, and Public Facility departments.

All eight agencies have high percentages of participants working in the City for at least 3 years: 96.3% for Library is the highest, followed by 93.3% for Public Works and Transportation, 90.9% for Public Facility, 86.7% for Police. This suggests the turnover rate is not a major concern in the City. The majority of the participants in these agencies also worked in the same position for at least 3 years. The above discussion suggest the City was a stable workforce, however, this may suggest this organization has less opportunity for job advancement.

	Overall	Fire	Police	Lib.	Pub. Health	Public Work and Trans.	Public Facil.	P&D	Admin	Others
N	848	99	113	54	60	284	22	92	108	7
Valid %		11.8%	13.5%	6.4%	7.2%	33.8%	2.6%	11.0%	12.9%	0.8%
Gender										
Female	41.9%	20.6%	46.4%	88.7%	74.6%	25.4%	50.0%	45.1%	52.8%	71.4%
Male	58.1%	79.4%	53.6%	11.3%	25.4%	74.6%	50.0%	54.9%	47.2%	28.6%
Job Title										
Clerk	17.5%	0%	17.1%	44.4%	12.5%	11.7%	27.3%	16.9%	35.0%	33.3%
Field Worker	40.0%	62.9%	67.6%	0%	21.4%	52.7%	31.8%	24.7%	4.9%	0%
Manager	5.9%	8.2%	3.6%	1.9%	5.4%	5.3%	9.1%	7.9%	6.8%	16.7%
Supervisor	8.6%	1.0%	0.9%	7.4%	10.7%	12.1%	18.2%	15.7%	6.8%	0%
Profession	17.5%	1.0%	9.9%	46.3%	41.1%	6.4%	13.6%	25.8%	33.0%	50%
Technician	10.6%	26.8%	0.9%	0%	8.9%	11.7%	0%	9.0%	13.6%	0%
Age										
Mean	43.46	39.63	42.04	45.41	42.47	44.69	47.09	44.23	42.84	45
SD	9.06	7.42	9.43	9.54	9.38	8.68	11.24	9.12	9.03	9.92
Employ w/city > 3yr.	88.0%	83.9%	86.7%	96.3%	81.6%	93.3%	90.9%	82.6%	83.2%	71.4%
Employ at current job > 3yr.	71.4%	58.6%	63.0%	75.0%	78.3%	79.0%	68.1%	71.7%	66.3%	42.9%
Ethnicity % of non-white	8.7%	6.2%	15.7%	1.9%	12.1%	8.2%	0%	8.9%	8.6%	14.3%
Education % with college	73.1%	79.4%	86.4%	92.4%	91.7%	58.6%	63.7%	76.7%	73.9%	57.2%
Marital status % married	64.7%	60.6%	64.2%	61.5%	75.4%	68.0%	31.8%	65.6%	60.6%	71.4%
Union status % member	72.2%	92.9%	94.5%	83.0%	84.5%	73.5%	50.0%	45.6%	48.1%	14.3%

Table 5-1: Demographic information within agencies.

	Clerk	Field worker	Manager	Supervisor	Professional	Technician
N Valid %	140 17.5%	321 40.0%	47 5.9%	69 8.6%	140 17.5%	85 10.6%
Gender Female Male	84.9% 15.1%	23.6% 76.4%	38.3% 61.7%	34.8% 65.2%	58.6% 41.4%	20.5% 79.5%
Age Mean SD	42.99 10.03	42.08 9.48	48.32 6.51	46.99 7.21	43.94 8.61	42.52 8.25
Employ w/city > 3 yr.	82.8%	88.4%	97.8%	89.8%	86.4%	88.2%
Employ at current job > 3 yr.	65.8%	72.1%	70.3%	73.1%	73.4%	67.8%
Ethnicity % of non-white	9.4%	11.6%	6.4%	5.9%	5.0%	7.2%
Education % with college	60.5%	66.3%	95.8%	82.6%	94.3%	74.7%
Marital status % married	48.9%	63.4%	78.7%	74.6%	70.1%	66.7%
Union status % member	74.3%	97.1%	17.0%	13.0%	55.7%	84.3%

Table 5-2: Demographic information within job titles.

5.2 UNIVARIATE ANALYSIS

Two major components of univariate analysis presented here are: descriptive statistics and correlation analysis. The results provide basic information about the variables and their relationships. All the variables were examined and some of them were chosen for further analyses and model testing. The following sections present the details of the results.

5.2.1 DESCRIPTIVE STATISTICS

In this section, I first present the descriptive statistics, and show the normality by histograms and Q-plots. The presentation is organized according to the classification proposed in the conceptual model: independent variables – individual characteristics, job characteristics, organizational characteristics; the mediating factor – employee empowerment; and the dependent variables – employees' TQM practices.

5.2.1.1 Individual characteristics

Since individual variables are measured by different scales, the descriptive statistics, such as means or standard deviations, may not be the best way to describe the sample. Thus, I decided to use frequency statistics to discuss the individual characteristics in this section; however, aggregated statistics, such as means, are used in the further analyses, such as correlations, regression, and factor analysis, to represent the degree of individual's TQM related

experience. Table 5-3 shows frequency and Table 5-4 shows means, SD and range of the variables.

Regarding the project involvement, 41.2% (valid percentage) of participants reported having participated in none of the TQM projects/efforts; 34.5% had participated in one or two TQM projects/efforts, and 24.3% had participated in three or more projects/efforts. As to participation in activities, 40.8% of the participants reported never participating in TQM activities (e.g. as a member or a facilitator of a TQM team or advisory committee, a teacher/trainer, or a participant in developing the agency's statement of mission, TQM related philosophy). 27.8% of the participants had been or were currently participating in one or two TQM activities; 31.4% had been or were currently participating in three or more TQM activities.

Regarding number of days of training employees were given, 25.3% of the participants reported receiving no TQM training; 28.7% had received TQM training for less than 2 days; 29.8% had received TQM training for between 3 to 10 days; 16.2% had received TQM training for 10 days or more. Extent of training asked respondents to mark whether they received the certain types of training from a list of 10 items. The higher score represents the wider extent of training they received. 24.5% reported no training received. This number is similar to the percentage received from the question about the days of training. This gives us an opportunity to examine the reliability of this questionnaire. We found the respondents' answers are fairly consistent in this aspect: 35.1% received at least 3 types of TQM training; 25.7% received between 4 to 6 types of TQM training; 14.7% received more than 7 types of TQM training. The

participants were also asked to rate the training they received. The training was rated as poor by 8.5% of the participants; fair by 24.1%; and good, very good or excellent by 36.6%.

In summary, these numbers suggested the majority of the participants had had some experience related to TQM either from TQM projects, or from participation in activities or TQM training. However, it should be noted that more people reported having received training than had been actively involved in TQM projects/activities (581 vs. 488/489). This raised the question of whether the project involvement/participation is more effective than training, since I suspect project involvement may increase employees' sense of ownership of a TQM project, and encourage the *active* participation, while the training is to give employees skills, which employees may *passively* accept. This questions was answered by the regression analysis. The concomitant effects of individual characteristics were examined. By doing so, the critical components which influence employees' TQM practices were identified and are presented in the regression analysis section.

Variables	Frequency – valid percentage
Number of projects	None (41.2%); one (21.4%); 2 (13.1%); 3 or 4 (15.2%); 5 or more (9.1%)
Participation in activities	0(40.8%); 1(17.2%); 2(10.6%); 3(9.0%); 4(8.1%); 5(5.3%); 6(4.2%); 7(3.2%); 8(1.6%)
Days of training	None (25.3%); less than 1 day(10.4%); 1 or 2(18.3%); 3 or 4(14.8%); 5 to 10(15.0%); 10 days or more(16.2%)
Extent of training (number)	0(24.5%); 1(15.8%); 2(8.9%); 3(10.4%); 4(8.7%); 5(9.7%); 6(7.3%); 7(5.9%); 8(4.4%); 9(3.4%); 10(1.0%)
Overall rating of training	None(27.2%); poor(8.5%); fair(24.1%); good(25.0%); very good(11.6%); excellent(3.5%)

Table 5-3: Frequencies for individual characteristics

Measurement	Mean	SD	Range of Scale Values	# of Items	Alpha Coefficient
Number of project	2.30	1.37	1-5	1	-
Participation in activities	1.85	2.17	0-8	1	-
Days of training	3.32	1.80	1-6	1	-
Extent of training received	3.09	2.80	0-10	1	-
Overall rating of training	2.96	1.48	1-6	1	-

Table 5-4: Descriptive statistics for individual characteristics

5.2.1.2 Job characteristics

Means, standard deviations and alpha coefficients were computed for five job

characteristics: skill variety, feedback, autonomy, participation, and opportunity for

advancement. These variables were measured with Likert-type scales (ranging from 1-5), on

which employees indicated the degree of each characteristic they perceived in their job. The

results showed that employees perceived their jobs to have skill variety, and autonomy

characteristics to a greater degree than the other characteristics. Both had means higher than the

midpoints: 3.2 and 3.82 respectively. They also perceived that their jobs have feedback,

participation and opportunity for advancement to a lower degree. They had means lower than

the midpoints: 2.66, 2.95, and 2.12 respectively on a scale of one to five. The standard deviations

of these variables ranged from 0.78 to 1.04, which indicated the participants in this sample did

not have very diverse responses to each variable. The internal consistency of these variables

were very good, with the alpha reliability coefficient ranging from 0.79 to 0.88. The alpha

coefficients computed from this study were also consistent with the values computed from the

previous studies. This suggests the measurements used here were rather reliable. Table 5-5

shows the descriptive statistics of the job characteristics.

The normality of each variable was checked by using histogram and Q-Q plot. The

histograms and Q-Q plots showed variables - skill variety, feedback, and participation were

closer to normal distribution. The distribution of autonomy was skewed with more responses on

the higher end. The distribution of opportunity for advancement was also skewed but with more

responses on the lower end.

Measurement	Mean	SD	Range of Scale Values	# of Items	Alpha Coefficient
Skill variety	3.20	0.94	1-5	5	0.88
Feedback	2.66	0.96	1-5	5	0.88
Autonomy	3.82	0.78	1-5	6	0.80
Participation	2.95	1.04	1-5	3	0.88
Opportunity for advancement	2.12	0.85	1-5	3	0.79

Table 5-5: Descriptive statistics for job characteristics

5.2.1.3 Organizational characteristics

Means, standard deviations and alpha coefficients were also computed for 10

organizational characteristics: management control, task clarity, role ambiguity, role conflict,

understanding of city vision, mission and goals, supervisor support, peer cohesion, social support

from others at work. The descriptive statistics are presented in Table 5-6. The results showed

employees perceived a higher degree of management control in the organization. The

measurement of centralization had a mean higher than the midpoints: 2.29 (on a scale of 0-4; SD=1.23).

Among the four variables measuring the standardization characteristics of organizational structure, participants perceived role ambiguity, role conflict to a less degree and also reported a higher degree of understanding the organization's visions, missions, and goals. The first two variables had means lower than the midpoints and the last higher than the midpoint: 1.59 (on a scale of 1-4), 2.14 (on a scale of 1-5), and 3.38 (on a scale of 1-5) respectively. The results showed the organizational structure was perceived as a more standardized one. The only conflicting result was found in the measurement – task clarity. Task clarity had a mean of 1.95 on a scale of 0-4, which was lower than the midpoint. This exception implies that the participants were clearer about their role responsibilities and where the organization was leading to than the tasks assigned to them.

The participants also perceived the social environment at work as a supportive one. According to the results, the measurements of the social environment had means higher than the midpoints: 2.30 (on a scale of 0-4; SD=1.46) for supervisor support; 2.49 (on a scale of 0-4; SD=1.39) for peer cohesion; and 3.13 (on a scale of 1-4; SD=0.64) for social support from others at work.

Alpha reliability coefficients for all measurements except management control are very good and are consistent with the values obtained from the previous studies. The range of the alpha coefficients was from 0.70 to 0.92. Management control has a relatively low alpha coefficient, 0.58. One should be cautious in using this single variable to measure the concept

that is of this study's interest. Although the reliability of this variable was somewhat low, I decided to keep this variable at this stage and waited for the results of multivariate analysis to see whether there were other variables that might be able to measure the characteristic of centralization as a supplement to management control.

The histograms and Q-Q plots were made to check the normality of the variables. Management control, understanding of city vision and social support from work were skewed with more responses on the higher end. Role ambiguity was skewed but with more responses on the lower end. The distribution of task clarity was closer to a platform. Role conflict, supervisor support, and peer cohesion were not normally distributed. Since these variables were used later on as independent variables, non-normal distribution did not violate the assumption of regression analysis. This examination was conducted only to have an idea of how robust the regression analysis would be.

Measurement	Mean	SD	Range of Scale Values	# of Items	Alpha Coefficient
Management control	2.29	1.23	0-4	4	0.58
Task clarity	1.95	1.48	0-4	4	0.75
Role ambiguity	2.14	0.89	1-5	4	0.89
Role conflict	1.59	0.61	1-4	4	0.78
Understanding of city vision, mission and goals	3.38	1.02	1-5	2	0.89
Supervisor support	2.30	1.46	0-4	4	0.74
Peer cohesion	2.49	1.39	0-4	4	0.70
Social support from others at work	3.13	0.64	1-4	4	0.80

Table 5-6: Descriptive statistics for organizational statistics

5.2.1.4 Employee empowerment

Descriptive statistics were also computed for variables as the mediating factor. Table 5-7 showed the means, SD, scale, and reliability of these variables. In employee empowerment, self-efficacy and outcome expectancy contained three measures specifically related to TQM techniques and skills. Employees were asked to express whether they thought they had skills to achieve TQM oriented results, how familiar they were with certain skills/techniques, or how they perceived the effects TQM techniques/skills brought to their work life. The results suggested, on average, participants rated their capabilities medium to low. In other words, this implied a lower degree of reported self-efficacy. Three variables measuring self-efficacy had means closer to or lower than the midpoints on scales of 1-5: 3.03 for skills acquired (SD=.93); 2.54 for familiarity (SD=1.17); and 2.84 for perceived effects (SD=.74). The reliability test showed the measures were highly reliable (alpha coefficients ranged between .83 to .97). For simplicity, the term, self-efficacy, was used in the rest of the analysis, although it also has the meaning of outcome expectancy.

Psychological outcomes were measured by two variables: job involvement and organizational involvement. On average, participants perceived medium to high involvement in their job and in the organization. The variables had means higher than the midpoints: 2.36 on a scale of 0-4 for job (SD=.71); and 5.89 on a scale of 1-7 for organization (SD=1.01). Reliability test suggested these two variables were appropriate (alpha coefficients were 0.67 for job involvement, and 0.71 for organizational involvement).

In the test of normality, all the variables in the mediating factor deviated somewhat from the normal distribution. Since they were not only treated as independent variables but also dependent variables, the normality assumptions of regression analysis might be violated. The normality was examined and paid attention to later at the factor level after multivariate analysis was conducted, because factors were used for further analysis instead of variables.

Employee Empowerment

Measurement	Mean	SD	Range of Scale Values	# of Items	Alpha Coefficient
Skills acquired	3.03	0.93	1-5	7	0.97
Familiarity with QI	2.54	1.17	1-5	6	0.96
Perceived Effects of QI	2.84	0.74	1-5	5	0.83
Job involvement	2.36	1.40	0-4	4	0.71
Organizational involvement	5.89	1.01	1-7	3	0.67

Table 5-7: Descriptive statistics for mediating factors

5.2.1.5 Employees' TQM practices

Three Likert-type scale variables were used to measure employees' TQM practices – use of data and information, process and quality results and customer focus. A new variable – overall TQM practices was obtained by averaging the three TQM practices variables. The higher the score of overall TQM practices indicates a higher degree of TQM institutionalization in the organization in general. The results showed employees perceived their agencies engaged in TQM practices to a higher degree in all three aspects and perceived medium to high on overall TQM practices. These variables had means higher than the midpoints: 3.05 for use of data and information, 3.01 for process and quality results, 3.24 for customer focus, and 3.09 for overall TQM practices on a scale of 1-5 respectively. SDs ranged from 0.76 to 0.87. Alpha reliability coefficients showed these measurements were reliable, ranging from 0.85 to 0.93. Table 5-8 presents the means, standard deviation, and alpha coefficients of these dependent variables. Histograms and Q-Q plots suggested these variables were very close to normal distribution. The normality tests for these variables were encouraging since they were treated as dependent

variables in the path analysis (by using regression analysis). The normality assumptions for

dependent variables were required.

Measurement	Mean	SD	Range of Scale Values	# of Items	Alpha Coefficient
TQM Practices					
Use of data and information	3.05	0.87	1-5	3	0.85
Process and Quality Results	3.01	0.76	1-5	8	0.93
Customer Focus	3.24	0.79	1-5	7	0.93
Overall TQM	3.09	.73	-	-	-

Table 5-8: Descriptive statistics for outcome variables – employees' TQM practices

5.2.2   CORRELATION ANALYSIS

In Section 5.2.1, each variable was provided the descriptive statistics and discussed. The

results of correlation analysis are presented in this section. First of all, the correlations between

control variables and dependent variables were presented, followed by the discussion of

correlation analysis between dependent variables - TQM practices, between mediating variables

and TQM practices, between individual characteristics and TQM practices, between job

characteristics and TQM practices, and between organizational characteristics and TQM

practices. Table 5-10 presents the Pearson correlations coefficients between control variables

and dependent variables if control variables are the continuous values, or R from the regression

analysis if control variables are categorical variables. Table 5-11 shows the Pearson correlation

coefficients of the study variables.

5.2.2.1 Correlation between control variables and study variables

In this section, the correlations between control variables and dependent variables were discussed. There were ten demographic variables in the survey, i.e. agency, job title, tenure with city, tenure on the current job, gender, education, ethnicity, age, marital status, and union membership. These variables were suspected to be able to result in different degrees of TQM institutionalization. In order to control the effects due to these variables and focus on the influence of dependent variables, we would like to select some of them to the regression analysis. The criterion of choosing the variables was to select those have high correlations with TQM practices variables. Two types of correlation analyses were performed to help reduce the number of control variables to be included in the models. One was regression analysis for control variables with categorical values. Another was the typical Pearson correlation analysis for control variables with continuous values. Among the ten control variables, agency, job title, gender, ethnicity, marital status and union memberships were categorical values. Tenure with city, tenure with the job, education and age were either ordinal scales, or continuous variable. Dummy variables were created for each categorical control variable. Table 5-9 shows the coding used for the categorical variables and scales for ordinal and continuous variables.

In order to examine the correlation between the categorical value with dependent variables, individual regression equation was built for each control variable, with dummy variables as independent variables and each study variable as a dependent variable. Knowing R-square indicates the percentage of variance of dependent variable explained by the independent variables, Cohen & Cohen (1983) suggest using R as an indicator of the correlation between a control variable and a study variable for categorical data. The higher the R-value is, the stronger

correlation between the control variable and study variable. Since tenure with city, tenure on the current job, and education were ordinal scales and age was a continuous variable, a general Pearson correlation was performed to examine the relationship between these control variables and studies variables. In Table 5-10, the numbers in cells are the R-values obtained from regression equation when control variables are categorical data, which shows the degree of the relationship between control variables and dependent variables. In addition, the numbers in cells are Pearson correlation coefficients if the control variables are ordinal or continuous variables.

The strategies of selecting control variables was choosing control variables which were significantly correlated with employees' TQM practices variables, i.e. the dependent variables of the study. That is because we would like to control the effect of these control variables and examine the effect of work environment characteristics on employees' TQM practices. The inclusion of the control variables into regression equations may accomplish this objective.

The results of correlation analyses suggested <u>agency, job title, and gender</u> were significantly correlated with all four TQM practices variables. Thus, they were included in the path analyses as control variables. <u>Tenure with city</u> and <u>tenure on the current job</u> were also significantly correlated with three of the four TQM practices variables. Thus, agency, job title, gender, tenure with city, and tenure on the current job were included in the regression equations as control variables, which results are presented in the later section.

Table 5-9: Dummy coding for control variables

Control variables	New variables	Coding used	Meaning
Agency	Dfire	Dummy coding Fire=1, other agencies=0	Compare fire with public facilities and others
	Dpolice	Dummy coding Police=1, other agencies=0	Compare police with public facilities and others
	Dlibrary	Dummy coding Library=1, other agencies=0	Compare library with public facilities and others
	Dhealth	Dummy coding Public Health=1, other agencies=0	Compare public health with public facilities and others
	Dtrans	Dummy coding Public works and Transportation=1, other agencies=0	Compare public work and transportation with public facilities and others
	Dplann	Dummy coding Planning and Development=1, other agencies=0	Compare planning and development with public facilities and others
	Dadmin	Dummy coding Administration=1, other agencies=0	Compare administration with public facilities and others
		Omitted variable: Public facilities and others=0 while all other variables were coded as 0	
Job title	Clerk	Dummy coding Clerk=1, other job titles=0	Compare clerk with technician
	Fieldworker	Dummy coding Fieldworker=1, other job titles=0	Compare fieldworker with technician
	Manager	Dummy coding Manager=1, other job titles=0	Compare manager with technician
	Supervisor	Dummy coding Supervisor=1, other job titles=0	Compare supervisor with technician
	Profession	Dummy coding Profession=1, other job titles=0	Compare profession with technician
		Omitted variable: Technician=0 while all other variables were coded as 0	

Table 5-9: Dummy coding for control variables (continued)

Control variables	New variables	Coding used	Meaning
Tenure with city		Ordinal scale, from 1 to 5	
Tenure on current job		Ordinal scale, from 1 to 5	
Gender	female	Dummy coding Female=1, male=0	Compare female with male
Education		Ordinal scale, from 1 to 8	
Ethnicity	white	Dummy coding White=1, non-white=0	Compare white with non-white
Age		Continuous scale	Higher value=greater age
Marital status	married	Dummy coding Married=1, non-married=0	Compare married with non-married
Union membership	union	Dummy coding Union member=1, non-member=0	Compare union member with not union member/fair share

Table 5-10: Correlations of control variables and dependent variables

Variables	Agency[a]	Job Category[a]	Employment with city	Tenure on job	Gender[a]
Use of data and information	.322***	.154**	-.068	-.047	.109**
Process and Quality Results	.280***	.271***	-.171***	-.116**	.161***
Customer Focus	.274***	.216***	-.153***	-.103**	.119**
Overall TQM institutionalization	.306***	.237***	-.141***	.-.096**	.139

Variables	Education	Ethnicity[a]	Age	Marital status[a]	Union membership[a]
Use of data and information	.036	.000	.062	.062	.028
Process and Quality Results	.100**	.041	.002	.053	.128***
Customer Focus	.068	.029	.026	.048	.089*
Overall TQM institutionalization	.07	.024	.029	.061	.069

* p<.05, ** p<.01, *** p<.001 (two-tailed)
[a] Dummy variable

5.2.2.2 Correlations between TQM practices

Table 5-11 shows the Pearson correlations coefficients between all study variables. TQM

practices variables were first examined in this section (Section 5.1.2.2). Based upon the

correlation coefficients shown in Table 5-1, we found three TQM practices variables have high

correlations between each other (r =.725 between the use of data and information and processes

and quality results; r =.695 between the use of data and information and customer focus and satisfaction; and r =.776 between processes and quality results and customer focus and satisfaction). It is not surprising to find overall TQM institutionalization was highly correlated with the three TQM practices (correlation coefficients were ranging from .713 to .915) since it is an additive function of the three. As a result, <u>Overall TQM practices</u> was selected for the further analysis to represent the all three aspects of TQM practices.

The three dependent variables - employees' TQM practices are part of Malcolm Baldrige Award criteria. The high correlations found in this study suggested when the employees integrated TQM practices into their daily work, they adopted all three of them. This finding also suggests the three elements of employees TQM practices an integral package. Employees cannot successfully implement one element without considering the others. For example, in order to consider customer's needs in a systematic way, data collection from customer, or service process is regarded as a useful and efficient tool to monitor the organization's performance.

5.2.2.3 Correlations between mediating factors and TQM practices

Among the five mediating factors, the three self-efficacy variables have medium to high positive correlation coefficients. Skills acquired from QI has high correlations with both familiarity and perceived effects (r = .503 and .767 respectively). Familiarity and perceived effects has correlation coefficient equal to .338. Two psychological outcomes variables have a medium positive correlation (r = .375).

All five mediating factors have significantly positive correlations with TQM practices. Skills acquired, perceived effects, and job involvement have higher correlations with all three

aspects of TQM practices (ranging from .318 to .467) than familiarity and organizational

involvement (ranging from .144 to .291). The findings supported the hypothesis 1a and 2a,

which suggested self-efficacy and psychological outcomes respectively were positively

associated with employees' TQM practices.

5.2.2.4 Correlations between individual characteristics and TQM practices

The results of correlation analysis between individual and TQM practices are presented in

this section. Correlation coefficients shown in Table 5-6 suggested number of TQM projects

involved and number of activities participated were **positively** correlated with four TQM

practices variables (use of data and information, processes and quality results, customer focus

and satisfaction, and overall TQM practices) at 0.01 significance level. The findings supported

the Hypothesis 3a, however, the correlation coefficients are very low ranging from .095 to .180.

In other words, number of TQM projects, and number of activities participated only explained

0.9% to 3.2% of variation of TQM practices (i.e. r^2 or R-square).

In the examination of the correlations between project involvement/participation and self-

efficacy of employee empowerment as stated in hypothesis 3b, I found number of projects

involved and participation in activities had medium positive correlations with skills acquired and

familiarity (ranging from .417 to .618). These suggested those who had been involved in more

QI projects perceived themselves more capability in carrying out TQM practices and reported

more familiar with TQM techniques. Less degree of correlation were found between project

involvement and perceived effects, and participation and perceived effects (.278 and .321

respectively).

5.2.2.5 Correlations between job characteristics and TQM practices

Hypothesis 5a states <u>enriched</u> job characteristics are positively associated with employees'

TQM practices. In the correlation analysis (see Table 5-6 for the correlation coefficients), we

found all job characteristics identified in this study were all positively correlated with employees'

TQM practices, which findings support the hypothesis. *Skill variety, autonomy* and *participation*

had fairly low correlation coefficients (most of them were below .200), but *feedback* and

opportunities for advancement had correlation coefficients at least greater than .332 on all three

TQM practices and *overall TQM institutionalization* variables.

In the discussion of job characteristics, hypothesis 5b also suggested positive correlations

between job characteristics and psychological outcomes of employee empowerment. We found

the results support my hypothesis: all job characteristics were positively correlated with <u>job</u>

<u>involvement</u> and <u>organizational involvement</u> with the correlation coefficients ranging from .201

to .505. <u>Skill variety, participation,</u> and <u>opportunities for advancement</u> had higher correlations

with job involvement (.505, .440 and .447 respectively) than <u>feedback</u> and <u>autonomy</u> (.398 and

.204 respectively). <u>Skill variety</u> and <u>participation</u> also had higher correlations with

<u>organizational involvement</u> (.326 and .339 respectively) than <u>feedback, autonomy</u> and

<u>opportunities for advancement</u> (.201, .235 and .201 respectively).

5.2.2.6 Correlations between organizational characteristics and TQM practices

10 organizational characteristics were examined in their correlations with TQM practices.

They are management control which was used as a measure for centralization; task clarity, role

ambiguity, role conflict, and understanding of city vision as measures for standardization/formalization; supervisor support, peer cohesion, and social support from others as measures for social environment. Hypothesis 6a suggested low centralization (i.e. low management control) is associated with more TQM practices by employees. However, in the correlation coefficient matrix (see Table 5-11), we found *management control* has small positive correlations with *TQM practices*. In other words, those who perceived management has higher controls on the employees, also perceived more TQM practices in the organization. It contradicted with my hypothesis and previous theoretical argument (Shea & Howell, 1998; Juran, 1992). However, this may imply the importance of a manager's role in TQM implementation. Is it possible that employees integrate TQM principles into their daily work simply because the management "asks" them to do? This finding elicited the question on management's support for TQM implementation, which is widely believed as a determinant for a successful TQM implementation, and how it interacts with management control to contribute on employees' TQM practices. This study is not going to investigate this issue, but does encourage the future study to focus on the role of management supports for TQM implementation, and its interaction effects with management control.

Hypothesis 6b suggested low centralization is associated with positive psychological outcomes of employee empowerment. The correlation coefficient suggested management control is negatively correlated with organizational involvement at the .05 level (r = -.078). In other words, employees who perceived high management control also experienced low organizational involvement, although the correlation was very small. Another variable of

psychological – <u>job involvement</u> was found to have no significant correlation with <u>management control</u>.

In the examination of standardization of the organizational structure, we found <u>task clarity</u> and <u>understanding of City vision</u> had positive correlations with TQM practices, while role ambiguity and role conflict had negative correlations with TQM practices. These all support the hypothesis 7a that when employees are clear on what their job responsibilities are, they are more likely to engage in quality improvement activities/efforts. It should be noted here that since this study is a cross-sectional design, we have to draw the conclusion of causality with caution. In other words, employees perceived high on task clarity, understanding the organization visions, missions and goals, and low on role ambiguity, and role conflict may be the result of TQM institutionalization.

Hypothesis 7b stated standardization is correlated with psychological outcomes of employee empowerment although the direction of the correlation is not known. According to the correlation coefficients, task clarity, and understanding city vision has positive correlations with job involvement and organizational involvement (ranging from .288 to .504). Role ambiguity and role conflict have negative correlations with job involvement and organizational involvement (ranging from -.172 to -.306). The findings suggest the positive correlation between standardization and psychological outcomes.

Hypothesis 8a states a supportive environment is positively associated with employees' TQM practices. The results showed that *supervisor support* in general, *peer cohesion*, and

support from others at work are all positively associated with employees' TQM practices with medium correlation coefficients (from .307 to .522). The results support the study hypothesis.

	1	2	3	4	5	6	7	8
Individual Characteristics								
1. Number of QI Project	1							
2. Participation in Activities	.752**	1						
3. Days of QI Training	.673**	.644**	1					
4. Extent of QI Training	.655**	.647**	.807**	1				
5. Rating of QI Training	.528**	.521**	.763**	.715**	1			
Job Characteristics								
6. Skill Variety	.269**	.305**	.237**	.248**	.174**	1		
7. Feedback	0.066	.080*	.115**	.125**	.140**	.220**	1	
8. Autonomy	.215**	.214**	.217**	.194**	.200**	.292**	.211**	1
9. Participation	.283**	.334**	.241**	.242**	.193**	.436**	.438**	.362**
10. Opportunities for Advancement	.118**	.093**	.118**	.137**	.130**	.293**	.533**	.172**
Organizational Characteristics								
11. Management Control	-.108**	-.154**	-.111**	-0.052	-0.033	-.178**	.104**	-.208**
12. Task Clarity	0.038	0.051	.083*	.096**	.112**	.185**	.445**	.164**
13. Role Ambiguity	-0.05	-0.009	-0.048	-0.051	-0.056	0	-.419**	-.190**
14. Role Conflict	0.036	0.045	0.012	0.032	0.008	-.077**	-.250**	-.188**
15. Understanding of City Vision	.233**	.267**	.285**	.302**	.286**	.282**	.356**	.240**
16. Surpervisor Support	.123**	.136**	.151**	.168**	.166**	.259**	.495**	.208**
17. Peer Cohesion	.125**	.156**	.149**	.154**	.148**	.301**	.359**	.094**
18. Social Support from Others	.102**	.095**	.093*	.099**	0.062	.273**	.375**	.153**
Employee Empowerment								
19. Skills from QI	.417**	.437**	.473**	.508**	.578**	.191**	.280**	.202**
20. Familiarity with QI	.585**	.618**	.642**	.692**	.577**	.271**	.128**	.177**
21. Overall Effects of QI on Job	.278**	.321**	.356**	.369**	.458**	.170**	.327**	.165**
22. Job Involvement	.210**	.222**	.192**	.226**	.189**	.505**	.398**	.204**
23. Organizational Involvement	.195**	.221**	.175**	.187**	.163**	.326**	.201**	.235**
TQM practices								
24. Use of Data and Information	.180**	.173**	.210**	.238**	.247**	.139**	.355**	.123**
25. Processes and Quality Results	.159**	.163**	.195**	.205**	.228**	.225**	.404**	.164**
26. Customer Focus and Satisfaction	.095**	.113**	.181**	.190**	.206**	.156**	.418**	.176**
27. Overall TQM Practices	.166**	.167**	.220**	.234**	.255**	.186**	.426**	.171**

Table 5-11: Pearson correlations between the study variables

* p<.05, ** p<.01 (two-tailed)

	9	10	11	12	13	14	15	16	17
Individual Characteristics									
1. Number of QI Project									
2. Participation in Activities									
3. Days of QI Training									
4. Extent of QI Training									
5. Rating of QI Training									
Job Characteristics									
6. Skill Variety									
7. Feedback									
8. Autonomy									
9. Participation	1								
10. Opportunities for Advancement	.367**	1							
Organizational Characteristics									
11. Management Control	-.124**	.075*	1						
12. Task Clarity	.269**	.346**	.281**	1					
13. Role Ambiguity	-.279**	-.271**	-.208**	-.469**	1				
14. Role Conflict	-.159**	-.135**	-0.016	-.319**	.308**	1			
15. Understanding of City Vision	.341**	.308**	0.04	.427**	-.341**	-.181**	1		
16. Surpervisor Support	.377**	.461**	0.013	.523**	-.348**	-.275**	.407**	1	
17. Peer Cohesion	.331**	.378**	0.044	.380**	-.255**	-.179**	.260**	.472**	1
18. Social Support from Others	.372**	.393**	0.042	.339**	-.315**	-.192**	.217**	.358**	.575**
Employee Empowerment									
19. Skills from QI	.290**	.259**	-0.001	.242**	-.197**	-.129**	.381**	.289**	.240**
20. Familiarity with QI	.296**	.142**	-.121**	0.041	-0.054	0.058	.257**	.117**	.120**
21. Overall Effects of QI on Job	.318**	.334**	0.063	.337**	-.240**	-.161**	.426**	.368**	.266**
22. Job Involvement	.440**	.447**	0.011	.504**	-.306**	-.225**	.366**	.548**	.627**
23. Organizational Involvement	.339**	.201**	-.078*	.288**	-.231**	-.172**	.346**	.288**	.289**
TQM practices									
24. Use of Data and Information	.233**	.339**	.147**	.418**	-.300**	-.178**	.363**	.427**	.307**
25. Processes and Quality Results	.345**	.399**	.108**	.551**	-.384**	-.201**	.478**	.522**	.373**
26. Customer Focus and Satisfaction	.286**	.332**	.167**	.511**	-.373**	-.227**	.438**	.441**	.338**
27. Overall TQM Practices	.315**	.395**	.151**	.539**	-.386**	-.219**	.472**	.504**	.368**

Table 5-11: Pearson correlations between the study variables

* p<.05, ** p<.01 (two-tailed)

	18	19	20	21	22	23	24	25	26
Individual Characteristics									
1. Number of QI Project									
2. Participation in Activities									
3. Days of QI Training									
4. Extent of QI Training									
5. Rating of QI Training									
Job Characteristics									
6. Skill Variety									
7. Feedback									
8. Autonomy									
9. Participation									
10. Opportunities for Advancement									
Organizational Characteristics									
11. Management Control									
12. Task Clarity									
13. Role Ambiguity									
14. Role Conflict									
15. Understanding of City Vision									
16. Surpervisor Support									
17. Peer Cohesion									
18. Social Support from Others	1								
Employee Empowerment									
19. Skills from QI	.182**	1							
20. Familiarity with QI	.072*	.503**	1						
21. Overall Effects of QI on Job	.197**	.767**	.338**	1					
22. Job Involvement	.509**	.286**	.196**	.335**	1				
23. Organizational Involvement	.261**	.259**	.178**	.247**	.375**	1			
TQM practices									
24. Use of Data and Information	.317**	.318**	.186**	.354**	.369**	.215**	1		
25. Processes and Quality Results	.355**	.368**	.184**	.446**	.467**	.291**	.725**	1	
26. Customer Focus and Satisfaction	.331**	.322**	.144**	.385**	.407**	.262**	.695**	.776**	1
27. Overall TQM Practices	.366**	.370**	.192**	.439**	.451**	.275**	.899**	.915**	.906**

Table 5-11: Pearson correlations between the study variables

* $p<.05$, ** $p<.01$ (two-tailed)

5.3   MULTIVARIATE ANALYSIS

In the multivariate analysis, factor analysis was first performed to reduce all variables to fewer key constructs, followed by path analysis, which used the constructs extracted through the factor analysis.

5.3.1   FACTOR ANALYSIS

Factor analysis was performed to extract uncorrelated underlying constructs from a set of correlated independent variables.   Before discussing the result of factor analysis, I first would like to address why I use the factors rather than variables for further analysis. In this study, there are a considerable number of independent variables (20 exogenous variables and 5 mediating variables) used to measure the constructs proposed in the conceptual model. Some variables were chosen to measure the same theoretical construct in the interest of thoroughness. Take standardization for example. Task clarity, role ambiguity, role conflict and understanding city's vision were chosen to represent the standardization characteristic of the organizational structure. On the one hand, the variables are usually correlated if, as I suspected, they represent the same construct (their correlation coefficients ranged from -.181 to .469). On the other hand, including correlated variables in the regression analysis raises the potential problem of multicollinearity. According to Cohen & Cohen (1983), a serious consequence of multicollinearity is highly unstable partial coefficients for the independent variables that are highly correlated. The first advantage of performing factor analysis, and the most important one is to reduce the risk of

multicollinearity when uncorrelated underlying constructs were extracted by factor analysis and were used in the regression analysis in place of correlated variables.

The second advantage of factor analysis is its ability to reduce the number of variables by combining those correlated into one. As a result, first of all, it helps to build a more parsimonious path model which is easier to analyze and interpret. Second, according to their work in 1983, Cohen & Cohen stated an important principle in research inference: "less is more" – fewer variables can lead to "more statistical test validity, more power, and more clarity in the meaning of results (P. 171)". In the statistical inference, Type I error and Type II error are inversely related. In other words, when Type I error is decreased, it often accompanies the risk of increasing Type II error. Some balance between the two is needed. One way to do so is to have fewer variables in the hypothesis tests or fewer independent variables in multiple regression analysis. According to their argument, the fewer variables, the fewer analyses are performed; as a result, the smaller is the probability of spurious significance (i.e. *investigationwise* Type I error). Also, less independent variables in the multiple regression analysis can decrease the standard errors of partial coefficients and increase the t values and hence the power (i.e. reduce the probability of Type II error).

The third advantage of factor analysis is its ability to confirm the major concepts empirically when little agreement has been reached (Cattell, 1966). In the discussion of the conceptual model in earlier chapters, I have proposed to discuss the work environment in three contexts: individual, job and organizational contexts. I also emphasized this classification was for the convenience of identifying the influential characteristics. The distinction between job and organizational characteristics was not clear. Disagreement is very likely to occur concerning the

variables chosen to measure the hypothetical constructs. Take the standardization characteristics of organizational structure for example. I chose to use task clarity, role ambiguity, role conflicts, and understanding city vision to measure this organizational characteristic; however, some of the literature suggests role ambiguity and role conflicts should be considered job characteristics. It is controversial to claim these variables represent the same construct, i.e. the standardization as I proposed to investigate. Another example is found in the variable – autonomy. Autonomy is widely accepted as a job characteristic, however, high autonomy of the employees may also suggest a low centralization characteristic of an organization. As mentioned earlier in the discussion of conceptual framework, these variables were chosen in the interests of their representations of "work environment" characteristics. I decided to use factor analysis to assist me in identifying and clarifying the underlying constructs, and confirming the major concepts in the research model.

It is also necessary to mention the disadvantage of performing the factor analysis beforehand. Some researchers do not recognize factor analysis as a scientific tool. Since factor analysis has no unique solution, it has to rely on the investigators' subjective judgement. For example, investigators need to choose the number of factors to extract, or the method of rotations, etc. Sometimes, researchers can manipulate the analysis and choose the solution which confirms their presumptions. Another disadvantage of performing the factor analysis is that, by using the constructs, we may lose the subtlety of the information the variables can provide.

To perform factor analysis, principal component analysis was used as the extracting method to identify the underlying patterns of study variables. Varimax was used as a rotation method, because it put emphasis on the simplicity of interpretation of factors by maximizing the

variance of the loadings for each factor. According to Sainfort and Carayon (1995), four analytical criteria can be used to select the appropriate number of factors: the cumulative percentage of total variation explained by the factor solution, the Kaiser's rule (eigenvalue greater than 1) and Jolliffe's rule, the graphical analyses of the scree graph and the Log-eigenvalue Diagram (LEV), and ease of interpretation and parsimony. In this study, the procedures for choosing factor numbers are first to extract numbers of components with eigenvalues greater than 1. Then, check the scree plots and check whether the extracted components show the interpretable pattern. If needed, factor analysis was performed again with an assigned number to be extracted. The final judgement of the factor solution was based on the ease of interpretation according to theoretical concerns and parsimony.

In this study, three groups of variables were factor analyzed. Since individual characteristics were specifically related to the quality improvement experience rather than the perceptions of overall organizational environment as represented by the job and organizational characteristics, they were factor analyzed separately first. Then follow the variables from job and organizational characteristics as the second group of variables to be factor analyzed. The third group of variables was the five variables of mediating factors. In the following sections, the results of factor analysis are presented.

5.3.1.1 Underlying constructs of individual characteristics

Five individual characteristics were factor analyzed using principal components analysis: number of projects involved, participation in activities, days of training, extent of training received, and overall rating of training. Before discussing results, Kaiser suggest examining the

measure of sampling adequacy (KMO). The KMO statistics obtained by the computation of

SPSS was .852, which suggested that a factor analytical model was appropriate (below .50 is

considered unacceptable). The Bartlett test of Sphericity was equal to 2532.67($p<.0001$), which

also suggested the use of a factor model to be appropriate.

In the factor analysis of individual characteristics, the criterion of eigenvalue greater than

one yielded one common factor. This suggested that only one factor associated with the group of

variables has variance greater than one. Scree plot suggested the number of common factors

should not exceed two. Cumulative percentage of variation suggested 74.22% of the total

variation of 5 variables can be explained by this common factor. Communality which suggested

the variance of each variable accounted for the common factor(s) was satisfactory. They were

greater than .671. The results suggest the one factor model is appropriate, however, based upon

the hypothetical structure of individual characteristics and the result of the scree plot, I decided

to run a two-factor model and examine whether the latter (two-factor) was acceptable. Two-

factor solution with varimax rotation yielded a model which explained 86.28% of variance.

Communalities of the variables are at least greater than .829. The factor loadings were shown in

Table 5-13. The two-factor solution showed all training related variables loaded highly on

Factor 1, while the variables of "active" involvement and participation loaded highly on Factor 2.

Both one-factor and two-factor solutions were considered appropriate. It is not surprising

that all these variables were related among themselves since they were all measures specifically

for employees' "TQM activities". However, in the conceptual model, I proposed to study

employees' training as a "passive" acceptance as opposed to an "active" involvement. The latter

was believed to play a more important role in employees' TQM practices. In order to investigate

the competing effects of the two, two-factor solution was selected due to the interests of the

study, and were named: **training received** and **project involved**.

Variables	Communalities	Factor 1 (Training received)	Factor 2 (Project involved)
Rating of QI training	.887	**.916**	.220
Days of QI training	.870	**.788**	.500
Types of QI training	.829	**.763**	.497
Participation in activities	.865	.317	**.874**
Number of QI projects	.863	.348	**.862**
% of variance accounted for		45.24%	41.04%

Table 5-12: Factor loadings for individual variables

(Note: Bold indicates factor groupings for final factor solution)

5.3.1.2 Underlying constructs of job and organizational characteristics

As stated earlier, the classification of job and organizational characteristics was

controversial. In order to clarify the conceptual framework and build a parsimonious path model

based on the underlying constructs, factor analysis was performed. The five job characteristics

and eight organizational characteristics were factor analyzed using principal components

analysis. The measure of sampling adequacy (KMO) was equal to .855 and Bartlett's test of

Sphericity was equal to 2641.45 (p<.0001). Both statistics suggested a factor analysis model to

be appropriate.

The extraction of eigenvalue greater than 1 and varimax rotation method resulted in a

three-factor model, which explained 55.49% of variances of job and organizational variables.

Scree plot suggested a model with less than four factors to be appropriate.

The criterion of grouping is based on a factor loading higher than .50. If the variable

loaded higher than .50 on more than one factor, considerations were taken for each variable.

According to this criterion, participation was ruled out first since it loaded moderately on both

Factor 1 and Factor 3 with loadings smaller than .50. It was found that peer cohesion, social

support from others at work, opportunities for advancement, supervisor support and feedback

loaded highly (greater than .50) on Factor 1. Factor 2 consisted of variables chosen to measure

the standardization: role ambiguity, task clarity, role conflict, and understanding of city vision.

Factor 3 consisted of three variables: management control, autonomy, and skill variety, although,

skill variety had high loadings on both Factor 1 and Factor 2 (.513 and .571 respectively). It is

not surprising to see autonomy and skill variety go along with management control, since high

management control often implies employees have less control over their jobs. As a result,

employees might perceive they have less flexibility in exerting the skills they have. Moreover,

the skill variety was measured by the perceptions of the employees rather than the actual

contents of their job. Their perceptions of the skill variety might be strongly connected with

their perceptions of management control and autonomy. In this study, I decided to keep skill

variety along with two other variables in Factor 3[7].

Factor analysis was performed again after removing participation. The criterion of

eigenvalue greater than one also resulted in a three-factor solution. The groupings of the

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[7] Factor analysis was performed without participation and skill variety. However, it was found role conflict had a
very low communality (.387) in this model. In the model that kept skill variety, but without participation, the
overall communalities were improved. This also gave me reason to keep the skill variety in my final solution.

variables were the same with the previous one, only the factor loadings were somewhat different. Moreover, this model explains slightly more variation than the previous one (55.49% before removing variables vs. 56.42% after removing variables). Table 5-14 shows the factor loadings for each variable and the groupings.

According to the results, Factor 1 consisted of five variables: peer cohesion, social support from others at work, opportunities for advancement, supervisor support and feedback. This factor was then named as the **job enrichment** factor since it was comprised of variables considered to be associated with high work motivation or increasing the richness or meaningfulness of the job as suggested by previous literature.

Factor 2 consisted of the variables proposed to measure the standardization characteristic of the organizational structure: role ambiguity, task clarity, understanding of city vision, and role conflict. It was then named **standardization** as suggested in the conceptual model. It should be noted here that role ambiguity and role conflict had negative correlations with task clarity and understanding of city vision.

Factor 3 consisted of three variables: management control, autonomy and skill variety. It was then named **centralization**, as a construct to measure the centralization characteristic of organizational structure. Note that management control was negatively correlated with autonomy and skill variety. It is worth noting that a reverse score of management control was used in calculating factor score. Factor scores are further discussed in Section 5.3.1.4.

However, in the future publication, the alternative factor scores after the removal of skill variety should be

A four-factor solution was also extracted and examined. Role conflict in four-factor

solution was extracted to be an independent factor. According to the rules of parsimony and ease

of interpretation, a four-factor was not recommended. I decided to use the results of the three-

factor model.

considered.

Variables	Communalities	Factor 1 (Job enrichment)	Factor 2 (Standardi- zation)	Factor 3 (Centrali- zation)
Peer cohesion	.633	**.791**	.083	-.013
Social support from others	.555	**.734**	.128	-.015
Opportunities for advancement	.515	**.677**	.236	.025
Supervisor support	.551	**.581**	.456	.066
Feedback	.538	**.549**	.485	-.040
Role ambiguity	.615	-.179	**-.731**	.220
Task clarity	.618	-.026	**.637**	-.101
Role conflict	.416	.431	**-.626**	-.203
Understanding of city vision	.447	.314	**.571**	.150
Management control	.632	.097	.191	**-.765**
Autonomy	.649	.0003	.477	**.649**
Skill Variety	.601	.528	-.013	**.568**
% of variance accounted for		23.89%	20.37%	12.16%

Table 5-13: Factor loadings for job and organizational variables

(Note: Bold indicates factor groupings for final factor solution)

5.3.1.3 Underlying constructs of mediating factors

Five variables of mediating factors were factor analyzed using principal components analysis: skills acquired, familiarity with QI, perceived effects of QI, job involvement and organizational involvement. The KMO statistic was equal to .655 and Bartlett's test of Sphericity was equal to 1051.05 (p<.0001). They both suggested the use of a factor model to be appropriate.

The criterion of eigenvalue greater than 1 resulted in an one-factor solution accounting for 49.58% of the total variance. However, in examining the initial eigenvalues, the second

eigenvalue equaled .995 which was very close to one. It might be very unwise to exclude the

extraction of the second component. Scree plot also suggested that two-factor solution might be

appropriate. Moreover, the communalities of job involvement and organizational involvement in

the one-factor model are very small (.349 and .284 respectively), which suggested one common

factor may not be enough to capture the variance of job involvement and organizational

involvement. Theoretically, I suspected two underlying constructs among these variables, one

was specifically related to TQM related skills, and the other was related to psychological

outcomes. Due to all these considerations, a two-factor solution with varimax rotation was

extracted and examined. Table 5-14 shows the factor loadings of the two-factor model.

Variables	Communalities	Factor 1 (Self-efficacy)	Factor 2 (Involvement)
Skills from QI	.854	**.909**	.168
Perceived effects of QI on job	.746	**.835**	.222
Familiarity with QI	.501	**.701**	.100
Organizational involvement	.711	.110	**.836**
Job involvement	.661	.209	**.786**
% of variance accounted for		41.39%	28.08%

Table 5-14: Factor loadings for mediating variables

(Note: Bold indicates factor groupings for final factor solution)

The results showed the variables can be grouped in accordance with the hypothetical

structures. Namely, skills from QI, perceived effects of QI on job, and familiarity with QI

loaded highly on Factor 1, whereas organizational involvement and job involvement loaded

highly on Factor 2. Factor 1 was then named **self-efficacy** and Factor 2 was named **involvement**. The results of two-factor model were used for the further analysis.

5.3.1.4 Factor scoring

In summary, the factor analysis resulted in two underlying constructs for individual variables: **training received**, and **project involved**; three for job and organizational variables: **job enrichment** characteristics, **standardization**, and **centralization**; and two for mediating variables: **self-efficacy** and **involvement**. These constructs were later used to build a path model. Before proceeding with the path analysis, the scores for the constructs had to be computed. There were several methods to calculate the factor scores. Among them, regression method, least squares criterion, and Bartlett's criterion were most commonly mentioned (Kim and Mueller, 1978). Moreover, the summation of standardized values of variables with high factor loadings was considered the most convenient way to construct a factor scale. No matter which method is chosen for the construction of factor scale, in practice, there is usually a high correlation among the scales produced by different methods (Sainfort & Carayon, 1995).

For simplicity, I chose to construct the factor scores by the summation of variables with factor loadings higher than .50. Since the variables had different scales, the standardized values were calculated first and later used in the construction of the factor scores. Variables in the same construct were assigned the same weight. Take training for example. The factor, training, consisted of three variables: rating of QI training, days of training, and type of training. Each has a scale ranging from 1 to 6, 1 to 6, and 0 to 10 respectively. Each of the variables was first transformed to standardized values with means equal to zero and standard deviations equal to 1.

The factor score of training was obtained by averaging the standardized values of the three variables. Thus, this new scale measures the degree of training employees had received. The same procedures were followed for the computation of the factor scores. However, special attentions was paid to two constructs: standardization and centralization.

Standardization consisted of variables which had negative correlations among themselves, for example, role ambiguity and role conflict had negative correlations with the other two. Therefore, in the computation of the factor score, the direction of the variables scores were taken into account. The final scale of standardization measures the degree of standardization of the organizational structure. A higher score represents a higher degree of standardization, i.e. employees have a clearer idea of what their responsibilities are, where the organization is leading to. Centralization was calculated in a way that a higher score represents a higher degree of centralization, i.e. high management control or low autonomy. The descriptive statistics of the constructs are shown in the following table:

Factors	N	Mean	Min	Max	SD	Alpha Coefficient
Project involvement	818	-.002	-.90	2.40	.94	.86
Training received	711	.017	-1.24	2.00	.94	.91
Job enrichment	756	-.003	-1.95	1.73	.74	.90
Standardization	773	-.007	-2.71	1.31	.72	.86
Centralization	777	-.004	-1.68	2.50	.77	.81
Self-efficacy	737	.026	-1.99	2.28	.83	.95
Involvement	794	.006	-3.25	1.13	.83	.75

Table 5-15: Descriptive statistics for the factors

The factor analysis were performed with groups of variables. Cronbach reliability coefficients (alpha coefficients) were computed. However it was computed by pulling all the items that were used to measure the variables of which they shared the same factor. The results

(see Table 5-15) showed fairly nice reliabilities for the new scales (ranging from .75 to .95). They also suggested these new scales can be used separately in the future study in terms of their high reliabilities.

Correlation coefficients were computed between every pair of factors. The results were shown in Table 5-16. On the one hand, we would like to see some correlations between some factors, especially the factors that were suspected to influence the mediating factors, for example, project involvement and training received on self-efficacy (correlation coefficients are .575 and .692 respectively); or job enrichment, standardization, and centralization on involvement (.614, .526 and -.384 respectively). On the other hand, we do not expect and do not like to see high correlations for fear of running into multicollinearity problem in the regression equations. According to the previous discussion, one of the advantages of using factor analysis is to remove the potential problem of multicollinearity. However, from Table 5-16, we know project involvement and training received from individual characteristics were still highly correlated (correlation coefficient is .724). As discussed earlier in Section 5.3.1.1, eigenvalue greater than one only yielded a one-factor solution for individual characteristics. Moreover, there was a sharp drop of eigenvalue between one-factor and two-factor solution (from 3.711 to .603). In other words, the variables in this group were highly correlated, and one factor solution could explain most of the variations. Imposing a two-factor solution was for the interest of the study, however, it resulted in a high correlation between these two factors.[8] Arbitrarily, researchers believe

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[8] Although in the group of mediating factors, I also imposed two factors while originally eigenvalue greater than one

correlation coefficients higher than .7 or .8 might come with the problem of multicollinearity in regression analysis. Since regression analysis were employed in path analysis, this potential problem needed to be examined with different methods, such as, using VIF (Variation Inflation Factors) statistic, or removing one of the two factors (project involvement and training) in the regression equations to see if there is a drastic change of regression coefficient of the other. If VIF is less than 10, as suggested by Fox (1997), and no significant change of regression coefficient, it shall be safe to interpret the results of regression analysis without fear of the multicollinearity issue.

	Factors	1	2	3	4	5	6
1	Project involvement	1.000					
2	Training received	.724**	1.000				
3	Job enrichment	.162**	.199**	1.000			
4	Standardization	.116**	.172**	.594**	1.000		
5	Centralization	-.318**	-.261**	-.236**	-.126**	1.000	
6	Self-efficacy	.575**	.692**	.372**	.348**	-.240**	1.000
7	Involvement	.269**	.252**	.614**	.526**	-.384**	.381**

Table 5-16: Correlation matrix for the factors

* p<.05, ** p<.01

yielded one-factor solution, however, the second eigenvalue for two-factor solution is closer to 1 (.995) (see Section 5.3.1.3), suggesting a two factor-solution is a possible solution. As the results showed, the correlations between self-efficacy and involvement is .381, which suggested self-efficacy and involvement to be two different constructs as I had proposed.

5.3.2 PATH ANALYSIS

Figure 5-1 shows the revised research model with the constructs extracted from the factor analysis. Path analysis was performed to investigate the hypothetical relations between the constructs. There were five exogenous constructs in this diagram: project involvement, training received, job enrichment, standardization, and centralization. Among them project involvement and training received were suspected to have a direct effect on employees' TQM practices, and an indirect effect through self-efficacy. Job enrichment, standardization and centralization were suspected to have a direct effect on employees' TQM practices, and an indirect effect through involvement. There were four path models to be analyzed. Each has a different outcome variable, each representing employees' TQM practices. The four outcome variables were: use of data and information, processes and results, customer focus, and overall TQM practices (the average of the three employees' TQM practices).
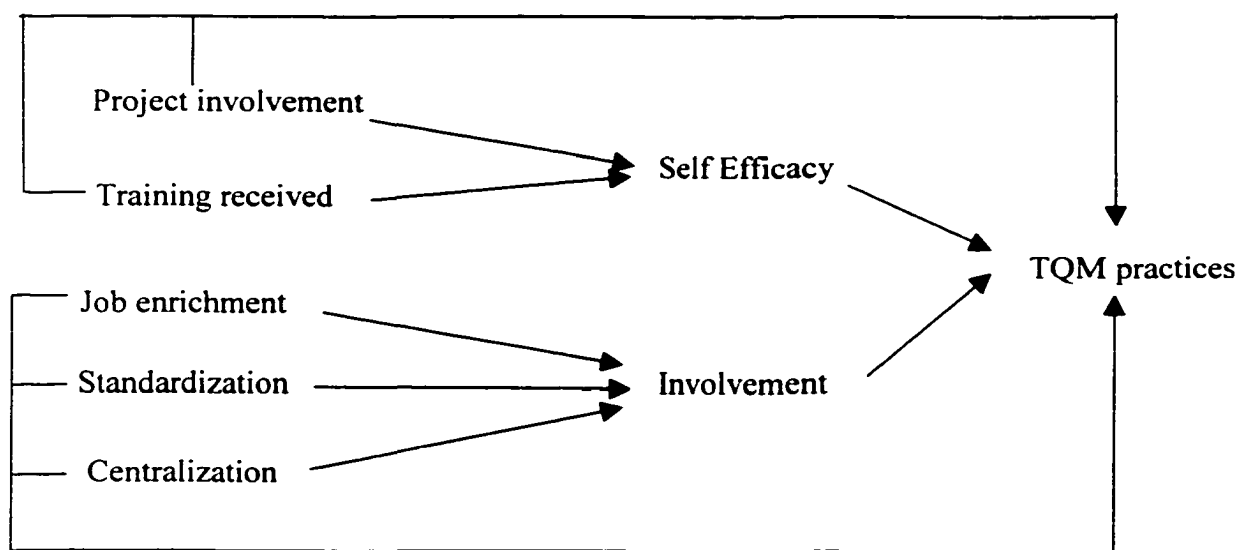
Figure 5-1: Revised Path Model

The strategies of path analysis were recommended by Asher (1983), Sainfort (1988), and Carayon-Sainfort (1992). Standardized regression coefficients were computed to represent the effects between variables.

Three steps were taken in order to evaluate each path model. First, the mediating variables were treated as dependent variables in two separate regression models: self-efficacy was regressed over project involved, and training received; involvement was regressed over job enrichment, standardization, and centralization. Second, each of the employees' TQM practices: use of data and information, process and results, customer focus, and overall TQM practices, was regressed over the five work environment constructs and two mediating factors. Third, the direct and indirect effects were assessed according to the methods suggested by Asher (1983) and Carayon-Sainfort (1992). In each of the regression models, hierarchical regression analysis was performed. Control variables identified in Section 5.2.2.1 were entered as the first block, followed by the block of independent variables shown in the model. The control variables consisted of seven dummy variables for agency, five dummy variables for job title, one dummy variable for gender, and two continuous variables – tenure with city and tenure on the current job. These variables were suspected to be able to make a difference in terms of employees' self-efficacy, involvement, or employees' TQM practices regardless of the influence from work environment. In order to investigate the effects of study variables, the effects of the control variables had to be controlled by being accounted for the regression equation.

5.3.2.1 Outcome variable: Self-Efficacy

The first path to be evaluated was the effect of TQM related experiences on employees' self-efficacy. The first regression analysis was performed on the dependent variable – self-efficacy over control variables, and two study constructs: project involved and training received. The results showed the model explained 54.2% of variance for self-efficacy. Table 5-16 presents the standardized regression coefficients of control variables and two study constructs: project involvement and training received. R-square changes were recorded in the gray area to indicate the amount of variances explained by entering each block of variables. The residuals were plotted to examine whether the model violated the assumptions of regression analysis. The plots showed residuals were normally distributed and appeared to show homoscedasticity (constant variance). Durbin-Watson statistic equals 1.95 (close to 2), which indicated no violation of independence assumption. The assessment of residuals suggested the adequacy of the model.

According to Section 5.3.1.4, we knew project involvement and training received had high correlation. In order to check whether collinearity was a problem, VIF statistics were obtained. The results suggested no indication of mulcollinearity since no VIF was greater than 10 (2.54 for project involvement and 2.10 for training received).

The results of regression analysis suggested both project involvement and training received were positively associated with employees' self-efficacy, which supported the study hypotheses. Since the beta-coefficient is the standardized regression coefficient, Fox (1997) suggested that the comparison between the effects of two independent variables are appropriate. Project involvement has a beta-coefficient equal to .244, and training received has a beta-coefficient equal to .544. This result suggested training received plays a greater role than project

involvement in employees' perceptions of their capabilities of carrying out TQM practices. Such results were surprising, since I expected the active involvement might have a stronger effect than passively receiving training. However, both together do explain a large amount of variance in self-efficacy. More discussion were addressed in Chapter 6, Discussion.

Dependent variable: Self-Efficacy

Independent Variables	Beta-coefficient	p-value
Control Variables	Δ R-square = .169***	.000
Fire	-.055	.336
Police	**-.139**	**.023**
Library	-.024	.598
Health	-.046	.354
Transportation	-.099	.194
P & D	-.072	.195
Administration	-.086	.146
Clerk	**.114**	**.020**
Field Worker	**.114**	**.034**
Manager	.067	.094
Supervisor	**.113**	**.008**
Professional	.075	.136
Female	-.024	.474
Tenure with city	**-.128**	**.000**
Tenure on current job	**-.081**	**.018**
Study Constructs	Δ R-square = .372***	.000
Project involvement	**.244**	**.000**
Training received	**.544**	**.000**
Model R-square=.542***; Durbin-Watson Stat. = 1.95		

Table 5-17: Regression analysis on self-efficacy
*p < .1, **p < .05, ***p < .01

5.3.2.2 Outcome variable: Involvement

The second path to be evaluated was the path between work environment constructs and employees' involvement. Regression analysis was performed using involvement as a dependent variables, and control variables, job enrichment, standardization, and centralization as independent variables. The model explained 48.1% of variance of involvement. Table 5-17 presents the standardized regression coefficients of independent variables. The residuals were also plotted and examined. The plots suggested no violation of normality and constant variance assumptions. The Durbin-Watson statistic equals 1.99, indicating no violation of the independence assumption. The assessment suggested good adequacy of the model.

The results of the regression analysis showed job enrichment, and standardization had positive association and centralization had negative association with employees' job and organizational involvement at .05 level of statistical significance. The findings supported the study hypotheses and are consistent with the previous studies: enriched job characteristics might lead to positive involvement, e.g. job involvement and organizational involvement; moreover, those who are clear about their job responsibilities, the organization's visions, missions and goals, and have more control over their jobs are more likely to report having high job and organizational involvement. The standardized regression coefficients also suggested that job enrichment characteristics had a stronger effect on employees' involvement than the characteristics of the organizational structure.

Dependent Variable: Involvement

Independent Variables	Beta-coefficient	p-value
Control Variables	Δ R-square = .172***	.000
Fire	-.041	.521
Police	**-.144**	**.018**
Library	-.067	.144
Health	-.029	.545
Transportation	**-.186**	**.021**
P & D	-.108	.059
Administration	**-.143**	**.016**
Clerk	.012	.810
Field Worker	.038	.479
Manager	**.114**	**.002**
Supervisor	.057	.157
Professional	.094	.056
Female	.009	.784
Tenure with city	.013	.730
Tenure on current job	-.022	.553
Study Constructs	Δ R-square = .310***	.000
Job enrichment	**.385**	**.000**
Standardization	**.216**	**.000**
Centralization	**-.207**	**.000**
Model R-square=.481***; Durbin-Watson Stat. = 1.99		

Table 5-18: Regression analysis on involvement
*p < .1, **p < .05, ***p < .01

5.3.2.3 Outcome variable: Use of Data and Information

After examination of the effects of work environment on mediating factors, the direct

effects of work environment and mediating factors on use of data and information were

examined by using regression analysis. Use of data and information was regressed over control

variables, five work environment constructs and two mediating factors. The results showed the

model explained 40.4% of the variance in use of data and information. Standardized regression

coefficients of independent variables are shown in Table 5-18. The assessment of residuals

suggested no violation of regression assumptions.

Because of the high correlation between project involvement and training received, the

potential problem of multicollinearity was examined. To do so, VIF statistics were obtained.

The results suggested no indication of mulcollinearity, since no VIF was greater than 10.

Another way of checking this concern is by removing one of the highly correlated variables and

see if the removal of this variable leads to a significant change of the other. I first removed the

project involvement. The regression coefficients from the model without project involvement

were very similar (for example, standardized regression coefficient for training received was

.049 in the model with project involvement, and was .073 without project involvement. In both

models, training received was not significant predictor for the use of data and information). The

significance of the effects remained the same. The same procedure was then repeated, but this

time. training received was removed and project involvement was kept. The regression

coefficients from this model were very similar to the one with both variables, and the one

without project involvement. All these suggested mulcollinearity not a major problem in the

regression model. The effects (using the standardized regression coefficients) were stable and reliable.

Dependent Variable: Use of Data and Information

Independent Variables	Beta-coefficient	p-value
Control Variables	Δ R-square = .144***	.000
Fire	-.120	.126
Police	-.007	.931
Library	**.185**	**.001**
Health	**.129**	**.040**
Transportation	-.038	.707
P & D	.000	.997
Administration	-.040	.594
Clerk	.010	.873
Field Worker	-.043	.534
Manager	-.001	.988
Supervisor	-.098	.069
Professional	**-.164**	**.011**
Female	.017	.678
Tenure with city	-.053	.247
Tenure on current job	.062	.149
Study Constructs	Δ R-square = .260***	.000
Project involvement	.061	.293
Training received	.049	.395
Job enrichment	**.285**	**.000**
Standardization	**.197**	**.000**
Centralization	**.108**	**.018**
Self-efficacy	**.152**	**.006**
Involvement	.016	.738
Model R-square=.404***; Durbin-Watson Stat. = 1.91		

Table 5-19: Regression analysis on the Use of data & information
*p < .1, **p < .05, ***p < .01

The results of regression analysis suggested project involvement, training received and involvement were found to have no significant direct effects on employees' use of data and information at the .05 level of statistical significance. Job enrichment (beta-coefficient = .285), standardization (beta-coefficient = .197), centralization (beta-coefficient = .108) and self-efficacy (beta-coefficient = .152) have direct positive effects on the outcome variable. The **positive** association between centralization and employees' use of data and information is somewhat surprising. The result suggested those who felt less control over their jobs might perceive that the use of data and information were more pervasive in their agency. More discussion of this finding is presented in the next chapter.

The results of the three regression models (self-efficacy, involvement, and the use of data and information as dependent variables) presented earlier were then put together in the path diagram (see Figure 5-2). The path coefficients shown in Figure 5-2 were the standardized regression coefficients from the regression models, which indicated the direct effects on employees' use of data and information. Bold arrows pointing to self-efficacy, involvement and use of data and information indicated the residual path coefficients. They were calculated by: (1-Rsquare)$^{1/2}$ as suggested by Asher (1983).
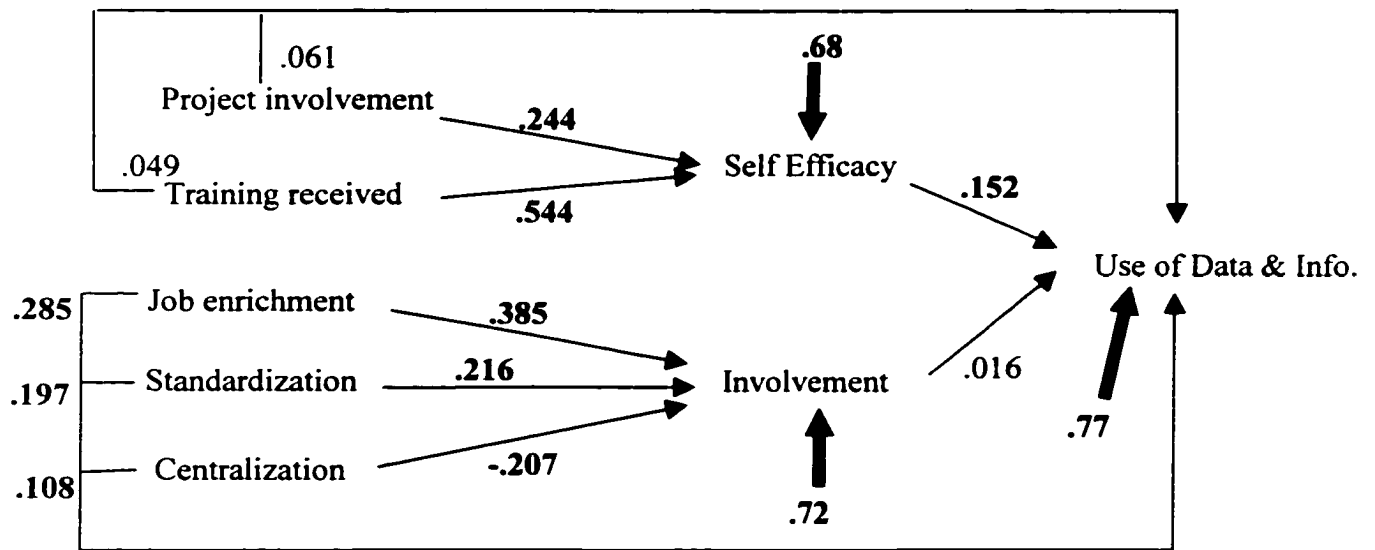
Figure 5-2: Path Diagram for Work Environment and Use of Data and Information

(Note: Bold indicates significant effects)

Dependent Variable: Use of data and information

Independent Variables	Direct Effects	Indirect Effects	Total Effects
Project involvement	ns	.037	.037
Training received	ns	.082	.082
Job enrichment	.285		.285
Standardization	.197		.197
Centralization	.108		.108
Self-efficacy	.152		.152
Involvement	ns		ns

Table 5-20: Direct and indirect effects on the Use of data and information

The indirect effects were calculated and are shown in Table 5-18. For example, the

indirect effect of project involvement on use of data & info was computed by the product of the

direct effect (represented by beta-coefficients) of project involvement on self-efficacy and the

direct effect of self-efficacy on use of data & info (i.e. .244*.152 = .037). Since involvement had

no significant direct effect on use of data & info, there was then no indirect effect from job

enrichment, standardization and centralization through this path.

5.3.2.4 Outcome variable: Process and Results

Another employees' TQM practice was examined: process and results. The direct effects of work environment and mediating factors on process and results were computed by regression analysis. The model explained 52.5% of the variance in the outcome variable. Table 5-19 shows standardized regression coefficients of independent variables and marginal R-square. Residuals were also assessed for the violation of regression assumptions. The plots and Durbin-Watson statistics suggested good adequacy of the model.

The procedures for examining the multicollinearity demonstrated in the last section were repeated. Both results from VIFs and removal of one of the highly correlated variables suggested multicollinearity was not a major concern. In other words, the model predicting process and results to be reliable.

The results of regression analysis showed job enrichment (beta-coefficient = .223), standardization (beta-coefficient = .348), centralization (beta-coefficient = .082) and self-efficacy (beta-coefficient = .175) have direct positive effects on the outcome variables at .05 significance level. As was found for the use of data and information, project involvement, training received and involvement had no significant direct effects on employees' adoption of process improvement and quality results. While job enrichment was found to have the strongest direct effect on employees' use of data (beta-coefficient = .285), standardization had the strongest direct effect on process control and quality results. Figure 5-3 shows the direct path coefficients of the variables.

The indirect effects of work environment on the process and results were also assessed. Since involvement had no significant direct effect on process and results, there was no indirect

effect on this outcome variable through this path. Overall, standardization was found to have the strongest effect on the process and results.

Dependent Variable: Process and Results

Independent Variables	Beta-coefficient	p-value
Control Variables	Δ R-square = .173***	.000
Fire	**-.212**	**.003**
Police	**-.179**	**.014**
Library	.030	.550
Health	.021	.711
Transportation	-.122	.183
P & D	-.084	.192
Administration	-.055	.418
Clerk	-.025	.643
Field Worker	-.070	.254
Manager	**.106**	**.018**
Supervisor	-.030	.541
Professional	-.094	.100
Female	.039	.291
Tenure with city	**-.108**	**.009**
Tenure on current job	.035	.362
Study Constructs	Δ R-square = .351***	.000
Project involvement	-.032	.539
Training received	.003	.954
Job enrichment	**.223**	**.000**
Standardization	**.348**	**.000**
Centralization	**.082**	**.043**
Self-efficacy	**.175**	**.000**
Involvement	.079	.072
Model R-square=.525***; Durbin-Watson Stat. = 2.12		

Table 5-21: Regression analysis on Process & quality results
*p < .1, **p < .05, ***p < .01

Figure 5-3: Path Diagram for Work Environment and Process and Results

(Note: Bold indicates significant effects)

Dependent Variable: Process & Results

Independent Variables	Direct Effects	Indirect Effects	Total Effects
Project involvement	ns	.043	.043
Training received	ns	.095	.095
Job enrichment	.223		.223
Standardization	.348		.348
Centralization	.082		.082
Self-efficacy	.175		.175
Involvement	ns		ns

Table 5-22: Direct and indirect effects on Process & quality results

5.3.2.5 Outcome variable: Customer Focus and Satisfaction

Next, customer focus and satisfaction was examined. This outcome variable was regressed over five work environment factors, and two mediating factors. The results of the regression analysis showed the model explained 48.0% of variance of customer focus and satisfaction. Standardized regression coefficients shown in Table 5-21 represented the direct effects of independent variables on customer focus and satisfaction. Residuals assessment showed no violation of regression assumptions which suggested the adequacy of the model.

Multicollinearity was also found not to be a major concern in the regression model predicting customer focus and satisfaction, suggesting the regression coefficients were stable and reliable.

According to the results, job enrichment (beta-coefficient = .226), standardization (beta-coefficient = .315), centralization (beta-coefficient = .135), and self-efficacy (beta-coefficient = .146) were found to have direct positive effects on the outcome variables, moreover, involvement (beta-coefficient = .098), which was found to have no significant effect on both use of data & information, and process and results became a significant factor on customer focus and satisfaction. Figure 5-4 shows the hypothetical path diagram and the path coefficients.

The indirect path coefficients were also computed. The results are shown in Table 5-22. Because of the significant effect of involvement, job enrichment, standardization, and centralization, there were the indirect effects on customer focus and satisfaction. Overall, standardization was found to have the strongest effect on employees' practices of customer focus and satisfaction.

Dependent Variable: Customer Focus and Satisfaction

Independent Variables	Beta-coefficient	p-value
Control Variables	Δ R-square = .141***	.000
Fire	**-.255**	**.001**
Police	-.108	.153
Library	.067	.196
Health	.007	.911
Transportation	-.131	.169
P & D	-.065	.339
Administration	-.066	.354
Clerk	-.024	.673
Field Worker	-.076	.238
Manager	.080	.084
Supervisor	-.020	.692
Professional	**-.125**	**.037**
Female	.008	.843
Tenure with city	-.054	.210
Tenure on current job	.059	.145
Study Constructs	Δ R-square = .339***	.000
Project involvement	-.085	.116
Training received	.100	.065
Job enrichment	**.226**	**.000**
Standardization	**.315**	**.000**
Centralization	**.135**	**.002**
Self-efficacy	**.146**	**.005**
Involvement	**.098**	**.032**
Model R-square=.480***: Durbin-Watson Stat. = 2.04		

Table 5-23: Regression analysis on Customer focus & satisfaction
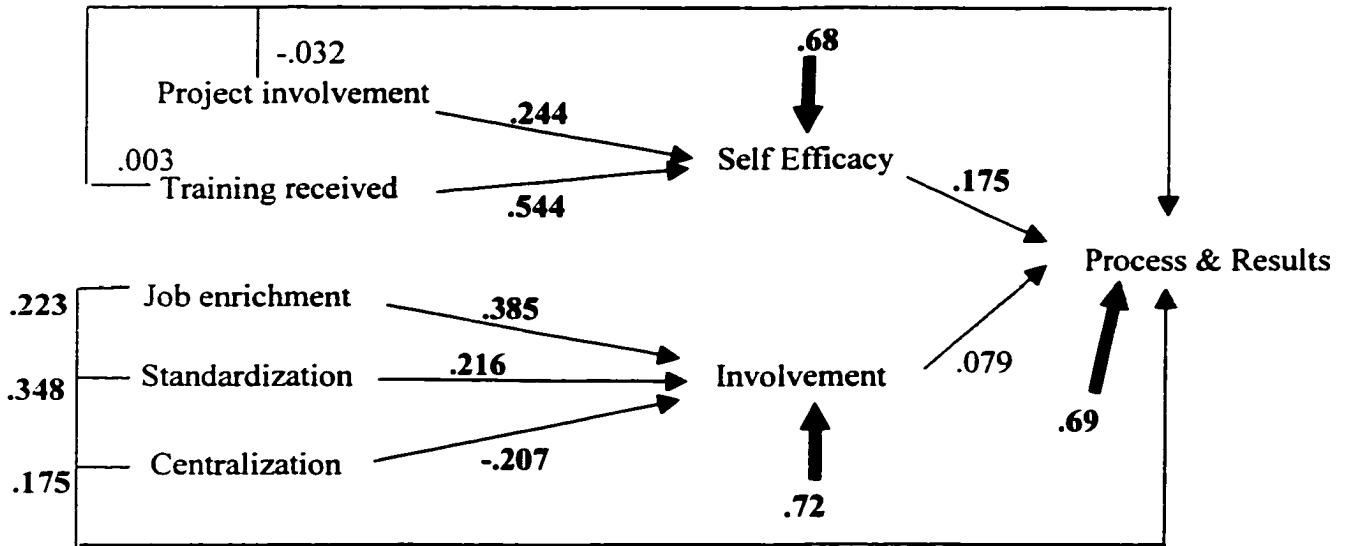*p < .1, **p < .05, ***p < .01

Figure 5-4: Path Diagram for Work Environment and Customer Focus and Satisfaction

(Note: Bold indicates significant effects)

Dependent Variable: Customer Focus and Satisfaction

Independent Variables	Direct Effects	Indirect Effects	Total Effects
Project involvement	ns	.036	.036
Training received	ns	.079	.079
Job enrichment	.226	.038	.264
Standardization	.315	.021	.336
Centralization	.135	-.021	.114
Self-efficacy	.146		.146
Involvement	.098		.098

Table 5-24: Direct and indirect effects on Customer focus & satisfaction

5.3.2.6 Outcome variable: Overall TQM Practices

Overall TQM practices was computed as the average of the three TQM practices identified in this study. It was also used as an outcome variable in path analysis. Overall TQM practices was regressed over five work environment factors and two mediating factors. The results of the regression analysis showed 54.2% of variances of the outcome variable was explained by this model. Table 5-23 shows the standardized regression coefficients and marginal R-square from the regression equation. Residuals were assessed and no violation of regression assumptions were found.

Multicollinearity was not a major concern in the regression model predicting overall TQM practices, suggesting the regression coefficients from the model were stable and reliable.

The results of the regression analysis showed a similar pattern of work environment as in the previous three analyses. Job enrichment (beta-coefficient = .273), standardization (beta-coefficient = .311), centralization (beta-coefficient = .121), and self-efficacy (beta-coefficient = .173) were found to have significant positive effects on overall TQM practices. Unlike the results found in customer focus and satisfaction, involvement showed no significant effect on this outcome variable. Figure 5-5 shows the path diagram and path coefficients.

The indirect effects were also computed. The results are presented in Table 5-24. According to the path coefficients, standardization (total effect = .311) was also found to have the strongest effect on overall TQM practices. This is further addressed in the next chapter.

Dependent Variable: Overall TQM Practices

Independent Variables	Beta-coefficient	p-value
Control Variables	Δ R-square = .170***	.000
Fire	**-.214**	**.002**
Police	-.106	.138
Library	**.110**	**.026**
Health	.059	.280
Transportation	-.107	.234
P & D	-.054	.390
Administration	-.059	.373
Clerk	-.013	.806
Field Worker	-.070	.245
Manager	.065	.135
Supervisor	-.056	.237
Professional	**-.144**	**.010**
Female	.023	.527
Tenure with city	-.079	.052
Tenure on current job	.060	.110
Study Constructs	Δ R-square = .372***	.000
Project involvement	-.015	.772
Training received	.055	.278
Job enrichment	**.273**	**.000**
Standardization	**.311**	**.000**
Centralization	**.121**	**.003**
Self-efficacy	**.173**	**.000**
Involvement	.067	.117
Model R-square=.542***; Durbin-Watson Stat. = 2.03		

Table 5-25: Regression analysis on Overall TQM practices
*p < .1, **p < .05, ***p < .01

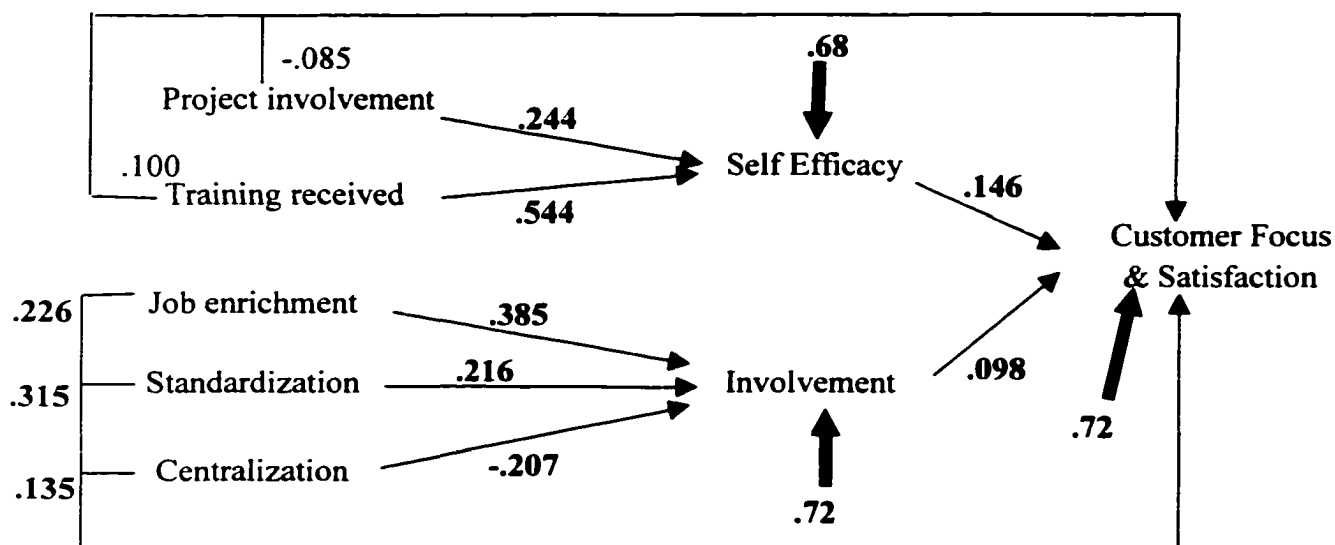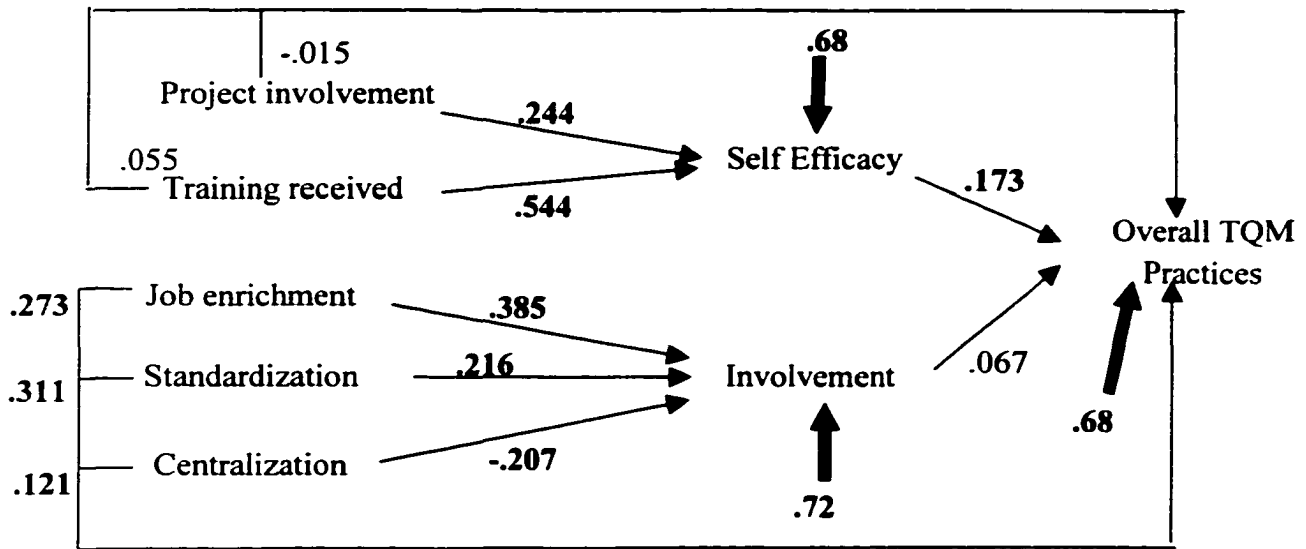**Figure 5-5: Path Diagram for Work Environment and Overall TQM Practices**

(Note: Bold indicates significant effects)

Dependent Variable: Overall TQM Practices

Independent Variables	Direct Effects	Indirect Effects	Total Effects
Project involvement	ns	.042	.042
Training received	ns	.094	.094
Job enrichment	.273		.273
Standardization	.311		.311
Centralization	.121		.121
Self-efficacy	.173		.173
Involvement	ns		ns

Table 5-26: Direct and indirect effects on Overall TQM practices

5.3.2.7 Alternative path models (Supplemental)

The above analyses and discussions of the path models were based on my theoretical

hypotheses. However, the data collected for this project may not answer the causal relationships

as hypothesized in my dissertation. For example, I assumed the self-efficacy was independent of

work environment characteristics, i.e. job enrichment, standardization, and centralization, since

self-efficacy in this study was specifically related with capabilities of TQM skills/techniques.

However, it is arguable that there is no relationship between self-efficacy and work environment

characteristics. It is possible that those who have high self-efficacy in TQM skills/techniques

may have demands. As a result, they may perceive their job and organization differently. It may

have positive effects on job enrichment, for example, those who are more confident in their skills

related to TQM practices may perceive their job as more meaningful, their work environment as

a supportive one. However, self-efficacy may have negative effect on job enrichment, if those

who are more confident in their skills have higher demands in their work environment.

Moreover, work environment may have a direct effect on employees' self-efficacy in TQM

skills/techniques. For example, those who work in a supportive environment may feel more

confident in their capabilities in general. Since the causal relationships between self-efficacy and

work environment characteristics are not clear, it may not be sufficient to claim that there is no

relationship between the two as I propose in this study. It is also arguable that these two

elements can be put in the same model while their relationship is not clear. It is not my attempt

to solve this problem in this study. Instead, I decided to run different path models to avoid the

controversy on the relationship between self-efficacy and work environment characteristics. In

the following paragraphs, the separate path models are presented. The once integrated models

are separated into two parts: one focuses on the path from individual characteristics through self-efficacy to employees' TQM practices, and indirect effects via self-efficacy; another focuses on the path from work environment characteristics (job enrichment, standardization, and centralization) through involvement to employees' TQM practices.

The direct and indirect effects of project involvement and training received, and direct and indirect effects of job enrichment, standardization, and centralization were computed from different regression equations. The disadvantage of doing so is that by calculating from different regression models, we cannot compare the effect of project involvement, training received, and self-efficacy from the others. Although my study interest is to consider all the characteristics from individuals' TQM related experience to job and organizational characteristics, and looked at their competing effects, here I present the alternative path models to examine whether the results would be very different. Figure 5-7 to 5-13 show the path diagrams and path coefficients of the alternative models. More advanced statistical tools, such as structural equations, are needed to investigate the complex relationships for the thoroughness of researching the organization phenomena.

According to the results, I found the significant effects in the alternative models are very similar to the study models. The only exception was found in the outcome variable – process and quality results. In the alternative model, involvement became a significant predictor for process and quality results, unlike the non-significant effect it had in the proposed model discussed earlier. Overall, job enrichment and standardization were still the two strongest predictors for employees' TQM practices. Self-efficacy was the strongest predictor in the path of

individual characteristics. These alternative models suggested the consistency of the significant

effects of work environment characteristics.

(1) Use of Data and Information:
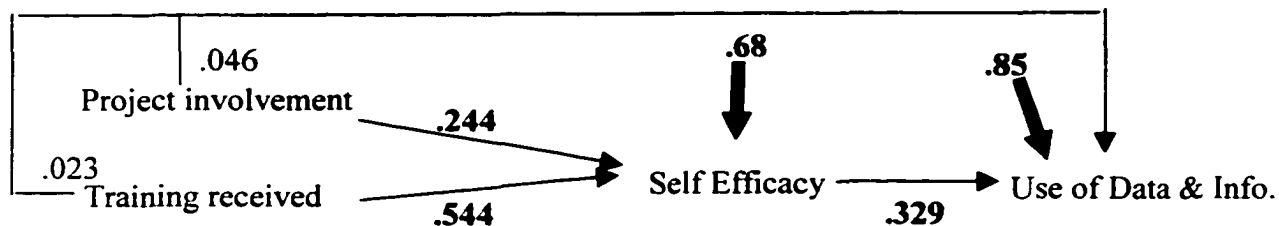
Figure 5-6: Path Diagram for Work Environment and Use of Data and Information-I
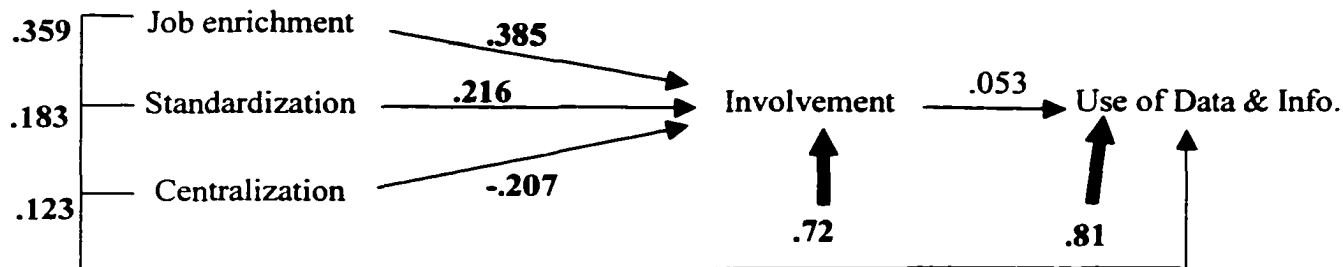
Figure 5-7: Path Diagram for Work Environment and Use of Data and Information-II

Dependent Variable: Use of data and information – through self-efficacy

Independent Variables	Direct Effects	Indirect Effects	Total Effects
Project involvement	ns	.080	.080
Training received	ns	.179	.179
Self-efficacy	.329		.329

Dependent Variable: Use of data and information – through involvement

Independent Variables	Direct Effects	Indirect Effects	Total Effects
Job enrichment	.359		.359
Standardization	.183		.183
Centralization	.123		.123
Involvement	ns		

(2) Process & Quality Results:
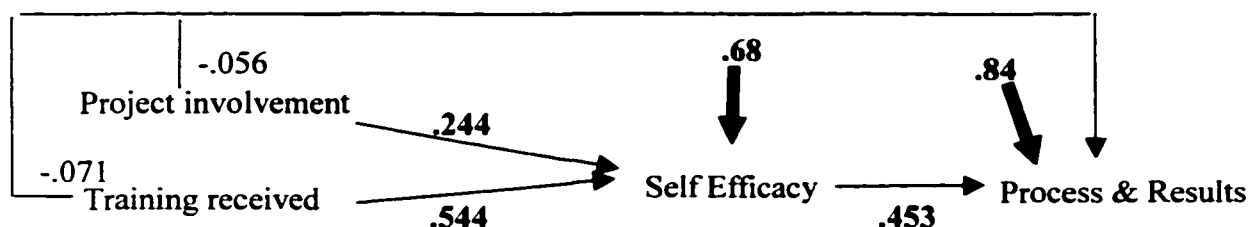
Figure 5-8: Path Diagram for Work Environment and Process & Results-I
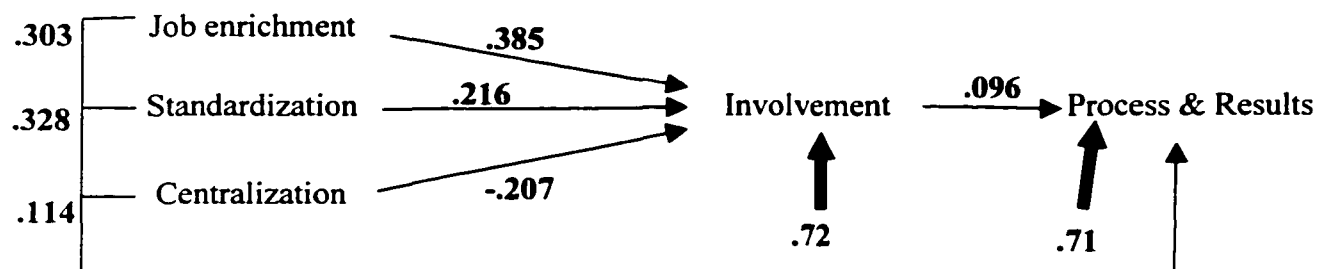
Figure 5-9: Path Diagram for Work Environment and Process & Results-II

Dependent Variable: Process and Results – through self-efficacy

Independent Variables	Direct Effects	Indirect Effects	Total Effects
Project involvement	ns	.110	.110
Training received	ns	.246	.246
Self-efficacy	.453		.453

Dependent Variable: Process and Results – through involvement

Independent Variables	Direct Effects	Indirect Effects	Total Effects
Job enrichment	.303	.037	.340
Standardization	.328	.020	.338
Centralization	.114	-.019	.095
Involvement	.096		.096

(3) Customer Focus & Satisfaction
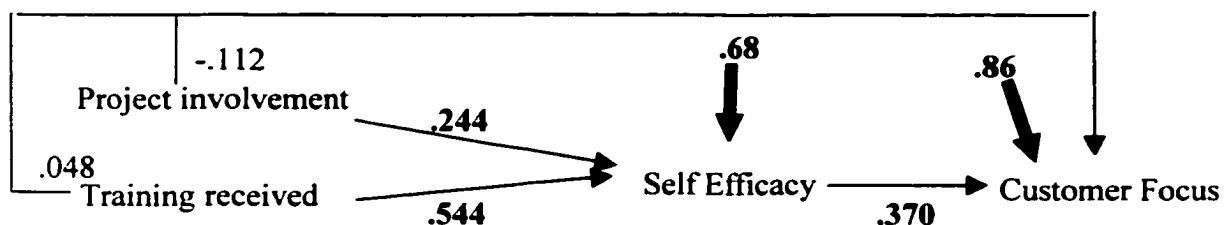
Figure 5-10: Path Diagram for Work Environment and Customer Focus-I
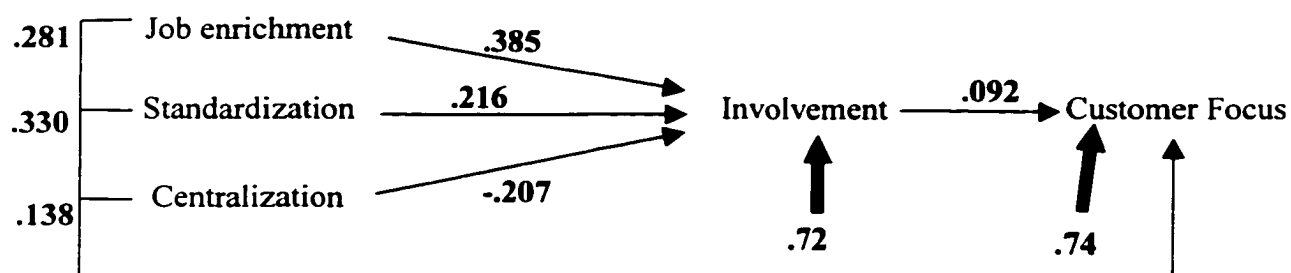
Figure 5-11: Path Diagram for Work Environment and Customer Focus-II

Dependent Variable: Customer focus – through self-efficacy

Independent Variables	Direct Effects	Indirect Effects	Total Effects
Project involvement	ns	.090	.090
Training received	ns	.201	.201
Self-efficacy	.370		.370

Dependent Variable: Customer focus – through involvement

Independent Variables	Direct Effects	Indirect Effects	Total Effects
Job enrichment	.281	.035	.316
Standardization	.330	.020	.350
Centralization	.138	-.019	.119
Involvement	.092		.092

(4) Overall TQM Practices:
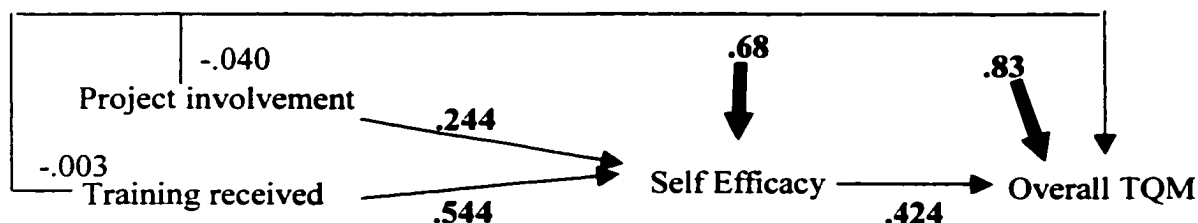
Figure 5-12: Path Diagram for Work Environment and Overall TQM Practices-I
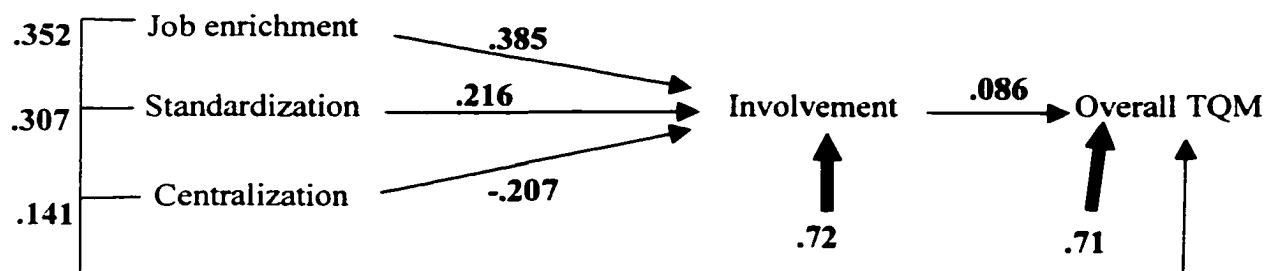
Figure 5-13: Path Diagram for Work Environment and Overall TQM Practices-II

Dependent Variable: Overall TQM – through self-efficacy

Independent Variables	Direct Effects	Indirect Effects	Total Effects
Project involvement	ns	.103	.103
Training received	ns	.231	.231
Self-efficacy	.424		.424

Dependent Variable: Overall TQM – through involvement

Independent Variables	Direct Effects	Indirect Effects	Total Effects
Job enrichment	.352	.033	.385
Standardization	.307	.019	.326
Centralization	.141	-.018	.123
Involvement	.086		.086

CHAPTER 6: DISCUSSION

6.1 SUMMARY OF RESULTS

6.1.1 PROFILE OF THE RESEARCH SITE

This dissertation has proposed a model that demonstrates how work environment characteristics influence employees' TQM practices. Critical elements under three contexts were first identified: the individual, job, and organizational characteristics. Variables chosen to measure these elements provided a profile of the work environment in the city of Madison. Surveys were sent out to the full-time employees. Among 2231 employees, 848 answered the survey, which yielded a 38% response rate. According to the descriptive statistics, the survey revealed that in this organization the majority of the participants had at least some TQM related experiences, either from project involvement, from participation in TQM activities, or from the training they received. Most of those who had received training rated the training good or excellent. Although the jobs in different agencies or different categories might present different characteristics, the study found, on average, those who answered the survey perceived their jobs as having the characteristics of skill variety and autonomy to a greater degree than feedback, participation, and opportunity for advancement. Overall, the participants also felt that the organization tended to emphasize the following of strict rules. Perhaps because they had rules to follow, they often felt clear about their role responsibilities, and seldom felt being put in a position to do things that conflicted with other work they had to do or were asked to do. However, the particular tasks assigned to them were not always as clear as their roles. They also

reported that they had a clear understanding of the city's visions, missions and overall goals, and felt they knew how their jobs contributed to these goals. The work environment was also considered a supportive environment in general.

In terms of TQM practices, employees perceived that their agencies had systems or ways to identify customers' needs, or to monitor the process, and also used the results or statistics to improve their jobs.

In summary, this research site was perceived to be centralized, standardized and supportive. TQM programs have been known to, or participated by the majority of the respondents.

6.1.2   CONFIRMATION OF MAJOR CONSTRUCTS

Work environment variables were factor analyzed to determine whether underlying constructs existed. It was found that the variables chosen to measure these characteristics shared major concepts. First of all, project involvement, and training received specifically related to TQM techniques/skills were found in the individual context. Project involvement referred to the extent of TQM projects or activities the participants had been involved into. Training received referred to the quantity as well as quality of TQM skills/techniques the participants had received.

Second, three major factors were found which characterized the work environment from job and organizational aspects: job enrichment, standardization, and centralization. Job enrichment contains the elements that were regarded as able to enrich job content, add meaningfulness to the job, and increase motivation through a supportive work environment.

Standardization reflects the degree of clarity employees perceive in the job content, in their role responsibilities, and in the organization's objectives. Centralization reflects the degree of management control. It also implies a increased management control, and lower autonomy and lower flexibility for the employees' use of skills.

These major factors extracted through factor analysis were similar to the hypothesized constructs. In the proposed model, enriched job characteristics, centralization, standardization, supportive environment and organizational commitment in quality improvement were suggested to influence employees' TQM practices. The results indicated that variables measuring supportive environment shared the same construct with some of the enriched job characteristics. This is not surprising since a supportive environment is likely to increase positive psychological outcomes for the employees, as do enriched job characteristics.

The major factors extracted from the empirical data were related to the four dimensions to be considered in creating a sustainable TQM culture as suggested by Schneider et al. (1996). According to Schneider et al. (1996), these four dimensions were the nature of work, the nature of the hierarchy, the nature of interpersonal relationships, and management support and rewards. The four dimensions were incorporated in the conceptual model as the framework of this study. The major factors identified in this study concerning job and organizational aspects reflect the first three dimensions. The fourth dimension – management support and rewards was in the conceptual model, but not examined because of lack of appropriate measures.

The third factor analysis was performed for mediating factors. In the TQM framework I proposed in Chapter 3 (see Figure 3-1), I emphasized that employee empowerment was the mechanism that increased the willingness of the frontline employees to engage in quality

improvement efforts. Thus, I included the employee empowerment as mediating factors, which I believed might moderate the effects of the work environment characteristics on employees' TQM practices. Specifically, individual characteristics have indirect effect via the effect of self-efficacy; and job and organizational aspects have indirect effects through psychological outcomes. According to the results, two mediating factors were extracted by using Factor Analysis: self-efficacy and involvement. The former reflects employees' perceptions of their capabilities in carrying out TQM related tasks; while the latter reflects the psychological outcomes of employees, here referred to as job and organizational involvement. These two major factors were the same as the hypothesized constructs.

As mentioned in Chapter 5.3.1, the benefits of factor analysis are to remove the potential problem of multicollinearity, build a parsimonious path model, and help clarify the major concepts of the study. The results of the factor analysis did help the study in confirming the major concepts. It was encouraging to find most of the major constructs identified with the empirical data were interpretable and consistent with the hypothesized ones. Moreover, factor analysis helped reduce the number of independent and mediating variables from 23 to seven factors, which made the path models easier to analyze and interpret. Although some of the factors were still found highly correlated, which did not totally rule out the potential problem of multicollinearity, the VIF from regression analysis did not suggest multicollinearity as a problem. Another way to check the multicollinearity is by removing one or another highly correlated factors. It was found removing one or another did not change the results much and the regression coefficient remained almost the same. This also indicated multicollinearity was not a problem in the regression analysis, which suggested the results were reliable.

According to path analysis, the results were found consistent with the hypotheses with a few interesting exceptions. In general, the model proposed in this study is a fairly good one. Most of the proposed paths were found significant and the direction of the effects was the same as suspected with the exception of centralization. Interestingly, the effects of the work environment varied with different TQM practices. In the following sections, the effects of work environment on mediating factors and different TQM practices are discussed and compared.

6.1.3   THE EFFECTS OF WORK ENVIRONMENT

6.1.3.1 Individual Characteristics on Self-Efficacy

Hypothesis 1b stated that the extent of project involvement or activities participated in, and training received had positive correlations with self-efficacy. The results were consistent with the hypotheses, in other words, the more projects employees had been involved into, or the more training they had received, the more capabilities they perceived they had in carrying out TQM tasks. It is interesting to find that training had a stronger effect on self-efficacy than project involvement (Beta=0.544 vs. 0.244), which was contrary to my expectations. Since project involvement encouraged "active" participation, the participants might feel more of a sense of ownership of the program. Thus, I argued that project involvement might have stronger influence than just "passively" receiving training. This might suggest employees' faith in experts. If the skills or techniques are given by others they perceive as specialists or professionals, they might feel more confident in their capabilities than if the quality program is designed or developed on their own. However, we did not have the information regarding the

involvement of experts in the project development or quality improvement related activities. Another reason that might contribute to the lower effect of project involvement is that the effect of negative experiences from project involvement was not controlled for. The design of the survey did include participants' evaluation of the training program. The effect of <u>training received</u> was already moderated by the rating of the training program. Contrarily, it was not so for the effect of <u>project involvement</u>. Those who reported more project involvement might not be willing to engage in TQM practices if the experiences had not been good. The influence of bad experience might weaken the effect of project involvement on TQM practices.

Another interesting result was found in the impact of control variables. Both tenure with the city and tenure on the current position had negative effects on self-efficacy when the extent of project involvement and training remained the same. At first glance, this might be surprising, because we expect to see those who had stayed longer in the organization might have gained more knowledge or experience about the jobs and might feel more confident in their capabilities. One possible explanation for this finding is that those people might be so used to their ways of conducting the jobs, that they might be somewhat resistant to learn new techniques or skills related to TQM. Their self-efficacy in those tasks that involve using TQM techniques or skills was low, but they may have high self-efficacy in other job tasks in general. It would be interesting to study the relationship between employees' tenure and their resistance to organization development programs and TQM programs in general.

6.1.3.2 Job and Organizational Factors on Employees' Involvement

Hypothesis H2b stated that enriched job characteristics and organizational characteristics are associated with psychological outcomes. Three work environment factors identified in this study were found to have significant association with employees' job and organizational involvement. Job enrichment and standardization were found to be positively, and centralization was found to be negatively correlated with employee involvement. The results were consistent with the hypothesis and previous literature. According to Lawler (1986, and 1994), Lawler, et al. (1992), high employee involvement can be achieved through the design of a job where enriched job characteristics are provided. The standardization characteristic of organizational structure, which suggests clarity not only in the tasks, but also in role responsibility, and organization's goals also lead to positive psychological state (Hackman, & Oldham, 1980). Low management control suggests power and control over the jobs are shared with employees, so that employees have more flexibility in decision making, and feel more meaningfulness in their jobs. According to the results of this study, the centralization characteristic of organizational structure also contributed to employees' involvement in addition to standardization and job enrichment.

6.1.3.3 Work Environment Factors on Employees' TQM Practices

The main purpose of this study was to examine how the work environment influences employees' TQM practices. Three employees' practices were identified and examined: use of data and information, process and results, and customer focus & satisfaction. Overall TQM practices, the average of the three variables, was also examined. In terms of the significant effects, use of data and information, process & results and overall TQM practices have the same

predictors from work environment. Job enrichment, standardization, centralization, and self-efficacy were found to have positive effects on these three outcome variables. Project involvement and training received did not directly but indirectly influence employees' use of data and information, process & results and overall TQM practices through the impact of self-efficacy. Customer focus & satisfaction had similar significant predictors, except that employees' involvement, that did not significantly influence the other three outcome variables was found to have a significant positive effect on customer focus & satisfaction. As a result, job enrichment, standardization, and centralization also indirectly influenced employees' customer focus & satisfaction through the impact of involvement. Table 6-1 shows the total effects of work environment on four outcome variables in descending order. Table 6-2 shows the study hypotheses and whether they were supported by the results.

Use of Data & Information	Process & Results	Customer Focus & Satisfaction	Overall TQM practices
Job Enrichment (.285)	Standardization (.348)	Standardization (.336)	Standardization (.311)
Standardization (.197)	Job Enrichment (.223)	Job Enrichment (.264)	Job Enrichment (.273)
Self-Efficacy (.152)	Self-Efficacy (.175)	Self-Efficacy (.146)	Self-Efficacy (.173)
Centralization (.108)	Training Received (.095)	Centralization (.114)	Centralization (.121)
Training Received (.082)	Centralization (.082)	Involvement (.098)	Training Received (.094)
Projects Involved (.037)	Projects Involved (.043)	Training received (.079)	Project Involved (.042)
Involvement (ns)	Involvement (ns)	Project Involved (.036)	Involvement (ns)

Table 6-1: Total effects of work environment factors in descending order

Table 6-2: Study hypotheses and the results

	Hypothesis	Results	Supported?
H1a	Self-efficacy is positively associated with employees' TQM practices.	Significant	Yes
H1b	Project involvement/participation and training are positively associated with self-efficacy.	Sig.	Yes
H2a	Psychological outcome is positively associated with employees' TQM practices	Partly sig.[a]	Partly supported[a]
H2b	Enriched job and organizational characteristics are positively associated with psychological outcomes.	Sig.	Yes
H3a	The more projects employees have been involved in, the more likely they will engage in TQM practices.	Not sig.[b]	No
H3b	Number of project involvement/participation has indirect positive effect on TQM practices through the effect of self-efficacy.	Sig.	Yes
H4a	Training is positively associated with employees' TQM practices.	Not sig.[b]	No
H4b	Training has an indirect positive effect on TQM practices through the effect of self-efficacy.	Sig.	Yes
H5a	Enriched job characteristics are positively associated with employees' TQM practices.	Sig.	Yes
H5b	Enriched job characteristics have indirect effects on TQM practices through the effect of psychological outcomes (involvement)	Partly sig.[a]	Partly supported[a]
H6a	Centralization is negatively associated with TQM practices.	It has sig. Positive effect.	No
H6b	Centralization has indirect negative effect on TQM practices through the effect of psychological outcomes (involvement)	It has sig. Positive effect	No
H7a	Standardization is associated with TQM practices.	Sig.	Yes
H7b	Standardization has an indirect effect on TQM practices through the effect of psychological outcomes (involvement)	Partly Sig.[a]	Yes[a]
H8a	Supportive environment is positively associated with employees' TQM practices.	Not proved in this study	No
H8b	Supportive environment has an indirect effect on TQM practices through the effect of psychological outcomes (involvement)	Not proved in this study	No

H9a	Top management support and human resources policy are positively associated with TQM practices.	Not proved in this study	No
H9b	Top management support and human resources policy have indirect effects on TQM practices through the effect of project involvement, training, and self-efficacy.	Not proved in this study	No

Note:

[a]: The significant effects were only found in the outcome variable: customer focus & satisfaction.

[b]: not Sig., because effects were found non-significant at .05 level of statistical significance.

It is surprising to find that the extent to which TQM project involvement and training did not contribute directly to TQM practices. Instead, the results revealed what matters more to TQM implementation is how the employees perceived their TQM related capabilities. The results do not suggest that the projects or training the organization provided are useless, since the projects and training did contribute largely to employees' perceptions on how capable they are in TQM skills and techniques, and in turn, encourage TQM institutionalization. This finding supports Shea and Howell's (1998) argument that "self-efficacy and outcome expectancies will mediate the effect of situational variables on employees' TQM consistent behavior and related outcomes (p:5)".

One postulation that may explain why the direct positive effects of project involvement and training were not found is that TQM project or activities and training may add up more workload to employees. Some negative reactions toward TQM program might occur and discourage employees to integrate TQM practices into daily work. In addition, we do not know whether the respondents participated in the projects voluntarily or not. If they were forced to participate, and negative impressions on the program were formed, it is unlikely that the number

of projects or training can increase their willingness to practice TQM. This may explain why project involvement as found negative effects, although they were not statistically significant (See Figure5-3 to 5-5). The results might have been different, if the quality of TQM experiences had been measured. That piece of information may also help to interpret the results.

Some caution should be used in interpreting the results found for self-efficacy, namely the measurement issue. Self-efficacy and outcome variables – employees' TQM practices in this study – were measured through employees' perceptions. It is not necessarily true that those who report high self-efficacy would engage in more TQM practices. Instead, it may be just due to their tendency to see things in a positive light, especially in a situation that the measurements of self-efficacy and employees' TQM practices uses similar wording. Participants might have unconsciously perceived the strong tie between the measurements.

Another major finding is that the indirect effects of job enrichment, standardization, and centralization were found only on the practice of customer focus & satisfaction, even though the effects are very small. Employees' involvement was regarded as a psychological outcome of job and organizational characteristics. The possible interpretation is that customer focus & satisfaction involves the social interaction where the feelings, emotions and employees' psychological states may play a part, as opposed to the pure technical, or mechanical skills for processing data & information, or monitoring the results.

The indirect effects of job enrichment, standardization, and centralization for customer focus & satisfaction were found either non-significant or very small on employees' TQM practices. In the previous chapter, the critical work environment that may influence TQM implementation were identified based on two major arguments: being consistent with TQM

principles, and employee empowerment. The larger direct effect than indirect effect suggests

that job enrichment, standardization, and centralization having impacts on TQM practices are

due to their consistency with TQM principles. Relatively speaking, employees' involvement

may not play a big role. In other words, the structure of the organization and job design may be

more influential than the psychological involvement of the employees on TQM implementation.

However, it is worth noting that we still cannot rule out the mechanism of employee

empowerment because employees' involvement only reflects part of employee empowerment. It

is not the exhaustive factor. More employee empowerment characteristics should be investigated

in future studies.

Another interesting finding is that although centralization had a negative effect on

employees' involvement as expected, it had a **positive** effect on all aspects of TQM practices.

This suggests that the higher management control, the higher degree of TQM institutionalization,

which is contrary to my hypothesis and the arguments in the previous literature (Juran, 1992, and

Juran & Gryna, 1993). When we proposed our hypothesis, we stressed employee empowerment

and flexibility for frontline employees, which may help make TQM institutionalization easier

because this is consistent with TQM philosophy. However, we neglected the possibility that

high management control may influence the employees to follow the organization's objectives.

If the organization's objective is to create and sustain a TQM culture, then high management

control becomes a positive factor in overall TQM institutionalization. Note that this explanation

states that management control is a positive factor under the condition that TQM is a desired

objective from management's perspective. This finding leads to my speculation of the

interaction effect of management control and top management's commitment to TQM. This provides a direction for future study.

Standardization and enrichment appeared to have the strongest total effects on employees' TQM practices. For the use of data and information, job enrichment had stronger effect than standardization. For the other two TQM practices and overall TQM practices, standardization had a stronger effect than job enrichment. The findings suggested a TQM program, through job and organization redesign, can be improved in terms of principles being integrated into daily work. The elements of supportive environment, feedback from job or supervisor, and the clarity of task, role responsibility, organization's goals or their job future are found to be associated with higher degree of TQM institutionalization. As pointed out in the beginning of this study, the purpose of this research is to identify the critical work environment factors that can help enhance TQM implementation. Once we identify these elements, we can build them into the TQM programs. According to the results, on the one hand, these elements are considered job enrichment characteristics, which will lead to a better quality of working life suggested in the literature. On the other hand, this study provides evidence that these elements are also beneficial for sustaining quality improvement program, such as TQM.

6.2 LIMITATIONS OF THE STUDY AND FUTURE DIRECTIONS

In this section, the limitations of the study are addressed according to the following

aspects: study design, measurement issue, analysis limitation, and generalizability.

This study is a cross-sectional design, where all the variables were measured at the same

time. The causal relationships cannot be demonstrated in such a design. Even though the path

models where the causal relationships were presented, the directions of the arrows were only

based upon the theoretical assumptions and could not be proved with the current data. The

"direct effects" or "indirect effects" used all over the previous chapter only reflected the strength

of the relationships between the two variables, rather than causal effects. More complex causal

relationships may exist between variables, but are not addressed in this study. For example, as I

stated earlier in Section 5.3.2.7, there may be relationships between self-efficacy, and job

enrichment, standardization, or centralization, or between self-efficacy and involvement. Section

5.3.2.7 shows the alternative models where these relationships were disregarded. The advantage

of doing so is to avoid the problem that potential relationships may influence the results of

proposed models. However, the disadvantage is that we cannot compare the effects of training,

project involvement and self-efficacy, i.e. TQM related experience, with work environment

characteristics. A suggestion for future study is to use structural equation modeling from which

the effects coming from different models can be compared.

There is hardly a perfect measurement that can capture the reality of organizational

phenomena. This may be more true in survey research like this study. There are several

weaknesses of measurements used in testing the models of the study. First of all, it's the biases of the respondents. In this project, questionnaires were given to all full-time employees. The response rate was 38%. The response rate is not impressive, but is satisfactory and adequate enough for proceeding research. However, a sampling bias occurred, since those who returned the survey might perceive the organization differently from those who did not. One postulation is that the respondents might be those who were exposed in more quality improvement practices, so that they understood what the questions of the survey were related to. They might be those who had high job and organizational involvement and hoped to see the continuous improvement or the organization. However, they might be those who had very negative opinions for their work environment, or quality improvement programs and used the survey to express their dissatisfaction for the work force. We do not know what reasons stood behind the respondents. One suggestion for the future study is to investigate the reason of low response rate and relate it to the research model. Response rate may represent some special characteristics of the work environment.

Another bias might occur because of respondents' tendency of the ratings. As James (1996) pointed out in his dissertation: "employees who rate one variable high will rate others high as well, not because of any real correlation between the two, but because of a general positive outlook (p246)". Using multivariate analysis may be able to alleviate this problem to a less degree than using simple bivariate correlations, since it is unlikely that all the measures were influenced to the same degree by an overall positive outlook.

This study is based on employees' perceptions of the work environment, and their TQM practices, as well as, self-report of their job and organizational involvement, or their capabilities

and familiarity of TQM related skills/techniques. It is our attempts to quantify the work environment characteristics and TQM institutionalization by Likert-type scales, however, the results may be different from the *actual* characteristics, and can only represent the *quantity* of TQM practices to some degree. This measurement issue should be taken into account in the interpretation of the results. One suggestion for future study is to collect data from interview, focus group, or organizational reports to validate the representation of survey questions, or to collect data in different ways other than questionnaire, for example, measuring the quantity of TQM practices, or using rating from others than self-report data.

Another measurement issue should also be addressed here is the use of TQM institutionalization at agency level to measure individual practices. As mentioned in Section 4.2.3, the measures for employees' TQM practices were at agency level, than at individual level as the models demonstrated. Note that employees may perceive very differently in their agency than their own practices. Although the first round data suggested that a moderate correlation between practices at individual and agency levels, it is strongly recommended to collect information at individual level and re-test the proposed models with the new data in the future study.

Several measurements should be improved or included in the future study. First of all, as stated in the discussion section, the ratings of employees' project experiences were not evaluated. Information about this may lead to different result, for example, *positive* project involvement experience may increase employees' TQM practices more than training. The effects of two elements proposed in the conceptual framework but excluded from the analysis should be investigated: top management commitment for TQM and human resource policy. I am

especially interested in comparing their effects with other work environment characteristics, and the interaction effect with centralization characteristics of organizational structure. In addition, employee empowerment in this study was measured by two variables: job and organizational involvement. More dimensions should also be examined, such as job satisfaction, motivation, and organizational commitment etc.

The analyses in this study still have room for improvement. First of all, as discussed previously in this study, the interaction effects may occur between top management commitment for TQM and centralization, or standardization and centralization. The examination of interaction effects are highly recommended in the future study. Secondly, structural equation modeling may be a better way to analyze the model than path analysis, since more complex relationships can be tested and effects in different models representing different relationships can also be compared. Finally, the concepts of self-efficacy and outcome expectancy were grouped together as a self-regulatory mechanism. However, they may represent two different constructs. It is suggested that these two should be examined separately in the future study.

The last issue and a critical one that should be addressed is the generalizability of the study. A public section was chosen as a research site for this study. The results found in this study may not apply to private sectors. For example, standardization was found to be one of the strongest predictors for employees' TQM practices, however, it may be due to the nature of a public sector. Public sectors have long been considered more stable, less competitive, with higher job security than private industries. The organizational culture may gradually change the attitudes of employees toward their jobs or organization. Clear rules, standards and clear role responsibility may be more favorable in public sectors than private ones. In this study,

centralization was found to have a positive association with employees' TQM practices. It would

be very interesting to know if such a result applies to a private sector. My recommendation is to

test the models proposed in this study using data from private sectors in the future study.

6.3 CONTRIBUTIONS OF THIS STUDY AND IMPLICATIONS FOR PRACTITIONERS

There are several contributions of this study. First, this study identified the critical work environment factors as antecedence for successful TQM implementation. These factors were later tested with empirical data. Most of the results supported the hypotheses and were consistent with the previous literature. Some interesting and surprising results were also found and discussed in Section 6.1. This study especially provided empirical evidence to verify the theoretical argument proposed by Schneider et al., (1996), and Shea & Howell (1998) on creating a sustainable organizational culture and the role of self-efficacy and outcome expectancy. Second, using the results of factor analysis, several subsets of scales were created and found to have high reliabilities. They can be used separately in the future study to measure the specific constructs. Finally, in this study, I bridged the gap between organizational science, such as job design theory, and organizational structures with TQM implementation.

Lawler, et al. (1992) have stressed that employee involvement programs can be improved by job redesign, i.e. by introducing enriched job characteristics to the employee involvement programs. According to the results of this study, a major contribution and implication for practitioners is that after knowing how work environment characteristics influence employees' TQM practices, we hope to build these characteristics into TQM interventions to help create a TQM culture. By doing so, employees and organization can benefit both from enriched work environment characteristics as well as the outcomes of a successful TQM implementation.

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APPENDIX - CITY EMPLOYEE SURVEY

PART A JOB CHARACTERISTICS

This first section will ask questions about various characteristics of your job within your agency. An agency is defined as a certain level within the City of Madison government, such as Streets, Police or Parks. Sometimes an agency is called a department or a division, for example Streets division and Police department.

1. Last four digits of your social security number _____
2. What is your present job title and/or classification? _____
3. What agency do you work in? _____
4. Which unit/section of your agency do you work in? _____

5. How long have you worked for the City of Madison?
1. LESS THAN 1 YEAR
2. 1 YEAR TO LESS THAN 3 YEARS
3. 3 YEARS TO LESS THAN 5 YEARS
4. 5 YEARS TO LESS THAN 10 YEARS
5. 10 YEARS OR MORE

6. How long have you worked in your current job position?
1. LESS THAN 1 YEAR
2. 1 YEAR TO LESS THAN 3 YEARS
3. 3 YEARS TO LESS THAN 5 YEARS
4. 5 YEARS TO LESS THAN 10 YEARS
5. 10 YEARS OR MORE

7. How many hours do you **normally** work per week? _____ HOURS

Indicate how much of each element you have on your job.

		VERY LITTLE	A MODERATE AMOUNT		VERY MUCH
8.	To what extent do you find out how well you are doing on the job as you are working?	1	2	3	4	5
9.	How much variety is there in your job?	1	2	3	4	5
10.	How similar are the tasks you perform in a typical working day?	1	2	3	4	5
10b.	How much are you left on your own to do your own work?	1	2	3	4	5
11.	To what extent do you receive information from your supervisor on your job performance?	1	2	3	4	5
12.	How repetitious are your duties?	1	2	3	4	5
13.	To what extent are you able to act independently of your supervisor in performing your job function?	1	2	3	4	5
14.	To what extent are you able to do your job independently of others?	1	2	3	4	5

		A MINIMUM AMOUNT	A MODERATE AMOUNT		VERY MUCH
15.	The opportunity to do a number of different things	1	2	3	4	5
16.	The control I have over the pace of my work	1	2	3	4	5
17.	The amount of variety in my job	1	2	3	4	5
18.	The feeling that I know I am performing my job well or poorly	1	2	3	4	5

19.	The freedom to do pretty much what I want on my job	1	2	3	4	5
20.	The feedback from my supervisor on how well I'm doing	1	2	3	4	5
21.	The opportunity for independent thought and action	1	2	3	4	5
22.	The opportunity to find out how well I am doing on my job	1	2	3	4	5

		VERY LITTLE	A LITTLE	SOME	A LOT	A GREAT DEAL
23.	How much do you take part with others in making decisions that affect you?	1	2	3	4	5
24.	How much do you participate with others in helping set the way things are done on your job?	1	2	3	4	5
25.	How much do you decide with others what part of a task you will do?	1	2	3	4	5

Indicate how often these aspects appear in your job.

		RARELY	OCCASIONALLY	SOMETIMES	FAIRLY OFTEN	VERY OFTEN
26.	How often does your job require you to work very fast?	1	2	3	4	5
27.	How often does your job require you to work very hard?	1	2	3	4	5
28.	How often does your job leave you with little time to get things done?	1	2	3	4	5
29.	How often is there a great deal to be done?	1	2	3	4	5

		RARELY	OCCASIONALLY	SOMETIMES	FAIRLY OFTEN	VERY OFTEN
30.	How often are you clear on what your job responsibilities are?	1	2	3	4	5
31.	How often can you predict what others will expect of you on the job?	1	2	3	4	5
32.	How much of the time are your work objectives well-defined?	1	2	3	4	5
33.	How often are you clear about what others expect of you on the job?	1	2	3	4	5

Please indicate how much you agree or disagree with each of the following statements..

		STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
34.	I have a clear understanding of the City's vision, mission, and overall goals.	1	2	3	4	5
35.	I understand how my job contributes to the city's vision, mission, and goals.	1	2	3	4	5

Indicate how often your immediate supervisor behaves in the following ways:

		NEVER	SELDOM	OCCASIONALLY	OFTEN	ALWAYS
36	Lets group members know what is expected of them	1	2	3	4	5

37.	Is friendly and approachable	1	2	3	4	5
38.	Encourages the use of uniform procedures	1	2	3	4	5
39.	Does little things to make it pleasant to be a member of the group	1	2	3	4	5
40.	Tries out his or her ideas in the group	1	2	3	4	5
41.	Puts suggestions made by the group into operation	1	2	3	4	5
42.	Makes his or her attitudes clear to the group	1	2	3	4	5
43.	Treats all group members as his or her equals	1	2	3	4	5
44.	Decides what shall be done and how it will be done	1	2	3	4	5

		NEVER	SELDOM	OCCASIONALLY	OFTEN	ALWAYS
45.	Gives advance notice of changes	1	2	3	4	5
46.	Assigns group members to particular tasks	1	2	3	4	5
47.	Keeps to himself or herself	1	2	3	4	5
48.	Makes sure that his/her part in the group is understood by the group members	1	2	3	4	5
49.	Looks out for the personal welfare of group members	1	2	3	4	5
50.	Schedules the work to be done	1	2	3	4	5
51.	Is willing to make changes	1	2	3	4	5
52.	Maintains definite standards of performance	1	2	3	4	5
53.	Refuses to explain his or her actions	1	2	3	4	5
54.	Asks that group members follow standard rules and regulations	1	2	3	4	5
55.	Acts without consulting the group	1	2	3	4	5

Please indicate how much you agree or disagree with each of the following statements..

	MY SUPERVISOR...	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
56.	Works on improving his or her knowledge and skills.	1	2	3	4	5
57.	Invites feedback from employees.	1	2	3	4	5
58.	Receives constructive feedback without reacting defensively.	1	2	3	4	5

The next set of questions ask about other people at work.

		NOT AT ALL	A LITTLE	SOMEWHAT	VERY MUCH
59.	How much do other people at work go out of their way to do things to make your life easier for you?	1	2	3	4
60.	How easy is it to talk with other people at work?	1	2	3	4
61.	How much can other people at work be relied on when things get tough at work?	1	2	3	4

62. How much are other people at work willing to listen to   1   2   3   4
your personal problems?

Conflicts can occur in any job. For example, someone may ask you to do your work in a way which is different from what you think is best or you may find that it is difficult to satisfy everyone. How often do you face problems in your work like the ones listed below?.

	RARELY	SOMETIMES	FAIRLY OFTEN	VERY OFTEN
63. Persons equal in rank and authority over you ask you to do things which conflict.	1	2	3	4
64. People in a good position to see if you do what they ask, give you things to do which conflict with one another.	1	2	3	4
65. People whose requests should be met, give you things which conflict with other work you have to do.	1	2	3	4

Now indicate how much of each type of opportunity for advancement and recognition you have:

	VERY LITTLE	LITTLE	SOME	GREAT	VERY GREAT
66. The number of opportunities to advance and move ahead	1	2	3	4	5
67. The recognition you receive for your work	1	2	3	4	5
68. The promotions and advancement you receive	1	2	3	4	5

The next set of questions asks about relationships between labor and management. Please indicate how much you agree or disagree with each of the statements.

	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
69. The union and management work well together.	1	2	3	4	5
70. The union and management are opposed to each other.	1	2	3	4	5
71. The way the union and management deal with each other needs to be greatly improved.	1	2	3	4	5
72. The union and management try to reach the same goals.	1	2	3	4	5
73. Both the union and management people try to make this a better place to work.	1	2	3	4	5

PART B ORGANIZATIONAL CULTURE

The following are 40 statements about the agency in which you work and are intended to measure the organizational culture of your work environment. The term "supervisor" is meant to refer to the boss, manager, department or division head, etc.

Please decide which statements are true and which are false of your agency. Please be sure to answer every statement. (Circle T or F for each.)

		TRUE	FALSE
1.	The work is really challenging.	T	F
2.	People go out of their way to help a new employee feel comfortable.	T	F
3.	Supervisors tend to talk down to employees.	T	F
4.	Few employees have any important responsibilities.	T	F
5.	People pay a lot of attention to getting work done.	T	F
6.	There is constant pressure to keep working.	T	F

		TRUE	FALSE
7.	Things are sometimes pretty disorganized.	T	F
8.	There is a strict emphasis on following policies and regulations.	T	F
9.	Doing things in a different way is valued.	T	F
10.	There's not much group spirit.	T	F
11.	The atmosphere is somewhat impersonal.	T	F
12.	Supervisors usually compliment an employee who does something well.	T	F

		TRUE	FALSE
13.	Employees have a great deal of freedom to do as they like.	T	F
14.	There's a lot of time wasted because of inefficiencies.	T	F
15.	There always seems to be an urgency about everything.	T	F
16.	Activities are well-planned.	T	F
17.	People can wear wild looking clothing while on the job if they want.	T	F
18.	New and different ideas are always being tried out.	T	F

		TRUE	FALSE
19.	A lot of people seem to be just putting in time.	T	F
20.	People take a personal interest in each other.	T	F
21.	Supervisors tend to discourage criticisms from employees.	T	F
22.	Employees are encouraged to make their own decisions.	T	F
23.	Things rarely get "put off until tomorrow."	T	F
24.	People cannot afford to relax.	T	F

		TRUE	FALSE
25.	Rules and regulations are somewhat vague and ambiguous.	T	F
26.	People are expected to follow set rules in doing their work.	T	F
27.	This place would be one of the first to try out a new idea.	T	F
28.	People seem to take pride in the organization.	T	F
29.	Employees rarely do things together after work.	T	F
30.	Supervisors usually give full credit to ideas contributed by employees.	T	F

		TRUE	FALSE
31.	People can use their own initiative to do things.	T	F
32.	This is a highly efficient, work-oriented place.	T	F
33.	Nobody works too hard.	T	F
34.	The responsibilities of supervisors are clearly defined.	T	F

35. Supervisors keep a rather close watch on employees.   T   F

36. Variety and change are not particularly important.   T   F

PART C QUALITY IMPROVEMENT (QI) IN YOUR AGENCY

PLEASE READ CAREFULLY

In 1984, the City of Madison began a program to improve the quality of services provided to citizens. This effort has taken on several different forms. This effort has also gone under several different names, such as Deming Core Group, Quality and Productivity, Quality Improvement, Total Quality Improvement, Quality in Daily Work, and so forth. In this survey, we will use the term **QUALITY IMPROVEMENT (QI)** to refer to **ALL** of the above.

How familiar are you with the following quality improvement (QI) techniques ?

		NOT AT ALL	A LITTLE	SOME	A LOT	A GREAT DEAL
1.	group dynamic skills (e.g., brainstorming, nominal group process)	1	2	3	4	5
2.	basic problem-solving process (e.g., PDCA, 7-step problem solving)	1	2	3	4	5
3.	basic statistical tools (e.g., Pareto diagram, flow chart)	1	2	3	4	5
4.	management planning tools (e.g., affinity diagram, tree diagram)	1	2	3	4	5
5.	customer research (e.g., identifying customer groups, survey)	1	2	3	4	5
6.	systems thinking	1	2	3	4	5

Have you ever been or are you currently:

		YES	NO
7.	a member of a QI team within your agency	1	2
8.	a member of a QI team across agencies	1	2
9.	a facilitator or team leader of a QI team	1	2
10.	a member of a quality steering or advisory committee within your agency	1	2
11.	a teacher/trainer of QI for other employees at the City	1	2
12.	a participant in developing your agency's statement of mission and philosophy	1	2
13.	involved in an improvement project within your agency or across agencies	1	2
14.	applying QI philosophy, principles, and methods to aspects of your professional life	1	2

15. In total, how many different QI projects/efforts would you say you have participated in at the City?

     1. NONE
     2. ONE
     3. TWO
     4. THREE OR FOUR
     5. FIVE OR MORE

16. How long ago were you last involved in a QI project/effort?

     1. NEVER BEEN INVOLVED
     2. CURRENTLY INVOLVED

3. LESS THAN 1 YEAR
4. 1 OR 2 YEARS
5. 3 OR 4 YEARS
6. 5 YEARS OR MORE

17. In total, how many days of training on quality improvement / customer service have you had?

1. NO TRAINING RECEIVED
2. LESS THAN 1 DAY
3. 1 OR 2 DAYS
4. 3 OR 4 DAYS
5. 5 DAYS TO LESS THAN 10 DAYS
6. 10 DAYS OR MORE

Did you receive any of the following types of quality improvement (QI) training?

		YES	NO
18.	QI orientation	1	2
19.	team leader or facilitator	1	2
20.	customer service	1	2
21.	voice of the customer	1	2
22.	quality in daily work	1	2
23.	seven-step problem-solving	1	2
24.	management and planning skills	1	2
25.	supervisory development	1	2
26.	informal training from employees or management	1	2
27.	other (please specify): _____	1	2

28. How long ago did you have your **most recent** QI training?

1. NO TRAINING RECEIVED
2. LESS THAN 6 MONTHS
3. 6 MONTHS TO LESS THAN 1 YEAR
4. 1 OR 2 YEARS
5. 3 OR 4 YEARS
6. 5 YEARS OR MORE

29. Overall, how would you rate the QI training you received?

1. NO TRAINING RECEIVED
2. POOR
3. FAIR
4. GOOD
5. VERY GOOD
6. EXCELLENT

30. Overall, how often do you use the skills learned in QI training?

1. NO TRAINING RECEIVED
2. NEVER USE
3. RARELY
4. SOMETIMES
5. FAIRLY OFTEN
6. VERY OFTEN

I feel that quality improvement (QI) in my agency has given me skills to...

		STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
31.	better identify and solve problems.	1	2	3	4	5
32.	become a more effective decision-maker.	1	2	3	4	5
33.	become more effective in planning my work.	1	2	3	4	5
34.	work more effectively in groups.	1	2	3	4	5
35.	better identify customer needs.	1	2	3	4	5
36.	better use data to improve services.	1	2	3	4	5
37.	become a more effective communicator.	1	2	3	4	5

I feel that quality improvement (QI) in my agency...

		STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
38.	has raised my overall level of job satisfaction.	1	2	3	4	5
39.	has done little to improve how I do my job.	1	2	3	4	5
40.	has increased my loyalty to the City of Madison.	1	2	3	4	5
41.	has helped me in my daily work.	1	2	3	4	5
42.	has improved my access to information necessary to do my job.	1	2	3	4	5

Has quality improvement (QI) decreased or increased your...

		STRONGLY DECREASED	DECREASED	NO CHANGE	INCREASED	STRONGLY INCREASED
43.	ability to respond to customer requests	1	2	3	4	5
44.	workload	1	2	3	4	5
45.	conflict in job duties	1	2	3	4	5
46.	clarity of job duties	1	2	3	4	5
47.	participation in decisions that affect your work	1	2	3	4	5
48.	opportunities for personal growth	1	2	3	4	5
49.	opportunities to advance and move ahead	1	2	3	4	5
50.	recognition you receive for your work	1	2	3	4	5
51.	variety of job duties	1	2	3	4	5
52.	feedback you receive about your performance	1	2	3	4	5
53.	opportunity to develop relationships with co-workers	1	2	3	4	5
54.	opportunity to develop relationship with supervisor	1	2	3	4	5

The following questions ask about quality improvement and unions.

55. What do you think the unions' role should be in QI? (circle one number)

    1. THE UNIONS SHOULD OPPOSE QI
    2. THE UNIONS SHOULD REMAIN NEUTRAL BUT NOT ACTIVELY PARTICIPATE IN QI
    3. THE UNIONS SHOULD SUPPORT AND ACTIVELY PARTICIPATE IN RUNNING QI

In your opinion, participation in quality improvement (QI) has...

		STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
56.	interfered with the proper role of the grievance procedure.	1	2	3	4	5
57.	given workers another channel to get their problems resolved.	1	2	3	4	5
58.	reduced member interest in the unions.	1	2	3	4	5
59.	improved the ability of the unions' representatives to solve problems or complaints workers bring to them.	1	2	3	4	5
60.	undermined the unions' ability to enforce the contract.	1	2	3	4	5
61.	improved the unions' communications with its members.	1	2	3	4	5
62.	weakened the unions.	1	2	3	4	5

PART D. IMPLEMENTATION OF QUALITY IMPROVEMENT

In this part of the questionnaire, we would like to measure the extent to which the quality improvement (QI) efforts have been implemented within your agency.

1. Please circle the number that indicates the extent to which you believe QI has been applied throughout your agency.

NOT AT ALL APPLIED				MODERATELY APPLIED				COMPLETELY APPLIED	
1	2	3	4	5	6	7	8	9	10

3. Please circle the number that best reflects your acceptance of QI.

DISLIKE VERY MUCH AND DON'T WANT TO USE				NEUTRAL				LIKE VERY MUCH AND EAGER TO USE	
1	2	3	4	5	6	7	8	9	10

4. If other employees asked you whether they should participate in QI, what would you tell them to do?

    1. I WOULD ENCOURAGE THEM TO PARTICIPATE
    2. I WOULDN'T SAY ONE WAY OR ANOTHER
    3. I WOULD DISCOURAGE THEM FROM PARTICIPATING

5. If we were to come back five years from now, what kind of QI program do you think we would find here?

1. QI WILL HAVE ENDED BY THEN.
2. QI WILL LOOK ABOUT THE SAME AS IT IS TODAY.
3. QI WILL HAVE GROWN AND EXPANDED.

Please tell us how much you agree or disagree with the following statements:

Management in this agency...	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
6. provides visible leadership in promoting QI efforts.	1	2	3	4	5
7. acts on suggestions to improve services.	1	2	3	4	5
8. builds customer focus and quality values into day-to-day management activities.	1	2	3	4	5
9. works with groups such as unions, to reach common goals, reduce conflict and develop cooperation and trust.	1	2	3	4	5
10. works with customers to strengthen the QI efforts.	1	2	3	4	5
11. promotes quality awareness and sharing with outside groups such as community, associations, other government and private organizations.	1	2	3	4	5
12. gives employees training in how to identify and solve quality problems.	1	2	3	4	5

This agency ...	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
13. collects and uses a wide range of data and information about the quality of its services.	1	2	3	4	5
14. compares data on the quality of its services to data on the quality of services at other organizations.	1	2	3	4	5
15. periodically sets specific goals to improve its services.	1	2	3	4	5
16. has personnel plans and practices that support QI efforts.	1	2	3	4	5
17. has specific mechanisms to reward individual employee contributions to quality objectives.	1	2	3	4	5

This agency ...	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
18. has specific mechanisms to reward group contributions to quality and performance objectives.	1	2	3	4	5
19. rewards employees for improving services.	1	2	3	4	5

| 20. | emphasizes employee health, safety and satisfaction during QI efforts. | 1 | 2 | 3 | 4 | 5 |

This agency ...	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
21. improves the quality of administrative processes.	1	2	3	4	5
22. works closely with its suppliers to improve the quality of their services and products.	1	2	3	4	5
23. continuously looks at the quality and performance of its systems and processes for delivering services.	1	2	3	4	5
24. periodically analyzes the quality of its services.	1	2	3	4	5
25. analyzes trends and changes in overall performance.	1	2	3	4	5
26. periodically analyzes the quality and performance of its internal administrative processes.	1	2	3	4	5
27. analyzes trends and changes in supplier quality.	1	2	3	4	5
28. collects and uses data on customer expectations and/or satisfaction when designing new services.	1	2	3	4	5

This agency ...	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
29. considers customer needs in a systematic way.	1	2	3	4	5
30. has clearly identified its customers.	1	2	3	4	5
31. has processes for identifying needs of its customers.	1	2	3	4	5
32. has developed strategies and plans to build and sustain strong relationships with its customers.	1	2	3	4	5
33. is committed to addressing the needs of its customers.	1	2	3	4	5
34. knows how to measure satisfaction of its customers.	1	2	3	4	5
35. collects and uses data on customer satisfaction to improve its services.	1	2	3	4	5

The following questions ask about the quality of services provided by the City. Please rate each of the following items.

		POOR	FAIR	GOOD	VERY GOOD	EXCELLENT
1.	The overall quality of services the City of Madison provides to Madison citizens.	1	2	3	4	5
2.	The overall quality of services your agency provides to external customers.	1	2	3	4	5
3.	The quality of services your agency provides to other City agencies.	1	2	3	4	5

A successful quality improvement (QI) program not only means that the quality of services provided by the City is increased, but also requires that a better work environment be provided for its employees. This part of the questionnaire asks about your perception of the quality of the working life in your agency. The following questions ask about your level of satisfaction with your job.

4. All in all, how satisfied would you say you are with your job?

      1. VERY SATISFIED
      2. SOMEWHAT SATISFIED
      3. NOT TOO SATISFIED
      4. NOT AT ALL SATISFIED

5. If you were free to go into any type of job you wanted, what would your choice be?

      1. I WOULD WANT THE JOB I HAVE NOW.
      2. I WOULD WANT TO RETIRE AND NOT WORK AT ALL.
      3. I WOULD PREFER SOME OTHER JOB TO THE JOB I HAVE NOW.

6. Knowing what you know now, if you had to decide all over again whether to take the job you now have, what would you decide?

      1. I WOULD DECIDE WITHOUT HESITATION TO TAKE THE SAME JOB.
      2. I WOULD HAVE SOME SECOND THOUGHTS.
      3. I WOULD DECIDE DEFINITELY NOT TO TAKE THE SAME JOB.

7. In general, how well would you say that your job measures up to the sort of job you wanted when you took it?

      1. VERY MUCH LIKE THE JOB I WANTED.
      2. SOMEWHAT LIKE THE JOB I WANTED.
      3. NOT VERY MUCH LIKE THE JOB I WANTED.

8. If a good friend of yours told you he or she was interested in working in a job like yours for your employer, what would you tell him or her?

      1. I WOULD STRONGLY RECOMMEND IT.
      2. I WOULD HAVE DOUBTS ABOUT RECOMMENDING IT.
      3. I WOULD ADVISE THE FRIEND AGAINST IT.

How strongly do you agree or disagree with the following statements?

		STRONGLY DISAGREE	DISAGREE QUITE A LOT	DISAGREE JUST A LITTLE	I'M NOT SURE	AGREE JUST A LITTLE	AGREE QUITE A LOT	STRONGLY AGREE
9.	I am quite proud to be able to tell people who it is I work for.	1	2	3	4	5	6	7
10.	I am not willing to put myself out just to help the agency.	1	2	3	4	5	6	7
11.	I feel myself to be part of the agency.	1	2	3	4	5	6	7
12.	In my work I like to feel I am making some effort, not just for myself but for the organization as well.	1	2	3	4	5	6	7
13.	I would not recommend a close friend to join our staff.	1	2	3	4	5	6	7
14.	To know that my own work had made a contribution to the good of the agency would please me.	1	2	3	4	5	6	7

The following questions deal with various working conditions. Please indicate how often you are exposed to the following conditions.

		NEVER	OCCASIONALLY	OFTEN	ALWAYS
15.	How often are you concerned or bothered about losing your job or being laid off?	1	2	3	4

What are the possibilities that in the next few years...

		NONE	A LITTLE	SOME	A LOT
16.	your job will be eliminated	1	2	3	4
17.	your job will be given to someone else	1	2	3	4
18.	your job will be replaced by computers or other machines	1	2	3	4

PART I. DEMOGRAPHIC INFORMATION

Finally, in order for us to group your responses along different categories, we would like to ask some general demographic information from you. Remember, this information is confidential and you will not be identified in any way with it.

1. Which gender are you? (Circle one number.)

   1. FEMALE
   2. MALE

2. What is your ethnic background? (Circle one number.)

   1. AMERICAN INDIAN OR ALASKAN NATIVE
   2. ASIAN OR PACIFIC ISLANDER
   3. BLACK, NOT OF HISPANIC ORIGIN
   4. HISPANIC
   5. WHITE, NOT OF HISPANIC ORIGIN

3. How much schooling have you had? (Circle one number.)

   1. NONE
   2. GRADES 1-6
   3. GRADES 7-11
   4. GRADE 12 (COMPLETED HIGH SCHOOL OR G.E.D.)
   5. COMPLETED HIGH SCHOOL PLUS OTHER NON-COLLEGE TRAINING (TECHNICAL OR TRADE SCHOOL)
   6. SOME COLLEGE
   7. COMPLETED COLLEGE WITH BACHELOR'S DEGREE
   8. COMPLETED COLLEGE WITH ADVANCED OR PROFESSIONAL DEGREE (MASTER'S, PH.D., D.V.M.)

4. How old are you? _____ YEARS

5. What is your marital status?

   1. MARRIED
   2. SINGLE
   3. SEPARATED
   4. DIVORCED
   5. WIDOWED

6. What are you presently?

   1. A UNION MEMBER
   2. NOT A MEMBER
   3. A "FAIR SHARE PAYER"

If you are a union member, please answer the following questions:

		YES	NO
7.	Have you attended at least one union meeting in the last twelve months?	1	2
8.	Did you vote in the last union election?	1	2
9.	Have you ever held an elected union office (President, VP, financial secretary, treasurer, trustee, executive board, etc.)?	1	2
10.	Have you ever held an appointed union office (e.g. steward, committee person)?	1	2
11.	Have you ever filed a grievance?	1	2

THIS IS THE END OF THE QUESTIONNAIRE. THANK YOU FOR YOUR COOPERATION !